Abstract Guide

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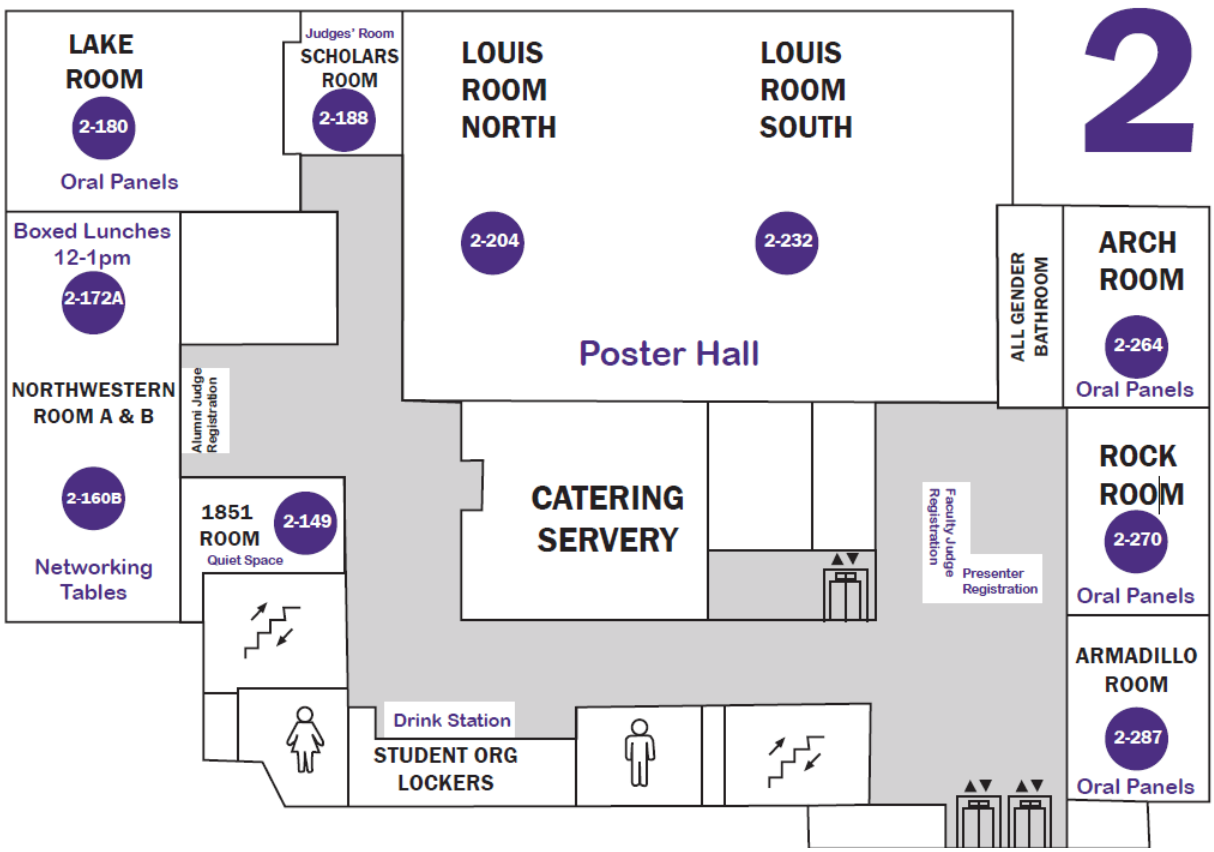
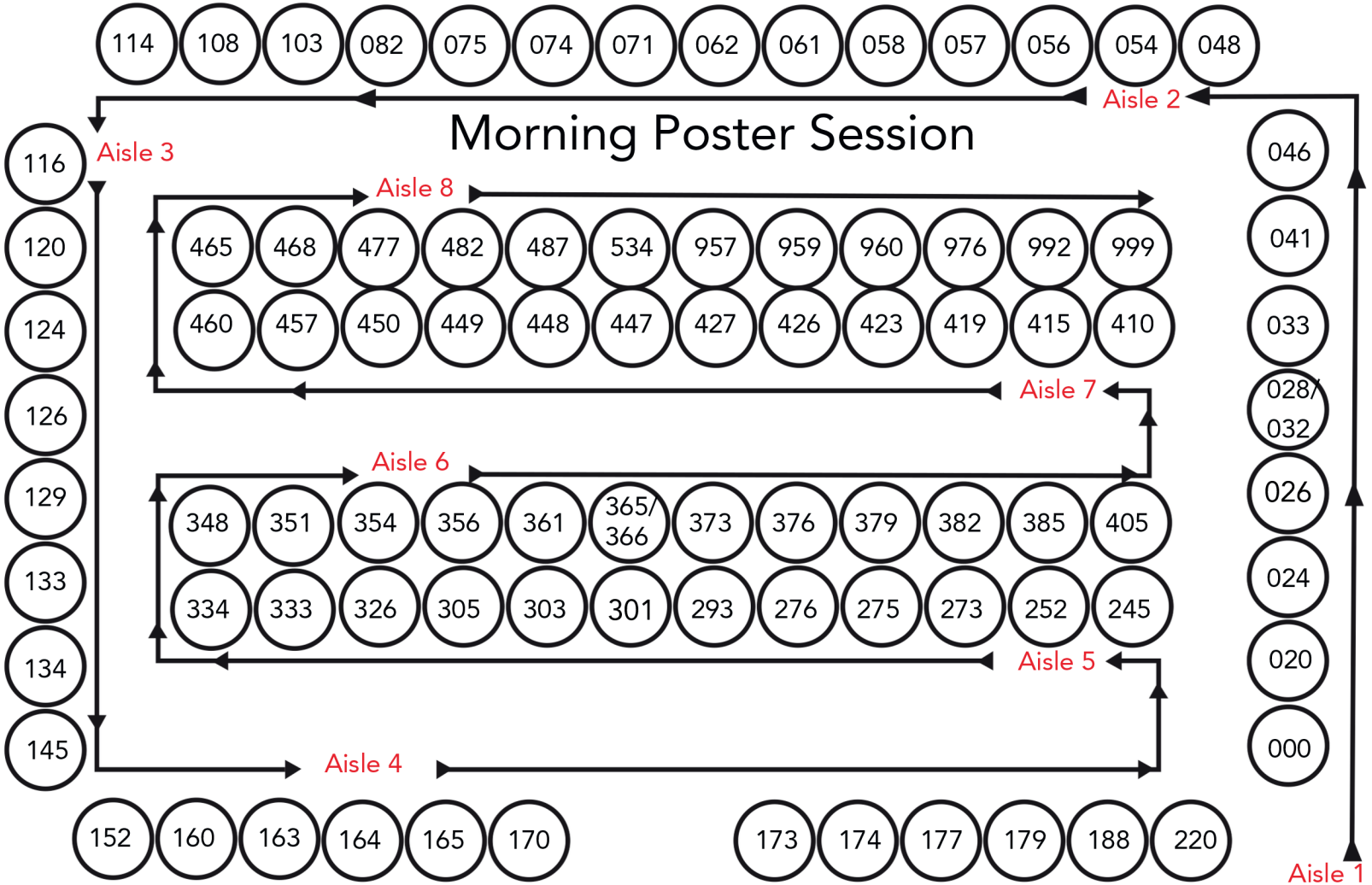
Norris Second Floor Map

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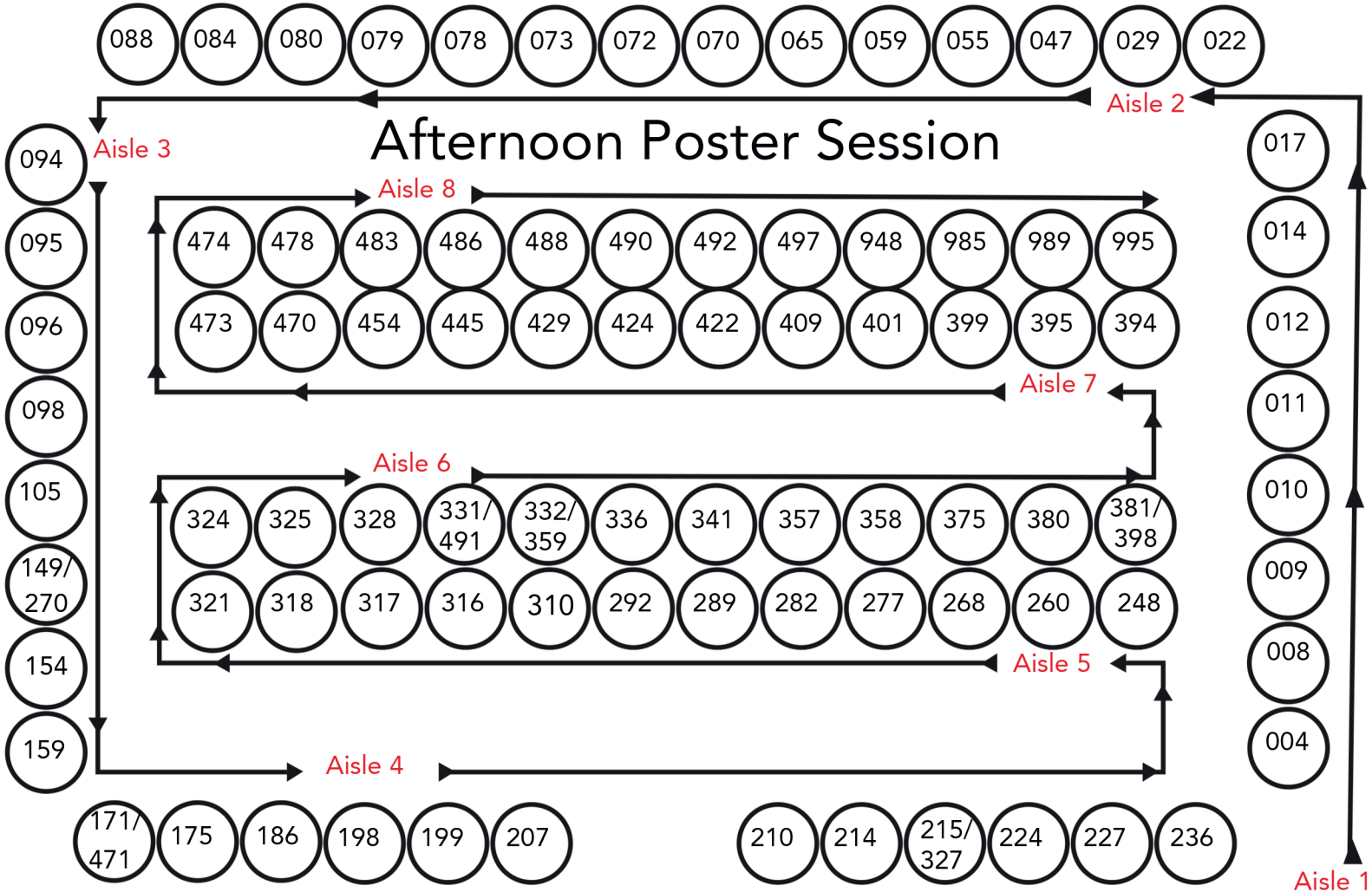
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Abdelhalim, Youssef Faculty Advisor: Jeremy Keys

Optimizing Thrust Performance in Hybrid Rocket Engines through Fuel Grain Geometry and Boundary Condition Modifications

This project focuses on optimizing hybrid rocket engines by investigating the effects of fuel grain geometry and boundary conditions on thrust efficiency.

Hybrid rocket engines, which use solid fuel and liquid oxidizer, offer advantages in safety and ease of handling compared to purely solid/liquid systems. Despite these benefits, hybrid engines are often limited by lower thrust performance, primarily due to inefficient combustion and flow dynamics, which tends to be between 25-33% lower than that of solid systems. It was shown that helical geometries in the solid grain fuel ports increase fuel regression rate over a classic cylindrical geometry. Additionally, the fuel regression of cylindrical ports in solid engines can be increased through the addition of a "finned" section near the head end of the fuel grains. No publications have explored adding such fins to a helical port.

To improve this combustion inefficiency, we designed a modular rocket testing rig to evaluate the performance of fuel grains of varying geometries. We sought to evaluate the following parameters: fuel port geometry, post-combustion chamber size, and nozzle convergence rate. In these experiments, we aim to optimize the inlet and outlet boundary conditions of the fuel grain in order to maximize engine thrust by reducing instability and improving combustion efficiency. To complement our physical rocket testing, we also apply computational modeling of fluid flow within the fuel grain in order to optimize the fuel regression rate.

Preliminary testing has indicated that helical fuel grains out-perform cylindrical fuel grains, consistent with prior published works. Adding "fins" along the helical cross-section is also shown to increase the rocket performance beyond that of a helical fuel grain with a circular cross-section. To further improve engine performance, we hypothesize that creating a smoother boundary transition on the inlet and outlet of the grain will enhance engine performance.

Presentation Format: Oral
Time: 12:45pm-2:15pm
Room: Lake Room
Number: 100/558/559

Adam, Tarifa Faculty Advisor: CJ Heckman

Understanding Female Neurophysiology: How Force Steadiness Changes with the Menstrual Cycle and Oral Contraception

Studying muscle movements and motor unit (MU) activity during voluntary contractions provides insight into the human neuromuscular system. Persistent inward currents (PICs) modulate MU activity and may influence the force steadiness (FS) of muscle movements. However, females remain underrepresented in neurophysiology research, and few studies account for hormonal fluctuations or oral contraceptive (OC) use. This thesis examines FS in two female groups: one with a natural menstrual cycle (MC) and another using OCs, which blunt hormonal fluctuations. Participants performed a contraction task, called the "sombrero," across the three MC phases (follicular, ovulation, and luteal) or the corresponding OC phases. We hypothesized that elevated estradiol during ovulation would reduce FS in MC females, while OC users would show more stable FS across phases. We also measured MU firing rates across the MC in a subset of participants to explore how hormonal changes influence motor output. Results showed less FS, or increased force variability, as the sombrero contraction continued, a finding consistent with male-dominated studies. However, when examining the female groups independently, FS varied across both groups; MC females exhibited more force output variability, or lower FS, in the early phase, while OC females had less variability, or greater FS, in the early phase. These findings suggest that female sex hormones influence FS in muscle contractions. Including both MC and OC participants provides a more comprehensive view of female motor control, underscoring the need to examine neurophysiology within diverse hormonal contexts and to more fully represent female physiology in motor control research.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 534

Ahn, Kaylyn Faculty Advisor: Jesse Yeh

A Divergent Justice: A Comparative Analysis of Command Responsibility in the War Crimes Trials of Bosnia Herzegovina and Serbia

The principle of command responsibility, a cornerstone of international criminal law, holds commanders liable for failing to prevent or punish war crimes committed by subordinates. However, command responsibility is considered one of the most complex and ambiguous liability theories in international criminal law. After the closure of the International Criminal Tribunal for the former Yugoslavia (ICTY) in 2017, the domestic war crimes chambers of Bosnia-Herzegovina (BiH) and Serbia assumed responsibility for prosecuting war crimes committed by mid- and lower-level perpetrators. This study conducts a comparative case analysis of war crimes trial documents from BiH and Serbia, including judicial decisions, prosecutorial arguments, and defense strategies. Findings show that BiH treats command responsibility as an omission-based liability, while Serbia classifies it as a separate crime. In Serbia, it functions as a 'conceptual adjunct liability,' referenced in court to establish innocence or culpability but not used as a standalone basis for prosecution. The lack of recognition of command responsibility as a liability in Serbia, and its absence as a sole basis for conviction in both countries, does not completely obstruct convictions in the studied cases due to prosecutors' preference for direct participation charges. However, Prosecutions of commanders complicit in war crimes but not directly involved are limited by the absence of established jurisprudence. These constraints hinder the potential for holding higher-ranking officials accountable, where indirect culpability is critical for conviction. This study contributes to the discourse on international law and transitional justice by highlighting the challenges of implementing international legal principles in domestic legal systems and the need for clearer, harmonized standards.

Presentation Format: Oral
Time: 12:45pm-2:15pm
Room: Armadillo Room
Number: 968

Alexio, Tahia Faculty Advisor: Almaz Mesghina

The Effect of Platonic Relationship Breakups on Academic Performance

We know romantic relationship breakups increase psychological distress which can then decrease academic performance, and having a support system can decrease the negative effects of distress. But, we still do not know if platonic relationship breakups have a relationship with academic performance. In this study of 13 Northwestern University undergraduate students, we will determine how platonic relationship breakups influence subsequent academic performance. We hypothesize that if students experience a platonic breakup, they will experience a decline in academic performance because of a breakup-induced increase in psychological distress, defined as an increase in stress and decrease in general wellbeing. Participants were surveyed on their academic performance, perceived stress levels, and general wellbeing (sleep, appetite, motivation, and concentration) before and after the breakup. We found that those who experienced a platonic breakup showed a decrease in academic performance and appetite and an increase in stress, sleep, motivation, and concentration, but these results were not statistically significant. Academic performance and stress had a small to medium effect size which suggests that our sample's academic performance decreased because a platonic breakup caused an increase in distress's stress levels. These findings emphasized the potential of friend breakups to act as significant academic stressors. This should incite educators to consider this effect and display understanding when met with a stressed student or when evaluating a student's transcript. Schools can take this and begin to provide counseling services and workshops that are specifically catered towards this type of breakup. This should also emphasize in students the importance of strong social support systems in helping them reach their academic goals, mitigating stress, and maintaining their general wellbeing.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 074

Aljuboory, Mariam

SnapVac: An Innovation in Video Laryngoscopy

Intubation is an emergency procedure required when a patient's airway is impaired. A laryngoscope is used to view the vocal cords and provide a guide for the insertion of the endotracheal tube used for assisted breathing. A suction catheter is frequently used to clear the airway of secretion during intubation. Repeated insertion of the suction catheter can lead to angioedema and acute epiglottitis. The Laryngoscope SnapVac is a GlideScopeTM suction-based attachment used to reduce visual obstruction by fluids during intubation for ER patients, thereby decreasing the number of attempts for intubation and reducing risk of complications.

The SnapVac was built through an iterative design process defined by CAD modeling followed by rapid prototyping. OnShape was used to create a 3D model, which was then printed out of PLA filament. Tubing similar to that used in the ER was connected to a handheld vacuum before being attached to the SnapVac to complete the full proof-of-concept assembly.

We began by acquiring straight and curved laryngoscope blades from Lurie Hospital, testing initial prototypes at the Feinberg Simulation Lab, and gathering feedback from several ER physicians/anaesthesiologists as we did so. We also received mentorship from a global health faculty from the BME department. While initial testing was run using a model intubation mannequin, extensive further validation is required before SnapVac becomes market-viable as a Class I medical device. This testing would begin with non-emergency operating room intubations and proceed to deployment in the ER as the design's efficacy is verified.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 215/327

Ananthakrishnan, Aparnaa Faculty Advisor: Edward Thorp

Efferocytic Signaling Suppresses Cardiac Allograft Vasculopathy

Heart transplantation is the final and most viable long-term option for patients with late-stage heart failure. While immunosuppression is successful in the mitigation of acute rejection, the benefits of heart transplantation are undermined by the chronic onset of cardiac allograft vasculopathy (CAV). Macrophages are important regulators of the inflammatory environment within the heart and have been implicated in progression of CAV. However, the molecular mechanisms by which cardiac macrophages contribute to CAV remain to be fully elucidated. We provide new evidence that during chronic allograft rejection, cardiac macrophages undergo proteolytic cleavage of *MerTK*, an anti-inflammatory macrophage receptor involved in apoptotic cell recognition. We newly demonstrate that effector CD8+ T cells secrete soluble factors that promote this cleavage of *MerTK* on macrophages, stimulating increased macrophage pro-inflammatory activity. Using a chronic rejection model in mice lacking *MerTK* (*MerTK*$^{-/-}$), we reveal that the loss of *MerTK* accelerates the onset of graft rejection and increases infiltration of effector leukocytes within the graft. In contrast, prevention of proteolytic cleavage of *MerTK* prolonged allograft survival and decreased infiltration of effector leukocytes. Subsequently, we evaluated allograft macrophages from *MerTK* cleavage-resistant (*MerTK*$^{CR/CR}$) mice to reveal increased mitochondrial fatty acid metabolism corresponding to the production of anti-inflammatory cytokines, specifically Interleukin 10. Collectively, our findings implicate the pivotal role of *MerTK* and efferocytosis by macrophages in the prolongation of cardiac allograft viability. Our study provides a framework to further explore and develop therapies preventing *MerTK* cleavage to determine its potential clinical value during organ transplantation.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 041

Andrade, Eduardo Faculty Advisor: Arthur Prindle

Forward Genetic Screen for a Putative GABA exporter in Bacillus subtilis

Biofilms are an association of bacteria that adhere to each other and form an extracellular matrix made of carbohydrates, proteins, lipids, and DNA. Biofilm signaling is largely mediated by small chemical messengers, which can impact community physiology and survival. *Bacillus subtilis* is a bacteria that is highly genetically tractable and serves as an ideal biofilm model. *B. subtilis* biofilms produce a significant amount of gh-aminobutyric acid, an amino acid commonly thought of as a human neurotransmitter. Several genes involved in GABA metabolism have been identified in *B. subtilis*; however, there are no known GABA exporters. Preliminary data from our lab leads us to hypothesize that such an exporter exists. To identify the protein responsible for GABA export in *B. subtilis*, forty genes were identified based on homology to known GABA exporters in other species. Mutants were made with each of the genes knocked out individually. These strains contained a genetic construct consisting of a fluorescent reporter driven by a GABA responsive promoter. Removing the exporter gene will cause cells to accumulate GABA and have higher levels of fluorescence. Strains were recorded growing using time-lapse microscopy. Those that appeared bright were sent for metabolite analysis where GABA levels were quantified. Knockout strains of the genes *aimA* and *gltT* showed higher fluorescence under the microscope and higher GABA levels. GABA challenge experiments also showed that knockouts of these two strains were highly sensitive to the presence of GABA compared to wild-type. Identification of a GABA exporter will allow for better understanding of how the molecule is used in *B. subtilis* and biofilm communities.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 497

Angulo, Nicholas Faculty Advisor: Eyal Kimchi

Camus: Optimizing Mouse Home Cage Behavior Monitoring Using Video

Mice have rich home-cage and circadian behaviors that are critical to studying neuropsychiatric disease models, yet lab mice are typically housed in compact home cages with opaque lids, making video monitoring impractical. We developed Camus, an open-source, camera-based system for continuous home-cage monitoring of mice in standard lab cages. Our goal with Camus was to develop an open-source system to measure 24-hour locomotor activity, circadian patterns, feeding and drinking behavior, and nesting behavior, within standard lab animal housing. Using off-the-shelf USB cameras and custom 3D-printed components, we optimized infrared illumination and ensured clear access to food and water. All design files, Python analysis scripts, and a computer pose estimation model (DeepLabCut) are freely available. We validated Camus using wild-type and 5xFAD transgenic mice across multiple age groups, comparing body weight, nest quality, and activity patterns to standard housing. Mouse weights and nest quality were comparable to controls. Circadian patterns showed expected nocturnal activity peaks, with increased eating and drinking during dark periods. Nest building predominantly occurred during light periods, consistent with known behavioral patterns. The system supports up to 20 cages per desktop computer, at ~$250 per cage. Video capture exceeded 99% frame retention at 640360 resolution and 30 FPS. Camus is a cost-effective, open-source system for home cage activity recording from mice in standard laboratory housing. The system can potentially be modified for other cage sizes or extended to other behaviors benefiting from continuous monitoring. Efficient monitoring of home cage behavior may facilitate research into neuropsychiatric diseases.

Presentation Format: Poster
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Number: 096

Azuma-Hall, Miles Faculty Advisor: Brian Hall

More Than a Sore Throat: a Bilateral Peritonsillar Abscess Case Report

Peritonsillar abscesses (PTAs) are an infection characterized by an abnormal collection of purulent fluid accumulating between the capsule of the palatine tonsil and the pharyngeal muscles. These infections are somewhat infrequent but dangerous, and they may occur as a complication of acute tonsillitis. While unilateral PTAs are relatively common, occurring in approximately 30.1 per 100,000 patients aged 5 to 59 years, bilateral PTAs are rare. The exact frequency is unknown, but reported rates range from less than 1% to approximately 4.9% of all PTA cases. This project shares the case report of a patient presenting to the emergency room with bilateral PTAs. Additionally, the case highlights the use of point-of-care ultrasound as a cost-effective tool in PTA diagnosis. Through a literature review and consultations with physicians, this project draws attention to the unique signs and treatment recommendations for bilateral PTAs, compiling key clinical findings and imaging. CT, ultrasound, and external photos from the case illustrate the bilateral PTAs, as well as positioning for ultrasound of the cervical region. The project also offers several suggestions to assist with abscess drainage and shares a variety of tools to improve visibility of PTAs. Ultimately, this case highlights the importance of imaging and key signs to guide effective treatment of bilateral PTAs.

Presentation Format: Poster
Time: 10:00am-11:30am
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Number: 170

Barna, Natalia Faculty Advisor: Danielle Tullman-Ercek

Optimization of Mfp5 Production Through T3SS-Mediated Protein Secretion

Protein-based biomaterials are widely used in medicine, with recombinant DNA technology enabling their rapid, high-titer production. Still, production is limited by challenges of microbial expression such as the formation of intracellular protein aggregates, which elicit costly and time-consuming purification. *Salmonella enterica's* Type III Secretion System (T3SS) bypasses these issues, directly secreting proteins of interest (POIs) from the cytosol to the supernatant. One POI is Mfp5, a mussel foot protein that allows mussels to attach to solid substrates in aqueous environments. Mfp5 can be repurposed for medical sensors or bacterial infection prevention, making its optimized production essential. Previously, Mfp5 had only been synthetically produced using *Escherichia coli* and *Bacillus subtilis*, which presents secretion challenges such as protease activity. While *S. enterica* lacks this issue, previous attempts have shown that its T3SS does not secrete Mfp5. To overcome this, the Mfp5 construct was genetically engineered for improved T3SS compatibility by incorporating a 2xFLAG epitope tag and SicP, a native chaperone that keeps heterologous proteins partially unfolded for T3SS targeting. Unlike previous constructs, these modifications enabled successful secretion. Further optimization was attempted by overexpressing *hilD* and *hilA*, T3SS transcriptional factors, and knocking out *hilE*, a T3SS inhibitor. Overexpressing *hilD* and *hilA* yielded expression but not secretion. Mfp5 expression and secretion titers, and its secretion efficiency, were quantified and compared for the updated construct in wild-type *S. enterica* and Δ*hilE S. enterica*. While Δ*hilE* increased titer, it did not enhance secretion efficiency. Future efforts will target secretion apparatus components to improve intracellular Mfp5 secretion.

Presentation Format: Poster
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Room: Louis Room
Number: 289

Barnowski, Harper Faculty Advisor: Jeremy Birnholtz

Posting Behind Bars: The Paradox of Prison TikTok

Incarcerated and formerly incarcerated individuals in the U.S. face a unique paradox: while the digitization of criminal records increases stigma and surveillance, social media also presents new avenues to challenge that stigma and renegotiate boundaries with the public. Our research explores how these individuals use platforms like TikTok and Instagram to manage stigma, resist institutional control, and navigate complex questions of visibility and surveillance. Addressing an intellectual gap in media and carceral studies, this work highlights the voices of a marginalized population whose digital lives remain underexamined. Through a mixed-methods approach - combining content analysis of social media videos and comment sections with in-depth interviews - our project investigates social media use during incarceration and after release. Our work examines the types of content shared, creators' motivations, public responses, and strategies for navigating risk and visibility. Our preliminary findings suggest that social media offers a vital space for stigmatized individuals to build community, critique carceral institutions, and push back against dominant narratives about what it means to be a felon. However, visibility also exposes them to platform surveillance, state monitoring, and public scrutiny. This duality reveals how social media simultaneously enables empowerment and risk. By reframing how incarcerated individuals interact with technology, this research contributes to broader debates in communication, surveillance, and criminology. It informs ongoing policy debates about digital access and carceral communication rights, and more importantly, underscores the urgency of resisting totalizing narratives about carceral populations by reimagining digital spaces as sites of both vulnerability and possibility.

Presentation Format: Poster
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Number: 426

Barnum, Lucia Faculty Advisor: Rebecca Ewert

From the Ashes: A Cross-Cultural Comparative Study on Community Response to Fire Disaster in Australia, Greece, Portugal, Ghana, Argentina, and Brazil

Anthropogenic climate change has increased the frequency and severity of wildfires worldwide. While dominant fire management strategies emphasize suppression-forward and technological solutions, community-based wildfire response remains an underexplored yet crucial component of disaster resilience. This research examines community-based wildfire responses across six case studies-Australia, Greece, Portugal, Ghana, Argentina, and Brazil-to analyze how social, political, and cultural factors shape local experiences of fire disaster, and how such experiences may differ from current fire management frameworks. Employing a mixed-methods approach, this study incorporates ethnographic fieldwork, semi-structured interviews with 34 experts and community stakeholders, and archival analysis of policy documents. The research identifies competing risk frames influencing fire governance, including ecological destruction, economic interests, and political accountability. Findings reveal that fire suppression is often prioritized over proactive, community-led mitigation efforts, identifying four central slippages between policy and local realities: 1) the prominence of disaster narrative-building as a form of sense-making; 2) the political manipulation of these narratives and/or interference motivated by bureaucratic and economic climates; 3) the dispossession of Indigenous and local knowledge through both historical and contemporary patterns of colonialism; and 4) the cultural capital of first responders outpacing their material value in the cycle of disaster response. The study concludes that fire management frameworks must shift to holistic prevention through community engagement, political ecology principles, and policy integration. By situating fire governance within cultural and historical contexts, this research contributes to broader climate adaptation efforts, advocating for interdisciplinary, community-driven approaches to mitigate escalating wildfire risks globally.

Presentation Format: Oral
Time: 10:45am-12:15pm
Room: Armadillo Room
Number: 104

Basava, Sanjana Faculty Advisor: William Dobyns

Patterns of X-linked Inheritance: A New Approach for the Genome Era

The concepts of X-linked (XL) dominant and recessive inheritance originated long before the mechanism of balancing X chromosome gene expression was understood but now have no scientific basis. Despite advances in genetics, the terms dominant and recessive continue to be widely used for XL disorders, contributing to persistent misconceptions. To re-evaluate XL inheritance, we reviewed data on 57 XL disorders, examining rates of disease expressivity, disease severity, gene product (protein) function, and X chromosome inactivation (XCI). X chromosome inactivation is the process by which one of the two female X chromosomes is silenced, meaning its genes are largely turned off. Our analysis demonstrated substantial expression of disease among heterozygous females, even in disorders considered to be "recessive." Female expression of disease was found to be related to the severity of the condition in males, XCI patterns, the ability to share gene products between cells, and rare cell-to-cell incompatibility. Therefore, the conventional classification of XL inheritance into dominant and recessive subtypes is biologically flawed and should be retired. A more nuanced framework for understanding XL disorders is needed to account for the underlying biological complexity. We propose four new groups of XL disorders with different patterns that should improve genetic diagnosis and counseling in families with XL disorders. This updated approach provides a clearer foundation for genetics education and supports precise clinical treatment in medical practice.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 075

Batra, Sunny

Sleep Wearables in Women's Health

This systematic review aims to evaluate the accuracy, usability, and impact of sleep wearable devices on women's health outcomes across different life stages as well as investigate bias in the existing research on these devices. Sleep is a critical component of health, especially for women, where the impacts of sleep are distinct across life, including adolescence, pregnancy, and menopause.

Using the PRISMA framework, we conducted a comprehensive search across multiple databases for studies published between January 1, 1994, and July 25, 2024. We included studies that used wearable devices to track sleep in female populations for purposes such as menstrual cycle tracking, menopause, or pregnancy. Data extraction included study title, sample size, metrics collected, and results, among other criteria, across 40 studies.

15 different devices were identified, ranging from the SenseWear Armband (released in 2002) to the Oura Ring (released in 2015), with costs between $99 and $2500. Devices were positioned on the finger, wrist, hip, intravaginally, or upper arm. The included studies comprised 70% of feasibility, pilot, or prospective cohort studies, indicating small sample sizes (average n = 68.7).

Our findings suggest that these devices can be used to detect significant health issues, such as predicting COVID-19 or intraamniotic infection in pregnant individuals. The results from this review can extend to providing valuable insights into women's health and promoting a healthy lifestyle. As such, this work demonstrates the feasibility and potential impact of wearable sleep technology in monitoring and improving women's health outcomes.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 199

Baumgardner, Emma Faculty Advisor: Teri Odom

Enzyme-decorated Spiky Gold Nanoparticles in Drug Delivery Applications

Enzyme-based therapies (EBTs) are established as treatments for certain metabolic deficiencies and continue to emerge as promising alternatives in wound healing and cancer therapy. Despite the selectivity and their high turn-over rate, enzymes are prone to degradation caused by changes of local environment (such as pH and temperature). Gold nanoparticles, with the biocompatibility and diverse surface chemistry, serve as ideal vesicles to stabilize immobilized enzymes on their surface and enabling *in vivo* delivery EBTs. However, unfavorable interactions between the negatively charged gold nanoparticle surface and enzyme structure can reduce enzyme activity. Spiky gold nanoparticles, with variably curved surfaces (radius of curvature < 10 nm) were hypothesized to increase targeting capability and loading of enzymes by limiting such interactions. To investigate shape effects, horse radish peroxidase (HRP), an activator in prodrug cancer therapies, was functionalized on both spiky and spherical nanoparticles with similar surface areas. If spiky nanoparticles are found to be increase activity of immobilized enzymes, EBTs could delivered drugs more efficiently, making these therapies more desirable over alternatives. Future research directions include exploring how shape effects influence orientation of immobilized enzymes on the nanoparticle surface, which also impacts enzyme activity and therefore, therapeutic efficacy.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 065

Berry, Chealen Faculty Advisor: Lucia Stein-Montalvo

Evaluation of the effects of curvature on kirigami structures

The adaptive capacity of most modern cities is limited. As such, new methods to combat the negative impact of climate change and other risks associated with the high population density of cities, such as poor air quality, heat stress, and the fast spread of airborne illnesses, need to be explored. In recent years, the ancient Japanese art form of kirigami, or "cut paper", has become a popular area of study among engineers, given that it transforms 2D sheets into 3D structures with tunable deformations and mechanical behaviors that can be applied to soft robotics, stretchable electronics, and even structural facades. When applied to canopy structures, these kirigami facades can provide adaptive shading and controlled ventilation. A mechanistic understanding of the effect of boundary-induced curvature on the kirigami membrane of such canopy structures, however, has yet to be explored. This research therefore aims to investigate how the curvature of a kirigami canopy structure impacts properties such as its mechanical stability, shading, and ventilation capabilities. Centimeter-scale physical models were constructed and various kirigami cut patterns were designed to make possible such investigations.The results of this testing can serve to inform future investigation into beneficial modifications of kirigami designs for various applications across scales, including for larger-scaled projects.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 152

Bhardwaj, Divya Faculty Advisor: Renee Engeln

Beauty Work and Body Image: The Role of Appearance Investment, Body Surveillance, and Body Dissatisfaction

Appearance management can require a significant amount of time and energy. Appearance-enhancing behaviors, also known as beauty work, are more common among women than men. Examples include applying makeup or using other cosmetics, grooming hair, choosing clothing, and exercising or following a specific diet specifically to improve appearance. Researchers have examined the links between body image and dieting/exercise, but virtually no empirical work has attempted to quantify how beauty work more broadly relates to psychological outcomes associated with body image. The current research aimed to examine whether appearance investment, both its self-evaluative and motivational factors, predicts beauty work engagement. We also explored how this relationship may be moderated by perfectionism, body surveillance, and body dissatisfaction. A sample of 186 U.S. women (ages 18-30) completed measures of these constructs and a measure of beauty work assessing the tasks women engage in to alter their appearance, how frequently and for how long. Preliminary results indicate that appearance investment has a significant positive correlation with yearly time spent on beauty work. Unlike the motivational factor, the self-evaluative factor had a significant positive correlation with body dissatisfaction, and it was more strongly correlated with body surveillance, corresponding with previous findings that self-evaluative salience of appearance is more maladaptive. Moderation models found that appearance investment predicts time spent on beauty work, driven by the motivational component, but did not find significant interactions with perfectionism, body surveillance, and body dissatisfaction. Future research could explore additional factors that may influence this relationship.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 324

Bider, Izzy Faculty Advisor: Malcolm MacIver

Analyzing Geometry of the Environment to Inform Mice's Peeking Behavior

Peeking behaviors-brief pauses during which an animal extends part of its body beyond cover to survey its surroundings-were observed in our previous experiments in the BotEvade paradigm. However there is a lack of literature towards this behavior limiting our understanding of its functional significance. We hypothesized that peeking serves to gain insight into the mobile threat's location, thereby enabling more efficient navigation under uncertainty. To test this, we designed an obstaclefilled maze in which we algorithmically predicted "optimal peeking sites"-locations at which lineofsight information about a pursuing robot would maximally reduce uncertainty about its position. Within the BotEvade task, mice were trained to traverse the maze toward a water reward in the presence of a robot predator. We quantified peek events that occurred relative to predicted sites. We found that, in the presence of a predator, mice peeked preferentially at predicted locations compared to any other locations. These results suggest that peeking is an active informationgathering behavior based on the animal's understanding of the threat and its surroundings. By isolating peeking behaviors through predictive site placement, our study fills a gap in understanding how rodents manage uncertainty during goaldirected navigation and lays the groundwork for our future experiments investigating the neural computations underlying planning.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 365/366

Blaszak, Avery Faculty Advisor: Hirokazu Miyazaki

Nuclear Abolition Activism On Campus: Catalysts and Motivations for Action

Amid ongoing nuclear weapons modernization and the persistent risk of catastrophic conflict, large-scale nuclear disarmament activism has visibly declined in recent decades, raising urgent questions about how younger generations engage with this issue. This study examines why Generation Z college students appear relatively disengaged from nuclear activism, focusing on how identity, fear, and political polarization shape involvement. Existing research on youth engagement is largely outdated, centered on Cold War-era activism, and does not reflect how digital culture, contemporary identity-based movements, and shifting political priorities influence participation today. To address this gap, this research investigated perceptions of nuclear activism among Northwestern University students through a two-phase approach: an initial survey (n=129) that gauged general attitudes, followed by in-depth interviews (n=8) that explored personal motivations. While 79.8% (n=99) of respondents reported involvement in activism, only one indicated participation in nuclear-related efforts. The most cited barrier was lack of knowledge (74.3%, n=84), followed by nuclear abolition not being a priority (63.2%, n=72). Interviews revealed that students prioritized identity-based activism, which they saw as more relevant than nuclear disarmament. Many interviewees expressed moral opposition to nuclear weapons, but without clear avenues for engagement, their concern rarely translated into activism. These findings suggest a cultural and educational disconnect between disarmament discourse and contemporary youth activism. Future research should examine broader generational attitudes and explore strategies to bridge the knowledge gap, particularly by linking nuclear activism to identity-based movements that resonate with younger populations.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 236

Bledsoe, Ethan Faculty Advisor: Daniel Horton

Conservation on a Slippery Slope: Mapping and Preventing Erosion in Manduriacu, Ecuador

Cloud forests are high-elevation tropical ecosystems characterized by persistent mist, rich biodiversity, and fragile soils. In the Manduriacu region of Ecuador, where conservation and development collide, steep slopes and expanding infrastructure have made the land increasingly unstable, resulting in widespread erosion. This erosion strips away nutrient-rich soil essential for growing food, clogs rivers that supply drinking water with sediment, and increases the risk of landslides. These impacts threaten both the surrounding ecosystems and the well-being of the communities that depend on forest resources. To better understand and prevent erosion, I used satellite imagery via Google Earth Engine, created digital maps in ArcGIS Pro, and applied the Revised Universal Soil Loss Equation (RUSLE) to estimate erosion risk based on rainfall, soil type, slope, vegetation, and land use. The most at-risk areas were near deforested slopes and roadways. I validated the model by partnering with local conservation rangers to visit high-risk zones and confirm visible erosion, including exposed roots and damaged hillsides. This model has valuable applications for understanding environmental change and guiding conservation. I used it to assess how infrastructure contributed to vegetation loss and build predictive models to forecast future erosion. I also compared erosion risk across deforested areas to help Fundacion Ecominga prioritize zones for reforestation and slope stabilization. The results revealed clear links between vegetation decline and deforestation for development. This project demonstrates how combining satellite imagery, mapping, and fieldwork can support conservation in fragile ecosystems while centering the voices and needs of the people who live there.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 084

Borgonovo, Emma Faculty Advisor: Massimo Marinacci

Understanding Human Decision Making: from Behavioral Economics to Artificial Intelligence

As the Greek philosopher Heraclitus said, "Every day, what you choose, what you think, and what you do is what you become." Decisions shape our lives. Understanding what drives human decision-making is essential not only in Psychology and Psychiatry but also in disciplines such as Marketing, Economics, Finance, Management, and Operations Research. Nowadays, when many of our decisions are supported by signals derived from obscure Artificial Intelligence entities, we need a deep understanding of the neurological mechanisms behind how we make choices. The Drift Diffusion Model is a foundational tool that describes human decision-making. It simulates the inner workings of the neurons from when they receive a signal till when a decision is made. I examine the underlying mathematical structure, that blends stochastic calculus and decision analytical premises. I perform numerical experiments and show that alternative formulations while building on the initial "classical" model, accommodate nuanced aspects such as how we deal with new information and how this information is provided to us. Also, I create a review of the recent cutting-edge applications of the DDM in the fields of Medicine, Economics, and Artificial Intelligence. Finally, I propose a new line of research: the application of the DDM to study decision-making processes and the value of information under bank run risks.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 082

Brazelton, Ethan Faculty Advisor: Shana Kelley

Dual-Chronoamperometry Drift Correction for Electrochemical Sensors

Electrochemical sensors offer a powerful tool for the future of point-of-care testing platforms due to their potential for reagentless, continuous operation, which is vital for tracking biomarkers that vary on a short time scale. However, biofouling and signal drift challenge the accuracy of electrochemical measurements. Chronoamperometry (CA) measures current over time and offers high sensitivity, but it has not been studied for drift correction due to its perceived resistance to drift. However, drift arises from self-assembled monolayer (SAM) desorption and biofouling, obscuring the results of CA techniques. This project investigates a dual-CA method with faradaic current extraction to address drift. This project uses the molecular pendulum (MP) to sense temporal changes in CA current. The current consists of faradaic (electron transfer) and capacitive (movement of charges) current which can lead to difficulties in analyzing data, especially when drift occurs. The dual-CA technique allows for the extraction of faradaic current and drift correction by applying mirror positive and negative potentials. This was tested by measuring current drift in the positive and negative currents during SAM desorption. Controls for gold and oxygen redox events were also tested by confining the potential range to exclude redox events. The dual-CA technique was then used for interferon-gamma sensing. Positive and negative currents correlated linearly over time as drift occurred under all conditions allowing for faradaic current extraction. Interferon-gamma was detected at varying concentrations. This dual-CA technique expands the opportunities for sensing applications by improving the reliability of the method to address the challenges of biofouling.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 490

Buffonge, Jackson Faculty Advisor: Jennifer Tackett

Parenting, Ethnic Identity, and Psychopathology in Youth and Young Adults

Both parenting practices and ethnic identity development have been independently linked to adolescent psychopathology symptoms. However, limited research has examined how these factors may interact. The present studies explored whether ethnic identity exploration and commitment moderate the relationship between parenting practices and psychopathology symptoms. In Study 1, 184 children aged 9-14 (*Mage* = 11.95, *SD* = 1.02) reported on their ethnic identity and psychopathology symptoms, while primary caregivers reported on their parenting practices and their child's psychopathology symptoms. Results indicated that ethnic identity exploration significantly moderated the negative relationship between parental involvement and anxious/depressed symptoms. That is, parental involvement was associated with lower anxious/depressed symptoms when exploration levels were low and as exploration increased, this protective effect weakened. Similar moderation patterns emerged between parental involvement and exploration for somatic complaints, internalizing psychopathology, aggressive behavior, and externalizing psychopathology. In Study 2, 138 young adults aged 18-23 (*Mage* = 19.01, *SD* = 1.13) reported on their ethnic identity, psychopathology symptoms, and the parenting practices of their primary caregivers during their childhood. In this sample, parenting practices did not significantly predict psychopathology symptoms, so the moderation analyses were not conducted. Together, these findings suggest a complex relationship between parenting, ethnic identity, and psychopathology, which necessitates further research.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 179

Butaney, Kaavya Faculty Advisor: Danielle Tullman-Ercek

Modifying virus-like particles for improved cargo transport and assembly

Modification of virus-like particles (VLPs) could allow for greater utilization of the virus capsid-derived structures for purposes like drug delivery and targeted treatments. The Tullman-Ercek Lab uses the MS2 VLP derived from the MS2 bacteriophage, which can self-assemble around negatively charged cargo. The MS2 VLP comprises multiple copies of coat proteins (CPs) with CP dimers as VLP assembly subunits. The lab uses a modification on a prominent fused CP dimer construct, which is featured in a complete VLP assembly subunit. This fused dimer is then circularly permuted to alter the protein termini by fusing the original N and C termini of the protein and creating new ones at a new, more approachable location. It is hypothesized that circular permutation could open up flexibility for terminal extensions with peptides. Following this circular permutation, a library was created to study the efficacy of VLP assembly under different termini positions. Initially, we conducted protein overexpression and purification procedures to understand how the circularly permuted subunit assembly responded to protein tags and cargo. We found that the protein was able to assemble into VLPs with the tag and the cargo. Following that, we intend to isolate different permuted subunits and attempt to reassemble VLPs around cargo under chemical controls *in vitro*. We have proven that one permuted subunit can reassemble around a common cargo under specific situations, and we are working to compare the reassembly efficiency of different permuted constructs.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 447

Caldwell, Benjamyn Faculty Advisor: SonBinh Nguyen

The delivery of nucleic acids for the systemic treatment of inflammations

Inflammatory diseases, ranging from allergies and psoriasis to asthma and COPD, result when inflammation is triggered in a manner that is misdirected, in excess, or is otherwise harmful to the body. Common drug therapies, such as those based on steroids, can reduce acute inflammation, but bring many severe side effects when used to treat chronic diseases such as rheumatoid arthritis or multiple sclerosis. To this end, recent studies have suggested that small, single stranded DNA sequences (oligonucleotides or ODNs) can serve as better therapies by inhibiting the initial activation of the inflammatory response and preventing symptoms from spreading. The use of ODNs as a therapeutic treatment has many challenges, however, as these molecules need to be delivered to the cellular signal receptors without being degraded or removed by biological defenses. To address these challenges, I am investigating the use of spherical nucleic acid (SNA) nanoparticles to deliver INH18, an inhibitory ODN, to a model cell and effectively suppress the inflammation response. To date, I have established the minimum concentrations of free INH18 that suppresses the inflammation response from the stimulant CpG agent.I am currently synthesizing several nanoparticles and carrying out cell studies to examine the effect of incorporating INH18 into the SNA structures. I expect to observe an increased efficacy for the SNA-incorporated INH18 to validate the hypothesis that its nanoparticle form can be used as an inflammation suppression treatment.These results will be discussed in this presentation.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 488

Camp, Lily Faculty Advisor: David Gate

Alzheimer's and Immunization: How Astrocytes Help Clear Amyloid-Beta in Treated Patients

Alzheimer’s disease (AD) is a neurodegenerative disorder characterized by the accumulation of the protein amyloid-β (Aβ) in the brain. Immunotherapies targeting Aβ have shown mild suppression of cognitive decline in clinical trials, yet the mechanisms underlying Aβ clearance in immunized brains remain unclear. Emerging evidence suggests that astrocytes, key support cells in the central nervous system, are involved in AD progression and can contribute to Aβ clearance. However, the specific astrocyte subtypes, their locations, and their interactions with other cell types following Aβ immunization are not well studied. This study investigates astrocyte gene expression changes following Aβ immunization. I hypothesized that reactive astrocyte states contribute to Aβ clearance and are more abundant in immunized AD brains. To test this, I applied single-cell RNA sequencing to brain tissue from AD patients immunized with AN1792 (active) or lecanemab (passive) and non-immunized AD controls. I used computational analyses, including clustering algorithms, differential gene expression analysis, and gene set enrichment analysis, to identify astrocyte subtypes and assess their functional roles. I identified distinct astrocyte subtypes with unique gene expression profiles and varying reactivity between immunized and non-immunized samples.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 957

Carlson, Rose Faculty Advisor: Bradley Sageman

The past is the key to the present: using 94-million-year-old rocks to understand modern ocean acidification

Oceanic Anoxic Events, or OAEs, are periods in Earth history characterized by vast, low-oxygen areas in global marine environments. Thought to result from major volcanic events that added massive volumes of carbon dioxide (CO2) to the global carbon cycle, OAEs can serve as powerful analogs for modern climate change. Initially identified via a widespread interval of black shales by Northwestern Professor Seymour Schlanger and Oxford Professor Hugh Jenkyns in 1976, OAE 2 is one of the most widely studied of these events. Recent research on stable calcium isotopic ratios ($\delta^{44/40}$Ca) from samples spanning OAE2 has suggested that ocean acidification may have resulted from the massive injection of CO2 to the Earth System during this period. Ocean acidification occurs when CO2 dissolves in seawater to form carbonic acid, a phenomenon that negatively impacts many marine organisms and makes it harder for shell-producing organisms to produce calcium carbonate (CaCO3). Because the ratio of certain stable calcium isotopes (calcium atoms with specific numbers of neutrons) is dependent on the rate at which CaCO3 is precipitated via biocalcification, these ratios can be analyzed in the geologic record to estimate past levels of ocean acidification. This project used MC-TIMS $\delta^{44/40}$Ca analysis of a rock core (GC-3) from West Texas to confirm the hypothesis of a global ocean acidification event during the OAE2 interval. Similar patterns were observed in $\delta^{44/40}$Ca results from the GC-3 core and cores from Colorado and Italy analyzed previously by other researchers.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 334

Carmona, Avryl Faculty Advisor: Alissa Chung

Potential drawbacks and/or benefits Mexican women experience embracing a positive beauty philosophy vs a neutral beauty philosophy

Driven by my curiosity and a desire to make body image research more applicable to marginalized communities, this project explores how beauty ideologies impact Mexican college women's relationships with their bodies. Social media is full of conflicting messages about how women should relate to their bodies, food, and movement, often creating confusion and overwhelm. Popular discourse frequently debates the merits of two philosophies: body positivity, which celebrates diverse appearances and challenges Western beauty standards, and body neutrality, which encourages detachment from appearance altogether, emphasizing body functionality and "turning away from the mirror to face the world." Most body image research centers on WEIRD populations; my study instead focuses on women who, like myself, grew up in a Latin sexist culture that often glorifies whiteness.

I conducted interviews to understand how cultural factors like *carrilla* (teasing), colorism, and collectivism shape body image. I also implemented two month-long interventions-one based on body positivity and the other on body neutrality-each involving daily journaling and affirmations.

Although I hypothesized that body neutrality would yield better outcomes, both interventions significantly improved body image and body functionality appreciation, likely due to participants' limited prior exposure to any structured body image practices. A recurring theme in interviews was the use of colorist humor to mock darker-skinned women. Many expressed feeling hurt but struggled to speak up, often feeling invalidated or pressured to maintain harmony. These findings emphasize the need for culturally sensitive, accessible mental health approaches that support women navigating collectivist family dynamics without relying solely on Western frameworks.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 095

Caro, Ellie Faculty Advisor: Melissa Foster

Addressing Eurocentricity in Western Musical Theatre Pedagogy

Melissa Foster, professor in Northwestern's theatre department, discusses the racist and classist origins of common terminology in musical theatre pedagogy in her book chapter, "Pedagogy of Western Musical Theatre" in the Oxford Handbook of Voice Pedagogy. This research is important because it reframes musical theater pedagogy from a more inclusive lens by proposing substitutions for terms that imply the superiority of singing styles stemming from European classical music. In my work as a research assistant in the Emerging Scholars Program, I conducted literature reviews, sourced evidence which helped craft the argument that specific pedagogical terms have racist origins, and edited the chapter draft at multiple stages. Professor Foster's argument reveals the use of this language expands into biases encountered at the collegiate and professional levels. In the early twentieth century, musical theater as an industry shared similarities to the style of European classical music, with many characters being written with the vocal quality found in European operettas. Certain musicals, including *The Sound of Music*, use styles of singing which stem from European classical music to denote characters as higher class than those singing with vocal styles stemming from non-classical non-European origins. This has many implications for the realm of musical theatre pedagogy, as it is imperative to address the Eurocentric origins of these terms while choosing new terminology that makes the pedagogy more inclusive. This is simply one component in the effort to broaden the scope of an already exclusive field, and more research should be done to address other biases in the musical theatre industry.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 014

Carpenter, Samantha Faculty Advisor: Vipul Shukla

Targeting the DNA Repair Protein HMCES in Cancer

DNA repair pathways are indispensable for the genomic integrity of all cells, allowing for correction of damaged DNA and prevention of potentially harmful mutations. Defects in DNA repair pathways often lead to accumulation of mutations and predisposition to cancer. Intriguingly, cancer cells frequently compensate for impairment in certain DNA repair mechanisms by relying on other DNA repair pathways, which is the basis of chemotherapy, radiation, and DNA repair targeting therapies. 5-hydroxymethylcytosine binding, embryonic stem cell-specific-protein (HMCES) is a highly conserved protein that has been recently discovered to play fundamental roles in multiple DNA repair pathways, including alternative end-joining, crosslink repair, and repair of abasic sites and oxidative damage. By analyzing The Cancer Genome Atlas (TCGA) databases, we found that HMCES is overexpressed in 25% of all cancers. Overexpression of HMCES in cancer is linked to frequent amplification of DNA copy numbers, particularly in highly aggressive solid tumors such as ovarian, head and neck, breast, and lung cancer. Furthermore, HMCES overexpression in cancer patients is associated with poor overall survival compared to patients with diploid HMCES copy numbers. Notably, HMCES overexpression is often observed in cancers with mutations in *BRCA*, *TP53*, and other DNA repair genes, suggesting reliance on HMCES in these cancers. Our findings, along with its already established DNA repair functions, suggest a potential role of HMCES in the development or progression of several cancers, implicating HMCES as an attractive therapeutic target relevant across several cancers.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 248

Caserio, Connor Faculty Advisor: Dan McAdams

Narrative Transformation in Alcoholics Anonymous: The Redemptive Self and the American Story

My study explores the transformative power of storytelling within Alcoholics Anonymous, focusing on how personal narratives of alcoholism and recovery foster identity reconstruction. Utilizing narrative identity theory, I analyze personal stories from the book *Alcoholics Anonymous* (commonly referred to as the Big Book) across its four editions. I examine how these narratives align with the redemptive self, a cultural master narrative prevalent in American society, centering on themes of early advantage and disadvantage. My analysis incorporates qualitative methods, such as close readings of foundational stories, and quantitative coding of thematic elements across different editions. Preliminary findings indicate that while early A.A. narratives predominantly reflect the experiences of white, middle-aged, upper-middle-class males, later editions showcase a broader range of backgrounds, illustrating the program's expanding inclusivity. They also highlight the consistent presence of internal/psychological early disadvantages, suggesting that this theme lies central to the narrative model of successful recovery in A.A. By understanding the evolution of these narratives, we can better appreciate the cultural and therapeutic impact of A.A. and potentially apply these insights in treatment contexts.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 357

Castelino, Kristen Faculty Advisor: Lucas Pinto

Tracking Through Time: A Computational Approach for Long-Term Neuron Tracking in Two-Photon Imaging

Performing complex tasks requires the coordinated activity of large populations of neurons. We can understand how these patterns arise by isolating and studying the activity of individual neurons. However, tracking the same neuron among hundreds captured in activity recordings presents a challenging task. This project aims to create a computational pipeline to track individual neurons across imaging sessions and analyze their activity across days. Transgenic mice expressing a GCaMP6s fluorescent marker in prefrontal cortex (PFC) excitatory neurons ran freely as fluorescence was recorded using two-photon microscopy. During imaging sessions, time series data and 3D morphological images were collected to measure cell activity and help localize the cells across days, respectively. Using Python and OpenCV, I began the cell-localization pipeline with a graphical user interface (GUI) to superimpose two-photon images onto the mouse's skull to determine the location of recording within the mouse's PFC. Once this location was determined, the depth of recording was calculated by a second algorithm comparing the time series and volumetric data. Lastly, analysis of cell attributes - including intercellular distance, cell area, and cell radii - was used to identify which cells were the same across datasets. Once cells were matched across sessions, their neuronal tracings could be analyzed to determine how their activity patterns changed over time. This approach enables consistent tracking of individual neurons across days, allowing for longitudinal analysis of their activity. Preliminary findings will be presented to discover how these patterns change as mice acclimate to the experimental environment.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 252

Chen, Jonathan Faculty Advisor: Bradley Sageman

Isotopic tracers of ocean acidification and extinction in Cretaceous foraminifera

The Early Cretaceous Aptian-Albian boundary interval (AABI) records diverse disruptions to global climate, including volcanic CO_2 emissions and global warming. Such an episode of environmental turbulence may serve as a geological analog for modern climate change predictions. In particular, the AABI was characterized by one of the largest-known extinctions of planktic foraminifera (free-floating protists with calcite shells). Foraminifera are among the most abundant marine calcifiers (organisms that produce calcium carbonate minerals) and are fundamental to Earth's carbon cycle. Thus, studies of the AABI may clarify the future of the carbon cycle and calcifier diversity. However, the direct cause of this foraminiferal extinction event remains uncertain. Through the AABI, shells of planktic foraminifera decrease significantly in size and thickness, symptomatic of biocalcification stress driven by ocean acidification (OA). To empirically investigate the role of OA in the AABI extinction event, we employ calcium isotope measurements of foraminifera. In calcite, the ratio of ^{44}Ca to ^{40}Ca ($\delta^{44/40}Ca$) increases as calcification rates decrease—thus, $\delta^{44/40}Ca$ values in fossil foraminifera shells track decreased biocalcification as a result of OA. We present the first high-resolution and high-precision $\delta^{44/40}Ca$ records of the AABI, extracted from foraminifera collected at Deep Sea Drilling Project (DSDP) Site 511 in the South Atlantic. Our planktic records reveal a significant increase in $\delta^{44/40}Ca$ values spanning the Aptian-Albian, identifying ocean acidification as the likely driver of foraminiferal extinctions during the AABI. These results further establish the AABI as a novel analog for how calcifiers may respond to modern OA.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 056

Chen, Max Faculty Advisor: David Uttal

How Large Language Models Can Help Us Study Spatial Language

Spatial language plays a crucial role in children's cognitive developmental stages, particularly in STEM learning such as math and engineering. Yet, analyzing spatial language in naturalistic settings remains challenging due to its context-dependent nature. Current analytical methods, such as human coding, are labor-intensive, while automatic tools like the Bag-of-Words (BoW) approach often fail to capture the nuance of spatial language.

In this work, we introduce a novel approach leveraging Large Language Models (LLMs), designed to improve upon existing spatial language analysis methods. We will analyze the potential of utilizing LLMs with multiple datasets, such as parent-child reflections on spatial tasks conducted at the Chicago Children's Museum, by replicating and extending upon previousnon-LLM transcription work and contrasting performances.

Specifically, we will showcase each dataset used in the study and examine the performances of human coding, BoW software (LIWC), and our proposed LLM-based method on the data, identifying the strengths and limitations for each method. Through our work, we aim to provide new insights for more efficient spatial language analysis and highlight the value LLMs can offer as a tool in spatial analysis and potentially broader semantic coding applications. We also look forward to sharing our work and receiving any feedback or comments from those both within and beyond the spatial cognition field alike.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 380

Chen, Jason Faculty Advisor: Alfred George

Functional Characterization of KCNT1 Variants Using a Thallium Efflux Assay

KCNT1-related epilepsy is a form of epilepsy that causes intractable seizures and long-term cognitive impairment. Past research has shown it is associated with gain-of-function genetic variants of KCNT1- a sodium-activated potassium channel expressed in the brain; however, current methodology has only elucidated functional consequences for a small subset of KCNT1 variants. The goal of my research is to develop a high-throughput screening assay that can efficiently classify gain-of-function KCNT1 variants.

To develop a screening assay for gain-of-function KCNT1 variants, I tested an assay that uses efflux of fluorescently-tagged thallium as a proxy for KCNT1 channel activity. To validate the use of this thallium efflux assay to identify gain-of-function variants and optimize its conditions, different concentrations of Thallium Sulfate and KCNT1 activity modulators were tested, and fluorescence was measured in cells containing a gain-of-function KCNT1 variant, C1309T, wild-type (unmutated) KCNT1, and inhibited KCNT1. These experiments demonstrated significant fluorescent separation for C1309T and the other KCNT1 channels, validating the use of the thallium efflux assay to differentiate gain-of-function KCNT1 variants. These experiments also showed the optimal concentration of Thallium Sulfate for this experiment to be 10 mM. Moving forward, this research aims to apply this thallium efflux assay on a library of uncharacterized KCNT1 variants to accelerate their functional annotation and guide precision therapies for patients with KCNT1-related epilepsy.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 292

Chen, Rebecca Faculty Advisor: Atique Ahmed

Exploring Aberrant Vimentin Expression and Localization in Glioblastoma

Glioblastoma (GBM) is a highly aggressive brain tumor characterized by invasion into surrounding tissue, contributing to resistance against temozolomide (TMZ), radiation, and maximal safe surgical resection. Vimentin, along with its phosphorylated form (p-VIM) is a cytoskeletal protein overexpressed in GBM and serves as a marker for enhanced migration and invasion. Here, we investigated the impact of TMZ on both phosphorylated vimentin and vimentin expression levels and their localization. We used immunocytochemistry and western blotting to assess vimentin expression levels in multiple Patient Derived Xenograft (PDX) GBM cell lines following treatment with 50 μM TMZ or DMSO for 72 hours. The expression and distribution of vimentin were analyzed using ImageJ. We integrated RNA-seq data from PDX GBM samples treated with DMSO and TMZ. Our findings reveal that high vimentin expression is localized to the tumor core and at infiltrating tumor edges. Notably, the average expression of vimentin increases after TMZ treatment compared to DMSO. Both immunocytochemistry and western blot analyses confirmed elevated levels of total vimentin and phosphorylated vimentin in the TMZ-treated samples. We observed an increased nuclear localization of vimentin in the TMZ-treated samples despite vimentin traditionally being associated with the cytoplasm. This increase in nuclear localization was also observed in phosphorylated vimentin in the TMZ treatment group. Our study identifies for the first time the presence of nuclear vimentin in GBM, a finding previously documented in colorectal cancer. This aberrant nuclear vimentin expression prompts further investigation into its role in invasion, potentially providing insights into future treatment options.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 088

Chi, Joshua Faculty Advisor: Malcolm MacIver

Analyzing Geometry of the Environment to Inform Mice's Peeking Behavior

Peeking behaviors-brief pauses during which an animal extends part of its body beyond cover to survey its surroundings-were observed in our previous experiments in the BotEvade paradigm. However there is a lack of literature towards this behavior limiting our understanding of its functional significance. We hypothesized that peeking serves to gain insight into the mobile threat's location, thereby enabling more efficient navigation under uncertainty. To test this, we designed an obstaclefilled maze in which we algorithmically predicted "optimal peeking sites"-locations at which lineofsight information about a pursuing robot would maximally reduce uncertainty about its position. Within the BotEvade task, mice were trained to traverse the maze toward a water reward in the presence of a robot predator. We quantified peek events that occurred relative to predicted sites. We found that, in the presence of a predator, mice peeked preferentially at predicted locations compared to any other locations. These results suggest that peeking is an active informationgathering behavior based on the animal's understanding of the threat and its surroundings. By isolating peeking behaviors through predictive site placement, our study fills a gap in understanding how rodents manage uncertainty during goaldirected navigation and lays the groundwork for our future experiments investigating the neural computations underlying planning.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 365/366

Chiu, Annie Faculty Advisor: Katherine Amato

Patterns of inflammation are associated with patterns of fecal-derived metabolites across human and nonhuman primate gut microbiomes

The gut microbiome, the community of microbes inhabiting the gut and their genetic material, plays an essential role in influencing and interacting with the immune system, contributing to the overall well-being of hosts and diverse functions vital for development throughout life. Yet, understanding the relationship between the gut microbiota and the immune system across host species is incomplete and limited as there is a lack of comparative data, including from nonhuman primates, who share phylogenetic relatedness to humans. The current study addresses this gap by comparing the effects of human and non-human primate gut microbiomes on human immune responses upon cytokine analysis. Through an ex-vivo immune cell culture protocol, we exposed 40uL of cultured human venipuncture blood to 40uL of fecal supernatant from either humans, baboons, howler monkeys, or capuchins . Immunoassays were used to compare the range of inflammation of IL-6, TNF-a, and IL-1v expressions. Blood samples incubated with howler monkey fecal supernatants resulted in the highest cytokine response. This could be due to howler monkeys having a more distinct microbiome, and associated microbial metabolites, compared to humans since they are a New World primate, and our howler monkey samples were collected in the wild. Moving forward, comparative analysis using 16S rRNA gene amplicon sequencing and metabolomics can reveal previously unknown microbial strains or functions unique to specific primates that are associated with our observed differences and likely play a role in immune regulation. These findings improve our understanding of microbial diversity within the gut and evolutionary relationships between the gut and the immune system across primates.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 399

Choi, Angela Faculty Advisor: Andy Craver

Structural Inequities in COVID-19 Hospitalization: Evidence from the All of Us Research Program

COVID-19 has exposed long-standing structural inequities in the U.S. healthcare system. This project uses data from the All of Us Research Program, a large and diverse national cohort, to examine how social and demographic factors relate to COVID-19 hospitalization. We analyzed 42,666 adults with confirmed COVID-19, including 1,533 individuals hospitalized with COVID-19 listed as the primary diagnosis. Logistic regression was used to estimate adjusted odds ratios (aORs) for key predictors. Older age was strongly associated with hospitalization, with aORs increasing across age categories up to 3.25 (95% CI: 2.59-4.08) for adults aged 66-95. Black (aOR: 3.43; 95% CI: 2.94-3.99) and Hispanic (aOR: 1.66; 95% CI: 1.39-1.99) participants had higher odds of hospitalization compared to non-Hispanic Whites. Low income, lower educational attainment, and higher neighborhood deprivation scores were also independently associated with greater hospitalization risk. These findings elucidate the continued position of structural inequality in shaping health outcomes and the need for public health strategies that address these underlying factors.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 487

Chopra, Giavanna

California's Connection Conundrum: DLR Technology Utility

As California strives to meet its renewable energy goals, insufficient grid capacity remains an inhibiting factor that needs to be addressed. It is estimated that more than three times the amount of renewable energy projects needed to meet California's 100% renewable energy goal are waiting for approval because of strains on existing energy infrastructure. One cost-effective way to rapidly increase the transmission capacity of existing power grids is to switch from static line ratings to dynamic line ratings (DLR). DLR technology allows grid operators to make real-time adjustments to the amount of electric voltage a transmission line can handle based on a variety of conditions, including wind, temperature, and humidity. Current static line ratings do not allow for variations in permitted line voltage capacity, causing grids to often be underutilized. These same sensors also have the ability to alert grid operators if power lines sag low to the ground, increasing their risk of sparking a fire. Given that 3,600+ wildfires in California have been caused in relation to power transmission and generation, more effective tools are needed. Based on qualitative analysis of model predictions, utility company documents, and examples of municipalities where DLR has been implemented, this paper recommends that the California legislature expand mandates and incentives for DLR implementation. Increasing grid capacity is essential to integrate new renewable power sources, and the technology used to collect data for dynamic line ratings can also be used to detect dangerous conditions that could lead to wildfires if not properly addressed.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 276

Chugh, Shailen Faculty Advisor: Magdalena Osburn

Isotopic Signatures of Water Cycling in High Arctic Greenland: Implications for Leaf Wax Paleoclimate Studies

As global climate shifts, accurate records of past warming are vital to predicting future climate, especially in regions where rapid change is anticipated. Leaf waxes and their hydrogen isotopic composition (δ^2H_{wax}) record critical hydrologic information from past Arctic warm periods in sedimentary records, allowing for reconstructions of past precipitation patterns. As plants synthesize these *n*-alkane leaf coatings, they incorporate the isotopic composition of their source water, and this relationship is widely consistent across environments. However, Arctic waxes fall off global δ^2H_{wax} calibrations. Physiological and environmental differences may explain this inconsistency, considering the shortened growing season and 24-hour light. To clarify this, I present a holistic study of δ^2H signatures at six high Arctic sites across the growing season from the common plant *Salix arctica*. I measured δ^2H values of environmental waters, xylem waters, and leaf waters via cavity ringdown spectroscopy, and δ^2H_{wax} values through compound-specific isotope analysis. All waters became ^2H-enriched through the growing season, representing increased evapotranspiration and decreasing influence of snowmelt. Leaf wax isotopes display a more complicated trend, as isotopic changes reflect both shifts in water sourcing and increased evapotranspiration. Additionally, C_{25} and C_{27} *n*-alkane δ^2H_{wax} values more closely align with global δ^2H_{wax} calibrations when compared with summer precipitation rather than annual. Overall, studying the isotopic changes associated with leaf wax synthesis, from source water to wax, reveals underlying water cycle processes and allows for more precise paleohydrologic reconstructions, providing a window into the future of Arctic hydrology.

Presentation Format: Oral
Time: 12:45pm-2:15pm
Room: Lake Room
Number: 153

Chung, Jessica Faculty Advisor: Mercedes Spencer

Characteristics of Measures Used to Assess Working Memory Across Studies Focused on Children with Specific Reading Comprehension Deficits

Reading ability, in terms of fluency and comprehension, has been consistently linked to executive function skills in existing research, and evidence suggests that executive function weaknesses are associated with reading comprehension difficulties. However, few studies have comprehensively explored executive function in children with Specific Reading Comprehension Deficit (S-RCD) - a reading difficulty characterized by reading comprehension deficits despite age-proficient word-level reading. The aim of the current meta-analysis is to elucidate if a unique executive function profile is associated with S-RCD and also if this profile differs based on whether linguistic or non-linguistic measures of executive function are examined. We conducted a systematic literature search, screening for studies that included samples of children (<18 years of age) with and without specific reading comprehension deficit. All included articles additionally reported data on at least one measure of executive function (e.g., working memory and updating, inhibition, cognitive flexibility and shifting). We compiled study data by coding information from the included studies to extract data for quantitative analysis. In this presentation, we provide descriptive information (e.g., assessment format, stimuli characteristics) for the different types of working memory assessments administered across a sample of included studies. Knowing the role that executive functioning plays in reading comprehension is important because it has the potential to inform the development of targeted interventions for students with reading disabilities.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 332/359

Clarendon, Audrey Faculty Advisor: Allison Strom

Neutral Oxygen Features in Galaxies at z 2-3: Probing Galaxy Evolution through Faint Emission-Line Diagnostics

Galaxies at varying developmental stages undergo different physical processes which produce unique spectroscopic signatures, or light given off by the galaxy's matter. Thus, we can analyze spectra over many epochs to constrain the physical processes that govern galaxy evolution. A common way to do this analysis is by constructing a so-called BPT diagram, which shows the flux ratios of galaxies' strongest, rest-optical emission lines. The faint line [OI]λ6302 is sensitive to the hardness of the ionizing spectrum, the presence of shocks, and diffuse ionized gas (DIG) in star-forming galaxies. It has been found frequently in early JWST surveys of z > 2 galaxies, indicating that it is a promising method for probing ionization mechanisms and tracing low-ionization gas in distant objects. We analyze a sample of galaxies from the Keck Baryonic Structure Survey (KBSS, z ~ 2-3) to construct a line-ratio diagram analyzing [OI]. The combination of [OI] measurements and photoionization models help to uncover why distant galaxies differ in location from local ones on diagnostic emission-line diagrams. This redshift-dependent separation is captured on the O1-BPT as a pronounced offset between z ~ 2-3 galaxies and local ones from the Sloan Digital Sky Survey (SDSS) as compared to the offset on other classical BPT diagrams analyzing [NII]λ6585 and [SII]λλ6718,6732. The offset and the inability of the models (at the lower stellar metallicity limit of $Z_* = 0.001$) to capture the high redshift data suggest that DIG and shocks may be contributing to the observed [OI] emissions.

Presentation Format: Oral
Time: 12:45pm-2:15pm
Room: Lake Room
Number: 031

Colombara, Silas Faculty Advisor: Thomas McDade

Childhood Household Wealth Mobility and Mental Health in Young Adulthood: Evidence from the Cebu Longitudinal Health and Nutrition Survey

Childhood socioeconomic conditions have lasting effects on mental health, but less is known about how changes in household wealth across childhood are associated with mental health. This study investigates the correlation between childhood household wealth mobility and mental health outcomes-depression and perceived stress-among participants of the Cebu Longitudinal Health and Nutrition Survey, a birth cohort study in Cebu, Philippines. Asset indices were created for five survey waves (baseline, age two, 1991, 1994, and 1998) as proxies for wealth. Wealth mobility groups were constructed using group-based trajectory modeling to categorize participants into Stable-Low, Low-Upward, and High-Upward wealth trajectories across the waves, when the participants were 0-15 years old. Linear regression models were then used to assess the correlation between wealth trajectories and mental health outcomes at ages 21-22. Compared to the Stable-Low group, depression scores for the Low-Upward group were lower on average (-0.16 SD, 95% CI: -0.26, -0.05). An even larger difference was observed with High-Upward group (-0.37 SD, 95% CI: -0.52, -0.22). No significant difference in perceived stress was found for both the High-Upward or Low-Upward groups. These findings suggest that upward wealth mobility during childhood could be associated with modest improvements in mental health, particularly depression, yet not perceived stress. However, the limited effect sizes highlight the importance of additional sociocultural and life course factors. Future research should explore long-term mental health outcomes and the intersection of wealth mobility with other sociocultural contexts.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 483

Cook, Quinn Faculty Advisor: Diego Kaenzig

Electric Utility Companies and Green Bonds; Energy Transition and the Greenium

In this paper, I study if a green premium (or "greenium") is present for electric utility companies who issue green bonds, effectively lowering their "Yields" and thus cost of their debt. The green bonds literature to-date on whether a greenium exists is mixed. Moreover, greenium studies largely do not specify sectorally, instead focusing either on government bonds or corporate bonds. I investigate the existence of this greenium by specifying my theory and data into the electric utilities sector, a particularly important one for the energy transition. I hypothesize that this sector should be especially likely to see a greenium emerge due to the relevance and materiality of green activity to utility company finances and investors. To examine if a greenium exists I use a matched pair methodology, extracting data from the Bloomberg Terminal and pairing 115 eligible utility green bonds to utility conventional bonds. I then analyze and control for differences in the "Yields at Issue" between these bond pairs. I find no evidence for a greenium in the electric utilities sector. This result carries sobering implications for the green bonds market and specifically the use of green bonds for the debt-financing of infrastructure in an energy transition.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 473

Coppisetti, Nikita Faculty Advisor: Samuel Stupp

Exploring the Therapeutic Potential of Peptide Nanofibers in a Human Spinal Cord Organoid Injury Model

Spinal cord injury (SCI) affects hundreds of thousands of people worldwide each year, often resulting in permanent disability. Over the past few decades, considerable efforts have been made to develop SCI therapies, but translating preclinical findings into effective treatments continues to be a significant challenge. To address this gap, our lab has previously developed bioactive peptide amphiphiles, artificial nanofibers that incorporate peptide-signaling sequences from proteins known to play roles in tissue regeneration pathways. While our research has shown that a specific combination of fibroblast growth factor-2 (FGF-2) and laminin-derived IKVAV peptide amphiphiles (PA) promotes regeneration in animal models, its effects in human tissue models had not yet been explored. I report here on the biocompatibility and regenerative potential of this candidate FGF-2 IKVAV PA using human spinal cord organoids as an organ-mimetic model. The initial cytotoxicity assay measuring LDH activity showed no significant increase in cell death following candidate PA treatment, indicating that the PA was biocompatible with healthy organoids. Next, I experimentally induced an injury with a scalpel in the organoids to simulate SCI, then added candidate PA nanofibers to the injury site as treatment. Importantly, immunohistochemistry followed by 3D imaging revealed the candidate PA promoted neuronal regeneration in injured organoids as evidenced by TUJ1-positive neurites, which was not observed in untreated controls. These findings suggest that the candidate PA has therapeutic potential for human tissue models and offers promising insights into nanomaterial therapies for SCI, bridging a critical gap between animal studies and clinical relevance.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 048

Cox-Caceres, Alani Faculty Advisor: Ken Paller

The Impact of Guided Relaxation on Sleep Quality and Mood in College Students with Sleep Disturbances

College students often find it challenging to maintain quality sleep due to increased stress and inconsistent routines that disrupt their ability to fall asleep. Poor sleep can negatively impact cognitive function and emotional well-being. Finding effective and simple ways to improve sleep is essential to reduce sleep difficulties in groups at higher risk of poor-quality sleep. The present research examined whether a brief guided relaxation audio (mindfulness) played immediately before bed could improve sleep and next-day mood compared to a control audio (brain entrainment). This study was a within-subjects, two-phase crossover trial. Participants completed one baseline and two counterbalanced intervention nights that alternated between mindfulness and brain entrainment. Objective sleep measures were collected using Muse sleep tracking headbands. Subjective measures of positive and negative affect were gathered through daily surveys the next day. Results indicated that objective sleep onset latency was significantly shorter on mindfulness nights compared to control nights. Shorter sleep onset latency on mindfulness nights was also significantly correlated with higher positive affect the next day. No other sleep or mood differences between conditions were found. Together, results suggest a brief mindfulness audio intervention in a home-setting can help people fall asleep quicker, which indicates the possibility for low-cost, widely available mechanisms to improve sleep in daily life.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 460

Cummins, Katie Faculty Advisor: Dilip Gaonkar

Coal, Culture, and Neostalgia: Reframing Industrial Heritage Identities for a Just Transition

The decline of coal in Kentucky is more than an economic transition; it is a cultural reckoning that reshapes community identities and historical narratives. As the state navigates the just transition, narratives of coal's legacy continue to shape community identities and attitudes toward change. This thesis examines how contemporary Kentucky folk musicians engage in counter-hegemonic storytelling to challenge dominant coal industry narratives and reimagine Appalachian identity. Using the concept of neostalgia (Kurlinkus & Kurlinkus, 2018) - a rhetorical strategy that selectively reclaims traditions to critique, rather than romanticize, the past - I analyze The Local Honeys' 2022 short film *Dying to Make a Living*. Through a multi-modal rhetorical analysis of spoken narration, soundscape, and musical performance, I demonstrate how The Local Honeys construct an alternative vision of coal heritage, one that centers labor justice, environmental consciousness, and community resilience. By framing coal not as a source of regional pride but as a site of exploitation and struggle, the film reclaims Kentucky's cultural history while advocating for a participatory and just energy transition. This study situates Kentucky's coal-mining song tradition within broader eco-musicological discourse and argues that neostalgic storytelling offers a powerful tool for engaging coalfield communities in democratic dialogue about their future.

Presentation Format: Oral
Time: 12:45pm-2:15pm
Room: Rock Room
Number: 092

Daniels, Kaprice Faculty Advisor: Robert Ward

Narratives of Resistance: Centering Student Voices in a Time of Crisis

In response to the 2020 racial justice protests, scholars have increasingly examined how Black identity, activism, and belonging are shaped within higher education. In his book chapter, Prof. Robert Ward, Assistant Professor of English, explores how first-year Black college students experienced the dual crises of the COVID-19 pandemic and the George Floyd uprisings. His work contributes to a growing body of literature by centering students at the beginning of their college journeys, revealing how this generation began to form political identities and racial consciousness amid national unrest.

As a research assistant in the Emerging Scholars program, I analyzed narrative reflections from first-year students using Critical Race Theory (CRT) to understand how the protests shaped their lives and communities. These powerful accounts offered firsthand insight into the emotional and social realities students faced during a pivotal moment in American history.

Through my analysis, I identified recurring themes such as racialized trauma, resistance, solidarity, and the importance of community. In weekly debriefing sessions with Prof. Ward, we explored how these themes highlighted gaps in traditional educational research and affirmed the legitimacy of lived experience as knowledge. I also conducted a literature review to ground the narratives in interdisciplinary scholarship and demonstrate the power of subjective storytelling in academic discourse.

This research deepened my understanding of CRT and showed me how reflective storytelling can expose systemic injustices. It reminded me that research can be a tool for empathy, healing, and justice, and inspired me to help create more inclusive and humanizing educational spaces.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 008

Day, Isabelle

Faculty Advisor: Sarah Rodriguez

The Evolution of the Perception of Risk of Childbirth in the US and the UK among Physicians and Public (1993-2023)

This project aimed to contextualize perceptions of risk of childbirth from 1993-2023 in the US and the UK to investigate patterns among its evolution. Investigating these perceptions among maternal healthcare workers and the public helps to better understand the high maternal mortality rate in the US. To investigate the public and professional perceptions of risk in labor, virtual research was conducted using SpringerLink, the American College of Obstetricians and Gynecologists, the NIH National Library of Medicine, and Northwestern Libraries. Archival research was conducted at the Wellcome Collection and the Royal College of Obstetricians and Gynecologists (RCOG)/ the Royal College of Midwives in London. In the UK, public views on risk in labor changed as birth activists pushed for more home births, autonomy in the birthing process, and as professional attention was increasingly placed on reducing the cesarean section rate, despite rates continuing to increase (NHS Digital, 2022). Activists in both the US and the UK were concerned about the overuse of interventions leading to higher maternal mortality and morbidity, although professionals viewed interventions as reducing risk, either to the mother or fetus, or both. Notably, some sources supported that doctors may rate risk in labor the lowest, compared to midwives or pregnant women (Lee et al., 2019). Our research highlights the need for better public education about the utility of certain interventions in labor, such as induction, in reducing maternal mortality and morbidity. Furthermore, it supports a greater emphasis placed on women's autonomy in labor for reducing birth anxiety.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 171/471

DeLeon, Isaiah Faculty Advisor: Ann Bradlow

Darren v. Blaine: the effects of listener stereotypes on the perception of sibilant duration

This study seeks to examine longer sibilant duration as a factor for gay men's speech. This paper adds to a growing body of literature regarding how perception of speech changes by way of detecting sexual orientation in conversation. Using Darren Criss as a source for visual and auditory stimuli, the current study attempts to close the gap between experimental settings and real-world practices in speech. A Word-Spotting task and Two-Alternative Forced Choice task are used to prime participants of utterances and the speaker's sexual orientation and have them select two alternatives that shed light on their ideas pertaining to sibilant duration and speech stereotypes. It is hypothesized that participants will indicate longer sibilant durations in the 2AFC task when assigned to the gay visual stimulus condition compared to the straight or neutral visual stimuli conditions. The results indicate there are no differences between the assigned experimental conditions, and the study advocates for current sociolinguistics research with more holistic accounts of gay men's dynamic identities and robust speech profiles.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 449

Deng, Lynna Faculty Advisor: Ludmilla Aristilde

Wastewater Bacterium Comamonas testosteroni: A Promising Platform for Microbial Plastic Recycling

In conventional, mechanical plastic recycling, plastic is melted, mixed, and extruded. Due to the mechanical stress and heat, the plastic deteriorates, becomes unusable after multiple recycling cycles, and must ultimately be disposed of via landfilling or incineration. Low-density polyethylene (LDPE) comprises the largest proportion of U.S. plastic waste generation (23%) and a disproportionately low proportion of U.S. plastic recovery (14%), making it a particular target for alternatives to mechanical recycling. The wastewater bacterium *Comamonas testosteroni* was probed as a prospective platform for microbial LDPE waste degradation. *C. testosteroni* was cultured with LDPE pellets for six weeks alongside controls containing pellets and no bacteria. Acetate, a common wastewater co-substrate, was added at concentrations of 0, 10, and 40 mM C to bacterial and control samples. The number of viable bacterial cells was monitored using plating. Scanning electron microscopy (SEM) was used to examine the pellets for physical signs of degradation, and infrared spectroscopy was used to measure the carbonyl index (CI) of the pellets, a chemical indicator of plastic degradation. Bacterial growth occurred at all acetate concentrations, and bacterial growth rate increased with acetate concentration. SEM images showed pellet surface roughness increased with acetate concentration in bacterial samples. CI in bacterial samples was higher than in control samples and increased with acetate concentration in bacterial samples. Taken altogether, our data indicate *C. testosteroni* natively degrades LDPE, and acetate enhances this degradation. We present *C. testosteroni* as a promising platform for LDPE waste processing and look toward further process optimization.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 492

DiPasquale, Adam Faculty Advisor: Joshua Leonard

Engineering Extracellular Vesicles to Optimize Biotherapeutic Delivery

Biotherapeutics show promise for treating many diseases, but are hindered by challenges with their delivery. Extracellular vesicles (EVs) hold a high potential as biotherapeutic delivery vehicles due to their low immunogenicity and ability to encapsulate a diverse array of cargo. However, EVs are limited by fast clearance from the body via uptake by nontargeted cells. We hypothesize that engineering EVs with mucin biopolymers would reduce EV nonspecific uptake, facilitating more effective biotherapeutic cargo delivery. To evaluate this hypothesis, EVs were isolated from Freestyle 293-F cells engineered to express a luminescent reporter (nanoluciferase), a doxycycline inducible mucin circuit, and T cell targeting molecules (anti-CD2/3 scFv) using ultracentrifugation. The amount of mucin expressed on the cell/EV membranes was varied by inducing the circuit with different amounts of doxycycline. The biophysical properties impacting EV uptake, including morphology, membrane fluidity, and mucin/targeting molecule loading, were measured using cryoEM, Laurdan GP, and single vesicle nanoflow cytometry. Uptake studies using Jurkat T cells and RAW264.7 macrophages were run to examine how varying levels of mucin and T cell targeting moieties affected the specific and nonspecific uptake of EVs. The results from this investigation indicate that balancing the loading of these molecules on the membranes of EVs plays a pivotal role in tuning their specific and nonspecific uptake, with mucin's impact on EV biophysical properties enabling this adjustability. These findings promote additional research with EVs involving loading their membranes with different molecules, like fusogens, to further improve their utility as therapeutic vehicles for combating disease.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 333

Do, Faith

TEAMs Human-AI Interaction Project

The efficacy of a group's teamwork can be evaluated by observing temporal sequences of direct communication between members at any given time. This study observes changes in this "state" based on the introduction of an AI teammate. We observed 59 teams of 2-3 members that completed two 15-minute tasks: one in problem solving, and another in creativity. These tasks were then repeated with the introduction of Vero, a Wizard-of-Oz Agent. Vero offered different types of assistance and appeared anonymously in one of four random modes: Taskwork, Teamwork, Combined, or Unleashed.

Group audio was automatically transcribed, with individual utterances coded based on the speaker and intended recipients, creating "hyperevents" where members often addressed multiple people at once. We analyzed these hyperevents using Relational Hyperevent Models (RHEM). RHEM extends relational event modeling by a) accommodating multi-recipient messages and b) estimating how the likelihood of an utterance depends on the evolving network.

Across tasks and variations, Vero altered two core features of team communication: the tendency to repeat sender-recipient patterns and the spread of participation. Across both task types, Vero's presence decreases cyclic and transitive closure, and increases repetition and individual participation - with the size and direction of effect changing based on mode. Results indicate Vero's addition reshaped core team dynamics beyond just its mere presence.

Ongoing analyses relate the estimated RHEM parameters to team performance in accuracy for problem-solving and fluency and novelty for creativity. The study demonstrates an accessible approach for examining the impact of algorithmic agents to a team network.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 445

Drinko, David Faculty Advisor: Yarrow Axford

Environmental Changes After European Settlement Inferred from Sediment Chemistry of a Wisconsin Lake

The Midwestern United States has undergone dramatic environmental changes in the ~200 years since the first European settlements. From clear cutting forests to setting up our modern roadways, neighborhoods, and croplands, the surrounding landscape changes are reflected in the sediments of local lakes. Lakes therefore provide unique archives of environmental history. We use sediment composition including organic carbon and nitrogen abundance, as well as the $\delta^{15}N$ and $\delta^{13}C$ stable isotopes and x-ray fluorescence spectroscopy (XRF) to assess elemental abundance and magnetic susceptibility of bulk sediments to study the impacts of European settlement on the landscape. Sediment cores collected from Gass Lake in Manitowoc County, Wisconsin (0.026 km^2 and ~7 m deep) were ^{14}C-dated and cover the past ~125 years. Gass Lake's watershed was a diverse deciduous forest before European settlement, then clear-cut in favor of agricultural lands, causing nutrient loading due to both deforestation and fertilizer use, which our sediment core proxies show. This has caused Gass Lake to become eutrophic with intense algal blooms, especially after precipitation events. We present a record which indicates that Gass Lake has undergone a shift toward algal-dominated organic as opposed to some input from terrigenous plants. This occurs despite a consistent signal of artificial fertilizer input as seen in the nitrogen isotope record. Gass Lake has also experienced major fluctuations in clastic sediment deposition alternating between tan, minerogenic sediments and black, organic-rich sediments. We put forth three hypotheses for this change in sedimentation and more recent shifts away from minerogenic input.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 477

Dushime, Sylvie Faculty Advisor: Clovis Bergere

Ikinamico: A Sonic Archive of Language, Performance, and Memory

This paper explores *Ikinamico*, a long-running Rwandan anthological radio drama, as a powerful yet understudied medium of cultural memory and social education. While much of the existing scholarship on Rwandan media focuses on the 1994 genocide against the Tutsi and the role of incitement through radio outlets like RTLM, this research shifts the lens toward constructive uses of radio in everyday life. Produced entirely in Kinyarwanda since 1984, *Ikinamico* is a serialized radio theatre/drama that explores themes such as domestic violence, corruption, and interpersonal relationships. The word *Ikinamico* directly translates to a play of culture. I argue that *Ikinamico* weaves oral storytelling traditions in the plays through scripts and sonic worldbuilding.

Through media analysis of selected episodes, interviews with the production team, and an exploration of audience engagement on social media, this paper investigates *Ikinamico*'s narrative structure, sound design, and performance style. It draws on the concept of "Radiorature," a form of technologized oral literature, to position the drama as both an educational tool and a cultural archive. I suggest that the program's improvisational ethos and deep reliance on proverbs, legends, and traditional idioms is a way of preserving Kinyarwanda. I suggest that *Ikinamico* can serve as an unexpected but important entry point into the digital history of Rwanda. In that way, I look at how meaning-making and history are also negotiated through sound, performance, and popular culture on the radio.

Presentation Format: Oral
Time: 12:45pm-2:15pm
Room: Rock Room
Number: 438

Dwivedi, Smera Faculty Advisor: Songi Han

Exploring Low-Density and High-Density Water Populations Using Nuclear Magnetic Resonance (NMR) Spectroscopy

Water is essential in biological processes, not just as a solvent but also plays critical roles in the function of biomolecules. The presence of two water populations with different densities, structures, dynamics, and hydrogen bonding properties has been theorized to impact bio-molecular interactions. However, their existence has been challenging to experimentally measure, both because the signals from water molecules tend to be overwhelmed by the tremendous signal from the bulk (where water molecules only interact with themselves), and because the different populations likely undergo fast exchange. This project aims to explore methods to measure the two populations of water experimentally in bulk water using nuclear magnetic resonance (NMR) spectroscopy to lay down the foundation for investigating water-protein interactions in the future. NMR offers information on both the chemical environment and molecular dynamics of water. The change in chemical shift of 17O nuclei in water highlights the change in molecular structure, while the changes in spin-lattice relaxation (T1) rate and spin-spin relaxation (T2) rates inform change in molecular tumbling rate. We evaluated these spectroscopic properties of water under a series of temperatures ranging from -15C to 25C with a special focus around 4C (water's densest point). Detailed analysis of the line shape and relaxation of water NMR signals were carried out, which yielded intriguing results that could lead to advancements in our understanding of the structure of water in liquid state.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 394

Edwards, Annie Faculty Advisor: Neal Blair

The acceleration of carbon sequestration by humans in a Southern Illinois Floodplain

Measurements of how much carbon dioxide is being removed from the atmosphere, carbon sequestration, are instrumental to modeling efforts to understand and manage anthropogenic climate change. Floodplains, specifically, have been argued to be an increasingly important site of carbon sequestration via carbon burial. Human activity has been increasing soil erosion rates in river systems since industrialization. Sediment (and carbon) is delivered to floodplains from soils eroded upstream, so accelerated erosion rates have been hypothesized to also increase carbon deposition and sequestration rates in these systems. However, there is still much uncertainty as to the magnitude and efficiency of carbon sequestration in floodplains. Our study investigates floodplain sediments collected from the Sangamon River Valley in the agriculturally dominated Southern Illinois, USA. We measured organic carbon (OC) concentrations and isotopic signatures in the sediments to understand OC sources and sequestration rates. Our analysis indicates that 59–84% of OC deposited in the floodplain was lost (likely back into the atmosphere) and not sequestered after European settlement in the region ~150 years ago. The persisting 16-41% that was sequestered was sourced primarily from the riverine input as opposed to the forest ecosystem on top of the floodplain. The isotopic measurements indicate that the sequestered OC was older and derived from the broader watershed rather than the local floodplain environment. Understanding sequestration dynamics of floodplains lends insight into the long-term impacts of human accelerated soil erosion on the carbon cycle.

Presentation Format: Oral
Time: 10:45am-12:15pm
Room: Lake Room
Number: 346

Egedigwe, Eni Faculty Advisor: Mercedes Spencer

Cracking the Code: Enhancing Detection of Reading Disorders

Specific learning disorders (SLDs) in word-level reading and reading comprehension are significant public health concerns due to their high prevalence and persistence. SLDs are neurological conditions that affect the ability to read and understand written language, existing as difficulties in decoding words or grasping the meaning of text. These disorders impact an estimated 3% to 20% of children in word-level reading and 8% to 10% in reading comprehension, affecting nearly 5.5 million children in the United States alone. The negative consequences for these children and their families emphasize the urgent need for improved identification and classification models. Our study aims to refine and validate new models for identifying and classifying reading disorders to better support children with SLDs. In this ongoing study, I supported several aspects of project development, including utilizing REDCap for data collection and management and creating participant recruitment materials. Parents will complete questionnaires covering a wide range of areas, including family history, parenting, home and neighborhood environment, and their child's language background and learning. For this presentation, we visualize descriptive data related to the questionnaire items created in REDCap, examining the number of items across different constructs and the format of these items to identify patterns throughout the questionnaire. This approach provides insights and feedback during research questionnaire development. Our goals are motivated by the critical need to develop improved models of identification and classification for SLDs, addressing their causes, consequences, and co-occurring conditions, and expanding our understanding of the nature and origins of these disorders.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 011

Feng, Hui Faculty Advisor: Viorica Marian

Mother-Child book-sharing activity differs across Taiwanese and American Cultures

We examined the narrative styles of Taiwanese-Mandarin and American-English speaking mothers and their preschool-aged children during a book-sharing task. Results revealed cross-cultural differences in narrative styles: Taiwanese dyads engaged in more instructional storytelling, while American dyads displayed more elaborative, co-constructed narratives. For example, Taiwanese mothers more frequently directed their child's attention and provided instruction, while American mothers more often built on the child's narratives and encouraged elaboration. These findings highlight how culture shapes maternal language scaffolding and child narrative development. Understanding cross-cultural variation in parent-child book sharing can inform pediatric narrative assessment and intervention, as well as parent coaching strategies for families from culturally and linguistically diverse backgrounds.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 301

Ferret, Josep Faculty Advisor: Baron Reed

Rethinking Moral Disagreements: A Model for Mapping the Divergence of Belief

I aim to investigate the root causes of moral disagreement by introducing a philosophical model that maps the divergence of moral beliefs through a systems-based framework. Rather than focusing solely on competing claims about what constitutes “moral facts”, I have created a model that identifies how implicit assumptions about systems (what moral evaluations are directed toward), and their functions (the goals or effects moral actions aim to produce) shape moral frameworks and, in turn, define what counts as moral knowledge. By structuring belief paths along these three dimensions, the model categorizes moral positions into nine distinct types, revealing both semantic and substantive sources of disagreement. This model shows that even philosophers nominally aligned within the same school-such as moral realism or relativism-may diverge due to incompatible definitions of core terms like "moral fact." The model is then applied to major ethical theories, including Utilitarianism, Subjectivism, Kantian Deontology, and Divine Command Theory, to illustrate how their divergences arise from differing interpretations of the systems and functions of the driving moral question. Lastly, I explore pragmatist interpretation of Quietist Moral Realism, demonstrating how the model not only maps disagreement but also reorients the meta-ethical conversation toward diagnosing and reconceptualizing the implicit questions that underlie moral inquiry. In doing so, this paper contends that the most profound disagreements in moral philosophy often stem not from conflicting conclusions, but from unacknowledged divergences in the presuppositions that guide the question: "What ought we to do?"

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 427

Flener, Shaafi Faculty Advisor: Scott Ogawa

Measuring the Impact of High School COVID-19 Policies On Enrollment Changes

The impact of the COVID-19 pandemic had long-reaching effects in nearly every industry and specifically in the education market as parents were faced with decisions around how to best educate their children safely. In this paper, I analyze the effect of choice of modality in the 2020-21 school year on changes in enrollment from 2019 to 2021 for public and private high schools in Cook County. Existing literature on the effects of modality during this time center around either enrollment of middle and elementary school-age children, or the effect of modality on test scores. I found a statistically significant decrease in the percentage change of enrollment in schools which spent more time being virtual or hybrid during the 2020-21 school year compared to schools which spent more time in-person rather than hybrid or online. For only schools in Chicago, there was a statistically significant decrease to enrollment for both schools which spent time completely virtual and time hybrid. These findings suggest that parents during COVID-19 influenced learning were more favorable towards ensuring normalcy in their children's educations than CDC or the Illinois Department of Public Health guidelines may have allowed.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 465

Flores, Maggie

The Experiences of Dyslexic Students in Higher Education

Dyslexic students in higher education face persistent academic, social, and institutional challenges, yet their lived experiences remain understudied in the U.S. context, particularly regarding the effectiveness of standardized accommodations. This qualitative study explores the experiences of dyslexic students across U.S. higher education institutions, examining their access to accommodations, perceived efficacy of support systems, and the broader psychosocial impacts of dyslexia. Expanding beyond prior research focused on elite universities, this project adopts an inclusive approach by recruiting 10 survey respondents and 5 interview participants from diverse higher education settings. Data were collected via anonymized surveys (assessing accommodation use, academic challenges, and stigma) and semi-structured interviews (probing individual narratives). Preliminary findings suggest a disconnect between standardized accommodations and students' unique needs, with participants reporting mixed effectiveness of note-taking support, testing accommodations, and assistive technology. Some describe institutional barriers surrounding accommodation programs and report difficulties acquiring accommodations, exacerbating feelings of anxiety common in the majority of participants. Additionally, social and emotional challenges-such as microaggressions and effort erasure-emerge as critical yet under-addressed factors. These insights highlight the need for more personalized, holistic support frameworks in higher education, including faculty training, universal design principles, and peer networks. By centering student voices, this study contributes to a growing body of advocacy research aimed at reducing disparities for dyslexic learners. Implications call for institutional reforms that move beyond compliance-driven accommodations to foster genuinely inclusive academic environments.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 227

Fofana, Mariam Faculty Advisor: Diego Arispe-Bazan

Rareh Gyals: Outcasts or Pioneers? A Close Analysis of Time-Defiant Krio Speech Trends and Its Implications for the Future

Linguistic innovations among marginalized communities are powerful acts of memory-making and self-definition. In Sierra Leone, sex workers, often relegated to society's margins, have played an important yet understudied role in shaping the Krio language through speech patterns that encode survival, defiance, and solidarity. This paper investigates linguistic trends among Sierra Leonean sex workers, focusing on their use of Krio to articulate exclusion and challenge hegemonic structures. Drawing on oral histories, ethnographic accounts, and linguistic analysis from two documentaries, I examine how these women use lexical choices, tonal shifts, and idiomatic expressions to assert agency in a society that often seeks to erase them. Positioned within discourses on gender, labor, and linguistic evolution, this study centers Sierra Leonean sex workers as linguistic pioneers whose innovations subvert temporal and social hierarchies. Their speech does more than mirror lived experience—it actively reshapes the socio-linguistic backdrop of contemporary Sierra Leone. The fluidity of Krio enables constant negotiation of power, and these women's contributions highlight language as a tool for stance-taking. Ultimately, this paper argues that examining Krio through the lens of sex workers' speech offers critical insight into the intersection of language, identity, and power. These women are not only outcasts, but time-defiant figures who redefine the boundaries of Krio's evolution while crafting self-determined identities. Their speech both preserves communal memory and signals the possibility of a more inclusive Sierra Leone.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 401

Fu, Lillian Faculty Advisor: Claudia Haase

Assent and Negation Language and Emotional Experiences in Marriages and Friendships

Language can provide a unique window into close relationships. Assent language (e.g., "yes", "okay") can signal validation, while negation language (e.g., "no", "never") can signal invalidation. The present project combined two laboratory-based dyadic studies with married couples (N=98 individuals) and friends (N=216 individuals) to examine links between assent and negation language and emotional experiences. In both studies, dyads engaged in 10-minute videotaped conflict and pleasant conversations. Then, they reported on the intensity of their subjective negative and positive emotional experiences. The relative frequencies of assent and negation words were calculated using the Language Inquiry and Word Count software. Linear mixed models revealed that, for married couples, both actor and partner assent were associated with lower negative emotions, and partner negation was associated with greater negative emotions (driven particularly by conflict conversations). These results generalized across gender and remained essentially stable when controlling for age, socioeconomic status, assent/negation word frequency, and total word count. Unexpectedly, for friends, there were no significant associations between assent and negation words and emotional experiences. Taken together, these findings show that assent and negation language have different emotional correlates in marriages vs. friendships and highlight the importance of examining language uses across different relationship contexts to capture their multi-functional nature.

Presentation Format: Oral
Time: 10:45am-12:15pm
Room: Arch Room
Number: 347

Gal, Emily

Faculty Advisor: Kevin Hellman

Cramps and Choices: How Young Adolescents Navigate Medication Usage and Absences Due to Menstrual Pain in the Two Years After Menarche

Up to 90% of girls experience menstrual pain that disrupts daily life, with 10-20% missing school as a result. While school absenteeism has been studied, less is known about how decisions to forgo social and physical activities relate to school attendance-and what factors shape these choices during this pivotal developmental period. We conducted a prospective cohort study of adolescents who completed a premenarchal visit and postmenarchal menstrual diaries every four months for two years (n 222). We collected demographic data and tracked daily menstrual pain, medication use, and monthly reports of missed school, social, and physical activities. Based on a novel menstrual decision-making model, we hypothesized that girls would be most likely to take medication, then miss physical activity, followed by social and school activities, due to differences in perceived benefits and costs. The results supported this: 21.38% missed only physical activity, 9.33% missed all three, and 8.70% missed both physical and social activities. Logistic regressions showed that each unit increase in maximum menstrual pain was associated with a 62.6% increase in the odds of medication use, a 33% increase in the odds of missing physical activity, and a 16% increase for social activity (Ps<0.01), with no significant effect for school. Anxiety and parental graduate education also significantly mediated absenteeism likelihood. Although medication was widely used, it failed to prevent activity disruption for many users. These findings underscore the need for improved pain management strategies and comprehensive menstrual education tailored to adolescents navigating early post-menarche years.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 410

Georgieva, Nina Faculty Advisor: Julia Kalow

Upcycling rubber waste through dynamic bond incorporation

Synthetic polymers, or large molecules composed of many small repeating units, are a significant source of global pollution. Up to 20 million metric tonnes of polymer products leak into the environment each year, wreaking havoc on global ecosystems. One synthetic polymer, polybutadiene, is a main component in tire rubber. Rubber products are resistant to natural degradation and typically landfilled at the end of their lifetime, causing a continuous buildup of rubber waste. It is imperative to develop a method for recycling rubber to promote sustainable circulation and reduce its negative environmental impact. Thus, we have pioneered a method by which we can convert ground-up rubber waste into a covalent adaptable network (CAN), which is a dynamically crosslinked polymer that can be reprocessed and recycled. We hypothesized that by incorporating a dynamic covalent crosslink into the polybutadiene polymer backbone, we could bind the interfaces between individual rubber particles while maintaining the ability to self-heal. Infrared (IR) spectroscopy was used to confirm effective incorporation of the sulfur-containing compound, and the modified rubber was then pressed and re-processed. By hot pressing, we were able to successfully create uniform films out of rubber waste particles, and tensile testing of the resulting films was used to compare the material properties of the recycled films to commercial rubber. Upcycled films proved to be stronger yet more brittle compared to their commercial counterparts. Ideally, this upcycled material could become a useful alternative to current disposal methods of tire rubber, decreasing rubber pollution.

Presentation Format: Oral
Time: 10:45am-12:15pm
Room: Lake Room
Number: 222

Gerber, Jessica Faculty Advisor: Adam Lin

Injectable Synthetic Bone Marrow Grafts (ISBM)

Bone marrow transplants (BMT) are often performed to replace damaged or diseased bone marrow with healthy stem cells. There are several reasons why engraftment may be delayed to ensure the safety of a patient, but postponing engraftment is a significant cause of patient mortality following stem cell transplantation. This project strives to create a synthetic temporary bone marrow graft capable of hematopoiesis specifically for white blood cells. The first goal of this research includes optimizing the chemical structure of the hydrogel. The thiol-maleimide chemical crosslinking is compared to a citrate-based biomaterial. The weight percentage, cell count, and ratio of laminin to fibronectin present are examined to determine which material most successfully promotes stem cell engraftment and survival. In addition, flow cytometry is used to study the cells present in the hydrogel. The second objective involves in vivo testing of the hydrogel in a mouse model. The femurs and tibias are harvested from the mice and kept with PBS solution on ice. A bone cutter is used to remove both ends of the bone, and the existing bone marrow is flushed out. Bone marrow already present in the mouse is depleted to remove hematopoietic cells before the synthetic bone marrow is transplanted. This mimics traditional bone marrow transplants often used to treat patients with blood cancer. Preliminary results indicate that azide-DBCM is not as effective as other hydrogel compounds. This research seeks to develop a clinically viable, implantable product for patients who require bone marrow transplants.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 468

Ghuman, Raav Faculty Advisor: Piotr Dworczak

Go With the Flow: Evaluation of Welfare Gains to Proportional Surface Water Rights

Surface water markets facilitate reallocation of water between users by allowing for trading of water rights, offering flexibility if initial allocations are not ideal. However, water markets still lead to inefficient outcomes due to transaction costs from many sources, one of which are the rights themselves. This paper develops a two-agent cooperative bargaining model to compare the welfare outcomes of absolute versus proportional water rights, with proportional allocations being a percentage share of the surface flow in a given year, compared with the fixed quantities specified in absolute rights. Using a Monte Carlo simulation framework, I evaluate how each regime performs in terms of social surplus as well as individual utility, incorporating distance and rights-related transaction costs to simulate trading frictions, as well as stochastic water availability. Proportional rights result in a 10.2% increase in social surplus relative to absolute rights, and outperform absolute rights in 99.9% of simulations. Proportional rights continue to perform better under growing urban population, and when hydrological variability increases, proportional rights perform even better with respect to social surplus, demonstrating their potential to serve as a form of climate resilience.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 419

GoingSnake, Athena Faculty Advisor: G.H. Crystal Ng

Manoomin/Psii and Water Relations in the Otter Tail Watershed: A Community-Driven Hydrologic Study

In the Great Lakes region, many Indigenous tribes have a strong relationship with Manoomin (Ojibwe)/Psii (Dakota) or wild rice. Manoomin/Psii and their waterways are sacred relatives to these communities and central to their wellbeing and cultural identities. Due to several environmental stressors-drastic water level changes, climate change, invasive and competitive native plants, and contaminants- Manoomin/Psii has increasingly been declining. A larger collaborative effort, *Kawe Gidaa-Naanaagadawendaamin Manoomin* (*First We Must Consider Manoomin/Psii*), works with and for many Anishinaabe communities toward the preservation and protection of their relative. This study is part of that collaborative and specifically aims to assess the dynamic relationships between ground and surface water fluctuations and Manoomin/Psii at five waterways in the Otter Tail watershed located in western Minnesota. With tribal permission, two of these sites were on the White Earth Ojibwe reservation and three were on ceded territory. Through collaboration with our White Earth partners, the team installed stream gauges and piezometers with pressure transducer sensors at the study sites in mid April. Manual water calibration and survey data were collected in mid July by canoe or with waders. These measurements included water depth, stick-up height, inner depth-to-water, outer depth-to-water, elevation, and GPS locations. The next steps included calibrating and plotting the data where we found significant fluctuations in water levels and both upwelling (groundwater moving up) and downwelling (surface water moving down). Downwelling and upwelling occurring at these lakes means that harmful contaminants can be entering through both the surface and ground water in the Otter Tail watershed. The changes in water levels throughout the season can also potentially be causing harm to this relative during their vulnerable life stages. Continued monitoring in these waterways in partnership with tribal resource managers is essential to help protect and maintain Manoomin/Psii for these communities and future generations of caretakers.

Presentation Format: Oral
Time: 10:45am-12:15pm
Room: Armadillo Room
Number: 452

Goldberg, Lilah Faculty Advisor: Lilah Shapiro

Not Just Sweet Treats: Exploring the Treatment of People with Celiac Disease Through the Lens of French and Italian Gluten-Free Bakery and Restaurant Owners

Celiac disease has no cure aside from a strict, lifelong adherence to a gluten-free diet. Research on celiac tends to focus on diagnosis or symptoms, leaving the daily experiences of the gluten-free diet largely unexplored. Despite restaurants' social and cultural significance, few studies have examined how employees of gluten-free establishments interact with this population in a non-clinical setting. This study explores the experiences of owners and employees at dedicated gluten-free bakeries and restaurants in Paris, France, and Rome, Italy. I conducted semi-structured interviews with 19 gluten-free establishments, 9 in Paris and 10 in Rome, with current employees fluent in English and over the age of 18. The interviews were analyzed using a grounded theory approach. Three primary themes emerged: (1) a strong sense of community between coworkers and between customers and employees, (2) a heightened level of emotional connection within the establishment, and (3) a shift in employees' perceptions of celiac, with reduced prejudice and increased awareness. These themes reveal a largely underexplored socio-emotional experience for both celiac patients and food workers. This study contributes to scholarship on the unique burdens of celiac disease as revealed by gluten-free spaces designed to accommodate the medically necessary dietary needs of the population, and may inform policy efforts to better support food workers and improve the daily experiences of celiac patients and individuals with special diets. Lastly, this project may speak to broader societal issues, including inclusion, belonging, and the intersection of food, health, work, and identity.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 186

Gordwin, Jackson Faculty Advisor: Sepehr Vakil

A Different World: How Black Men Perceive their Belonging at Northwestern

Sense of belonging can be used to determine a person or group of people's perceived fit or connectedness to a particular environment. For Black men-who are underrepresented in higher education-this sense of belonging is a determinant of academic persistence and well-being. At predominantly white institutions (PWIs) like Northwestern University, Black male students often face unique challenges that shape their ability to feel included, supported, and understood.The current project uses a grounded theory approach to explore how Black undergraduate men at Northwestern perceive their academic and social belonging. Interviews with 20 students revealed several key findings. First, social relationships tend to shift toward Blackness over time, with many students beginning college in predominantly white or Asian peer groups and later gravitating toward majority-Black communities. Second, participants-particularly in STEM spaces-often feel academically underprepared and report needing to work harder than their peers to succeed. Third, Queer Black men highlighted that Northwestern's LGBTQ+ spaces did not fully reflect their identities, leading to further isolation. In addition to these findings, national rhetoric around DEI efforts and race-conscious programming has introduced new anxieties about the durability of the spaces and initiatives that currently support Black undergraduate men's sense of belonging.

Presentation Format: Oral
Time: 12:45pm-2:15pm
Room: Arch Room
Number: 344

Granston, Arielle Faculty Advisor: Adrian Rodriguez Contreras

The Impact of Hypoxic Exposure on Nervous System Development in Neonate Rats

Premature infants commonly experience tissue oxygen deficiency, or hypoxia, which may impair neurovascular regulation during perinatal development. While literature indicates that hypoxia damages retinal tissue, its impact on the broader nervous system remains unclear. In our preliminary study, we investigated hypoxic effects on neonatal sensorimotor behavior using rat pups as a model of prematurity. We hypothesized that hypoxia may disrupt nervous system development, implicating motor control and sensory localization. 50% of a 14-pup litter was randomly assigned to an experimental group that was separated from the dam and exposed to hypoxic conditions (10.8% oxygen, 89.2% nitrogen) for 12 minutes at postnatal days 0 and 1 (P0 and P1). The control group also experienced maternal separation but remained breathing room air. We then conducted weight measurements (P0-P15, P21), 4-arm maze behavioral testing (P10-P15), and auditory brainstem response testing using pure tones from 2-36kHz (P21). Based on evidence that typically-developing pups prefer familiar scents, we placed pellets in each maze arm with one containing a sample from the litter's cage. Preliminary analysis of P10 revealed that 43% of the control pups navigated to the sampled pellets compared to 14% of the hypoxia-exposed pups. Furthermore, the experimental group had a 29% mortality rate while all control pups survived. These findings suggest that hypoxia may cause more extensive damage than we hypothesized, both affecting sensorimotor abilities and increasing mortality likelihood. A replicate experiment will test the validity of these findings, potentially advancing our understanding of the prognosis of hypoxia and premature births.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 149/270

Guallpa, Amy

Creating Four Isogenic Strains with Different Prion states in Yeast

Prions are infectious proteins that can exist in either normal non-prion or aggregated prion conformations. The mammalian prion PrP^{sc} is considered the causal factor of many fatal and aggressive neurodegenerative diseases known as Transmissible Spongiform Encephalopathies (TSEs), which includes Creutzfeldt- Jakob disease. Numerous prions have been identified in yeast, which are transmitted as inheritable protein conformations similar to that of PrP^{sc}. This project aims to create four isogenic strains of the yeast, *Saccharomyces Cerevisiae* with prion and non-prion conformations of Sup 35, a translation termination factor and Rnq1, a protein with mostly unknown functions. The prion form and non-prion form of Sup35 are termed as and [PSI^{+}] [psi^{-}], respectively, while the prion form and non-prion form of Rnq1 are termed as [RNQ^{+}] and [rnq^{-}].Through our research, we have successfully obtained the four strains containing: [RNQ^{+}][PSI^{+}] , [rnq^{-}] [PSI^{+}] , [RNQ^{+}][psi^{-}], and [rnq^{-}][psi^{-}]. These results were accomplished by curing [*PSI*] and/or [*RNQ*] from a parental strain containing both prions with guanidine hydrochloride. This technique causes inhibition of Hsp-104, a protein that is essential for prion propagation. Our results are confirmed by a combined analysis of phenotypic and fluorescence microscopic assays. We hope that our findings can be used in single-cell transcriptome analysis to further understand the function of Rnq1 and [RNQ^{+}] in yeast.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 331/491

Guan, Angela Faculty Advisor: Junsoo Kim

Detangling Entanglements: Using topology to mechanically tame polymers

Suppose a material that is like a necklace at the molecular scale - a polymer. Chemistry can answer how arranging the beads (monomers) can strengthen a polymer, but what if these "molecular necklaces" are tangled in a network? Now, this introduces a question of how topology, or the structural arrangement of polymers, define the mechanics of tension distribution. Here, we tune a crosslinked poly ethyl-acrylate (PEA) network with N-Methylformamide solvent to induce variations in entanglements. Specifically, we characterize local entanglements by their transience to unraveling, which can be systematically tuned to synchronize tension on a macroscopic scale. In consequence, we find this tuning parameter can be optimized to experimentally increase strength 2-fold, toughness 2-fold, and stretchability 10-fold. Our work magnifies a perspective of soft materials: by topology, they can become mechanically robust and qualify applications in soft robotics, cell/tissue engineering, 3D printing, etc.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 959

Guba, Mollie Faculty Advisor: Mark Alznauer

A Kantian Perspective on Plea Bargaining in the United States

In recent decades, the process of resolving criminal cases in U.S. courts has become dominated by plea bargains. Today, 98% of federal convictions and 95% of state-level convictions are reached through plea deals instead of the jury trial at the heart of the criminal justice system. While scholars have explored the legal and sociological dimensions of this issue, little attention has been paid to the ethical implications of a criminal justice system defined by negotiations. In this project, I argue that these ethical issues are most clearly illuminated by applying the lens of deontological ethics through Immanuel Kant's theory of punishment. To provide real-world context for my ethical analysis, I have conducted interviews with nine attorneys in which I gathered their insights on plea bargaining practices; these insights captured attorneys' internalization of negotiation-based criminal justice as well as highly inconsistent sentencing outcomes based on factors unrelated to guilt or innocence. I then analyze these insights using Kantian ethical principles that are central to criminal justice but are currently undervalued. I find that a Kantian evaluation of U.S. plea bargaining practices points to three primary principles we ought to prioritize to reexamine our negotiation-based approach to criminal cases: (1) avoiding efficiency-driven criminal punishment, (2) imposing proportionate punishments, and (3) preserving the law's legitimacy. These Kantian recommendations offer valuable principles that can guide more tangible reforms in U.S. criminal courts; through this approach, we can better pursue reforms consistent with normative ideas of justice rather than pragmatic considerations alone.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 358

Guha, Sneha Faculty Advisor: Chad Mirkin

Bivalent Glucosylceramidase Spherical Nucleic Acids for Parkinson's Disease

Parkinson's disease (PD) is a neurological disorder characterized by the loss of dopaminergic neurons resulting in movement disorders and dementia. A key contributor to disease progression is the aggregation of a-synuclein, which is exacerbated in some PD patients by mutations in the GBA gene that encodes for the Glucosylceramidase (GCase) enzyme. Mutations in GBA impair GCase function, resulting in lipid accumulation that accelerates alpha-synuclein aggregation and neuronal degeneration. Enzyme replacement therapy (ERT), which introduces functional proteins to restore enzymatic activity, can be a promising strategy. However, delivering protein to the brain is challenging due to the blood-brain barrier (BBB), which limits uptake of macromolecules.

Protein spherical nucleic acids (ProSNAs), characterized by a dense shell of oligonucleotides on the surface, have shown promise in enhancing cellular uptake while maintaining protein function. Previous studies demonstrated that ProSNA with Transferrin (Tfr) aptamer enhanced protein uptake to the brain. Given folate receptors are also abundant in the central nervous system (CNS), we hypothesized that dual targeting GCase protein with folic acid and Tfr would increase receptor mediated transcytosis. We synthesized four different GCase spherical nucleic acids (GCase-ProSNA) and tested their uptake in different BBB cells. We found that the Tfr ProSNAs, and the bivalent ProSNAs showed highest uptake and enzymatic activity compared to other variants and controls. These findings indicate that GCase ProSNAs can be a promising strategy for enzyme delivery across the BBB, offering potential therapeutic benefit for PD and other neurodegenerative diseases.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 220

Guo, Charmaine Faculty Advisor: Cecile Chazot

Tuning Structural Color in Ethyl Cellulose - Poly(Acrylic Acid) via Molecular Weight Blending

Synthetic dyes are widely used in the clothing industry due to their affordability, accessibility, and broad color range. However, they come with a significant drawback: toxicity. Many synthetic dyes contain harmful components such as sulfur, nitrates, and heavy metals, making both the dyes and the resulting wastewater environmentally hazardous. Some, like certain azo dyes, are even carcinogenic. This highlights the need for safer, sustainable alternatives. When ethyl cellulose molecules are dispersed in a relevant solvent, they can self-assemble into structures that produce vivid, angle-dependent colors without pigments. This phenomenon found in nature is called angle-dependent structural color. These mesophases can be cast into films and polymerized for practical applications. Cellulose, derived from plant material, is biodegradable and non-toxic, making it a sustainable and environmentally friendly option. In this study, we explore how blending different molecular weights of ethyl cellulose affects the resulting structural color. Specifically, we examine how varying the ratios of low, intermediate, and high molecular weight components alter the hue and the spectral range of the reflected light. We use reflection spectroscopy and angle-dependent tests to study the colors produced. These tools help us see how different blend ratios affect the brightness, sharpness, and range of the reflected color. This work contributes to a growing body of research focused on sustainable materials and colorants. By providing a deeper understanding of how ethyl cellulose composition affects self-assembled photonic structures, our study helps lay the groundwork for eco-friendly alternatives to synthetic dyes in textiles, packaging, and beyond.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 395

Gupta, Neha Faculty Advisor: Allison Moreau

Emergency Medical Services and Behavioral Health: Evaluating National Protocols for Psychiatric Care

Emergency Medical Services (EMS) in the United States respond to more than 50 million calls annually, with a growing proportion involving psychiatric or behavioral health crises. Yet, many Emergency Medical Technicians (EMTs) and paramedics report insufficient training for managing conditions such as suicidality, psychosis, and substance-induced agitation, leading to negative provider attitudes and mistreatment of psychiatric patients. To identify ways to close this critical gap, this project examined how EMS systems currently train EMS personnel to respond to psychiatric emergencies. We reviewed the national EMS protocols and training curricula to assess the scope and comprehensiveness of guidelines for responding to psychiatric emergencies. We also highlight potential reforms, including to the national Model EMS Clinical Guidelines. We found that 1.5% of training materials directly address psychiatric presentations, while these calls make up 7.3% of total call volume. Further, we found that national protocols only discuss delirium and agitated/violent behavior, failing to address non-agitated psychiatric emergencies. We evaluated the most commonly used EMS textbook which contains 60 chapters, yet only one addresses psychiatric emergencies (Behavioral and Psychiatric Emergencies and Suicide). Whilst additional crisis intervention and mental health first aid training exists, these are optional "continuing education" modules which providers are not required to complete. By synthesizing these findings, we aim to pinpoint evidence-based strategies to strengthen EMT and paramedic readiness when handling psychiatric emergencies. Ultimately, this work highlights the importance of better equipping first responders to deliver safe, compassionate, and effective care for individuals in psychiatric distress.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 000

Guy, Spencer Faculty Advisor: Jeremy Keys

Optimizing Thrust Performance in Hybrid Rocket Engines through Fuel Grain Geometry and Boundary Condition Modifications

This work explores the effect of fuel port geometry on hybrid rocket performance using 3D-printed acrylonitrile butadiene styrene (ABS) fuel grains. Prior research has shown that helical port geometries enhance fuel regression rates, but the impact of additional finned structures remains unexplored. To investigate the impact of these structures on performance, we produced 3D-printed cylindrical, helical, and finned-helical fuel grains, which were then tested in an ABS/nitrous oxide (NOS) hybrid rocket engine. We performed both computational fluid dynamics simulations and static hot-fire tests to assess the combustion stability, thrust performance, and regression rate of each geometry. Our results demonstrate that finned-helical grains produce enhanced thrust and an improved regression rate over previously studied cylindrical and helical grain geometries.

Presentation Format: Oral
Time: 12:45pm-2:15pm
Room: Lake Room
Number: 100/558/559

Hall, Zoey

Faculty Advisor: Katherine Amato

Shaping the Gut: The Role of Socioeconomic and Household Environments in Microbiome Development Throughout Early Life

Associations between gut microbiome variation and socioeconomic status (SES) have been documented in studies from the United States and Europe; however, few studies have examined these patterns in Southeast Asian contexts. Understanding how SES influences microbial development in early life is crucial, as early-life microbiome composition can have lasting effects on health and disease risk across the life course. This study explores how socioeconomic conditions shape the development of gut microbial communities in early life, using data from 128 children (ages 2 weeks to 16 years) across 83 households in the Cebu Longitudinal Health and Nutrition Survey. Socioeconomic status was evaluated through asset-based groupings from both a 1983 (grandparental) and 2017 (parental) household survey. Measures of gut microbial diversity revealed that a child's age was the strongest predictor of overall diversity, with rapid increases occurring during the first six years of life ($p < 0.001$). When examining the composition of gut microbial communities across individuals, no significant associations were found for specific household-level variables, such as diet, sanitation, or income source, when tested individually. However, when children were grouped by overall socioeconomic classification and environmental exposure, clear differences in microbiome composition emerged. Patterns were visualized through ordination plots and confirmed using statistical testing (PERMANOVA), which showed significant interaction effects between age and socioeconomic grouping as well as environment microbial exposure ($p < 0.001$). Rather than being driven by any single factor, the structure and diversity of gut microbial communities appear to reflect longer-term, intergenerational patterns of wealth and exposure.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 201

Hanson, Blake Faculty Advisor: Lokeswara Rao Potnuru

Characterization of Phosphonate-Based Metal-Organic Frameworks for Atmospheric Water Harvesting

Access to clean water remains a global challenge, but atmospheric water harvesting (AWH) using metal-organic frameworks (MOFs) presents a promising solution. MOFs are a class of highly porous metal complexes capable of gas adsorption and separation. Particular MOFs have been developed for AWH; however, the water uptake ability of these candidates must be quantified with advanced spectroscopic techniques to observe local structure and dynamics. The goal of this project is to characterize the water adsorption behavior of phosphonate-based STA-(Ni) MOFs using solid-state Nuclear Magnetic Resonance (SSNMR) spectroscopy to verify their potential for AWH. Two MOFs, STA-12(Ni) and STA-16(Ni) were studied using various SSNMR techniques, including proton (1H) and oxygen-17 (17O) H2O SSNMR, which were used to elucidate water adsorption to MOF binding sites based on changes in chemical shift and quadrupolar coupling. Spectroscopic information was obtained following dehydration and adsorption of the MOF with17O isotope water. Results indicated more significant changes in the1H and17O SSNMR signal following adsorption in the STA-16(Ni) sample. This supports STA-16(Ni) as a promising candidate for AWH applications and warrants continued investigation into this MOF. To strengthen the link between STA-16(Ni) and its potential for AWH, further analysis will need to be conducted with attention to relative humidity (RH). RH is key to understanding the behavior of the MOF in different atmospheric conditions, which will indicate the change in water dynamics within the pore of STA-16(Ni). Future work examining RH-dependent water dynamics will further establish the viability of STA-16(Ni) for real-world AWH development.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 999

Heath, Evelyn Faculty Advisor: Randall Allen Poole

Leo Tolstoy on Law, Morality, and Religion

Legal institutions have been at a heightened point of contention in modern discourse on justice and governance, especially in Western nations like the United States where systems of mass incarceration are increasingly facing criticism. I examine Lev Nikolayevich Tolstoy's religious-philosophical critique of Russian and Western legal systems. Through an analysis of his work and other scholarly publications, the research explores how Tolstoy's Christian enlightenment shaped his view of legal institutions as corrupt entities that perpetuate systemic oppression rather than uphold justice. The study investigates Tolstoy's central argument that legal systems fundamentally contradict Christian principles of love, forgiveness, and non-violence. It examines his three-pronged critique: that courts function as tools for oppressing the poor, that the nobility maintains control through legal institutions, and that the system keeps common people in ignorance and suffering. I also analyze Tolstoy's prescription for reform—the complete dissolution of state institutions and moral regeneration through Christian values. His critique remains relevant to contemporary discourse on justice systems, especially regarding institutionalized violence and social inequality.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 328

Hedin, Simon Faculty Advisor: Justin Notestein

Photons to Fuel: Harnessing Light to Produce Hydrogen by Designing SiO2/TiO2 Photocatalysts

Hydrogen is a versatile, non-carbon-emitting energy source with the potential to replace fossil fuels. However, transporting pure hydrogen is energy-intensive, technically challenging, and expensive. A promising solution is to store hydrogen within chemical bonds, using compounds known as Liquid Organic Hydrogen Carriers (LOHCs). LOHCs can easily be transported using existing infrastructure and safely release hydrogen on demand. To efficiently release this hydrogen using sunlight, researchers are developing light-activated materials called photocatalysts.

Titanium dioxide (TiO2) is a widely studied photocatalyst that performs well under ultraviolet light. However, its high reactivity can make controlling specific reactions difficult. To address this, we modified the surface of TiO2 by adding thin layers of silicon dioxide (SiO2) and used protective organic molecules to create nanometer-sized reaction pockets. These modifications altered the chemistry and structure of the photocatalyst's surface, allowing its behavior to be tuned.

We tested two methods for depositing layers of SiO2: Atomic Layer Deposition (ALD), which uses vapors, and Chemical Liquid Deposition (CLD), which uses liquids. Using these methods, nineteen unique photocatalysts were synthesized and analyzed for light absorption, surface composition, and surface structure. Then, each material was tested for its ability to release hydrogen from benzyl alcohol, a model LOHC, by measuring reaction rates, activation energy barriers, and byproduct formation.

Preliminary results demonstrate that thicker SiO2 layers enhance hydrogen release and improve photocatalyst stability. This work helps researchers understand relationships between photocatalyst surface structures and hydrogen generation performance. These findings contribute to the design of advanced materials for sustainable hydrogen-based energy systems.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 277

Hesekiel, Samantha Faculty Advisor: Alissa Chung

Parenting with ADHD Symptoms: Investigating Warmth, Discipline, and Their Impact on Children with ADHD

Attention-deficit hyperactivity disorder (ADHD) is a neurodevelopmental condition characterized by persistent inattention and/or hyperactivity-impulsivity (National Institute of Menal Health [NIMH], n.d.). Symptoms often emerge in early childhood and can lead to disruptive behaviors that impact functioning at home and in school. Given ADHD's high heritability, many parents also experience symptoms, potentially complicating parenting strategies. This study examined how parental ADHD symptoms, specifically in mothers, relate to these parenting strategies and child behavior outcomes. Eighty-eight mothers of children aged 4-6 were recruited via Prolific and completed the Adult ADHD Self-Report Scale (ASRS), the Comprehensive Early Childhood Parenting Questionnaire (CECPAQ), and the Child Behavior Checklist (CBCL). Results showed that maternal ADHD symptoms, particularly inattention, were significantly linked to greater use of negative discipline, $r=0.287$, $p=0.01$, though no meaningful associations emerged with warmth or positive discipline. Parenting style, especially positive discipline, was also significantly related to children's internalizing behaviors, $r=-0.272$, $p=0.01$. While male children (67.5%) were more likely to be diagnosed with ADHD than female children (44.7%), symptom severity did not differ significantly by gender. These findings highlight the impact of maternal ADHD traits on parenting behaviors and suggest that diagnosis rates may not always reflect actual symptom levels. The use of a community sample, rather than a clinical one, may have influenced parent-reported data and should be considered in future research.

Presentation Format: Oral
Time: 10:45am-12:15pm
Room: Arch Room
Number: 101

Holliday, Annika Faculty Advisor: Mary McGrath

Willingness to Pay for Eco-Labeled Products: A Study of Green Seal Certification and Consumer Trust

This study examines U.S. consumers' willingness to pay (WTP) a premium for common household items, detergent, eggs, and milk, bearing Green Seal certification. Using an experimental survey design with 853 participants, the research explores how psychological constructs, trust, and demographic factors influence green purchasing behavior. The results reveal no statistically significant increase in WTP for Green Seal certified products compared to conventional alternatives, underscoring the persistent "green attitude–behavior gap," in which pro-environmental intentions are often outweighed by price sensitivity. General Environmental Knowledge (GEK) emerged as the strongest predictor of WTP for eco-labeled products, suggesting that factual environmental understanding plays a critical role in motivating consumers to pay a green premium. In contrast, other pro-environmental constructs, while positively associated with WTP for conventional products, do not translate into higher valuations for Green Seal versions, indicating that the presence of an eco-label alone does not sufficiently enhance perceived value. Demographic patterns showed that younger and more politically liberal individuals reported higher WTP for Green Seal products, while trust in eco-labels was greatest among older, more educated, and liberal respondents. However, overall trust remained moderate, reflecting widespread consumer skepticism likely fueled by concerns about greenwashing and performative environmentalism. These findings suggest that businesses should prioritize transparency and environmental education to increase the perceived value of certifications, while policymakers should invest in public environmental literacy and eco-label regulation. This study underscores the complex interplay of knowledge, trust, demographics, and economic trade-offs in shaping consumer behavior toward certified sustainable goods.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 310

Huang, Joyce Faculty Advisor: Ann Bradlow

Say what again?: Investigating the intelligibility of Formula 1 driver speech between situations, contexts, and language backgrounds

This abstract describes the design, collection, and preliminary analysis of a corpus focused on Formula 1 (F1) driver speech, specifically addressing intelligibility in varied communication contexts. To begin with, a corpus was created, comprising driver radio communications extracted from an existing database, categorized according to drivers' race performance, and distinguishing between high-performing and low-performing individuals. The initial corpus includes recordings of 6 complete samples of radio speech between 3 races, all hand-transcribed and documented using a novel annotation method. It has provided insight into drivers' restricted vocabulary and their distinct communication patterns with their respective race engineers. An experiment has been proposed to systematically investigate intelligibility across three distinct contexts: in-car radio communications, post-race paddock interviews, and controlled studio interviews. Additionally, the research will examine whether presenting the interviewer's question in written form before auditory exposure influences participant comprehension of driver responses, as well as the effects of first-language English and second-language English on intelligibility. The experimental design and stimuli are currently under development, with data collection anticipated in Fall Quarter of 2025. This project aims to contribute valuable insights into speech production under high-stress conditions, offering potential applications in fields such as air traffic control and emergency medical communication.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 061

Hussain, Inaya Faculty Advisor: Robin Bates

Shortwave Radio: Sublime Communication and Community of the Cold War

This paper examines the effects of shortwave radio listening in North America. Shortwave is a type of long-distance radio frequency that has been historically used to reach international audiences, especially during the Cold War when it became one of the most effective ways for countries to broadcast propaganda internationally. I argue that the sublime and emotional experience of shortwave radio listening connected North American listeners to a new sense of truth surrounding their place in international humanity, political culture, and security. Additionally, the growth of a Cold War historical culture and the continuation of Cold War political anxieties in contemporary shortwave hobbyist groups troubles periodization of the Cold War.

I focus on the attitudes and experiences of North American shortwave listeners while situating them in a global communication network. The examination timeline begins in the 1960s and continues until the current day. Since shortwave radio listening is a largely unstudied topic, my work relies on primary sources such as radio broadcast recordings, hobbyist manuals, national radio club newsletters, focus groups, internet forums, and personal websites to examine the individual and cultural impact of shortwave listening. I place a special emphasis on the set of interviews that I conducted with shortwave listeners of the Cold War. I will present my findings using a slideshow, incorporating scene setting through key audiovisual artifacts.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 173

Hutzler, Ilana Faculty Advisor: Hayley Fivecoat

Protective Factors Against Declines in Relationship and Psychological Wellbeing During Periods of Unemployment

Unemployment can be difficult for romantic couples, impacting mental health and relationship satisfaction. Low-income couples are more impacted by the financial stress of unemployment, and protective factors may differ in this under-researched population. I hypothesized that individuals with higher self-esteem, relationship gratitude, social support, and more positive coping skills (more emotion- and problem-focused coping and less avoidant coping) will have higher relationship satisfaction and lower perceived stress, anxiety, and depression, and that these factors would protect against declines in well-being over time. I surveyed 110 partners (43 couples) who were in a relationship for at least 3 years, cohabiting, and at least one partner was unemployed. Participants completed two surveys 6 weeks apart. Using multilevel modeling, I found that relationship gratitude was associated with higher relationship satisfaction, and social support was associated with higher levels of relationship satisfaction and less perceived stress. Those with higher self-esteem initially had lower levels of stress, anxiety, and depression symptoms, but these benefits of self-esteem weakened over time. Emotion- and problem-focused coping styles were not associated with outcomes initially, but longitudinal analyses showed that the benefits of emotion- and problem-focused coping for depression increased with time. Avoidant coping was associated with higher levels of depression. These findings suggest that during periods of unemployment, improving relationship gratitude and social support may benefit relationships. Improving self-esteem may be especially beneficial to mental health in the early stages of unemployment, while emotion- and problem-focused coping may be most beneficial later in unemployment.

Presentation Format: Oral
Time: 10:45am-12:15pm
Room: Arch Room
Number: 112

Idowu, Miracle Faculty Advisor: Alissa Chung

This Wasn't on the Syllabus: The Hidden Curriculum of Office Hours

Office hours are often promoted as opportunities for academic support and relationship-building between students and faculty, but do they actually serve these purposes? This study explored how race, gender, and the purpose of attending office hours relate to students' academic sense of concept and sense of belonging, two cognitive processes that relate to a student's sense of self. Over 300 Northwestern University students filled out a Qualtrics survey, and I found that 69.6% of students attended office hours and 29% did not. Contrary to existing literature, I did not find significant racial or gender differences in office hour attendance patterns. However, students who attended office hours for career-related conversations or relationship-building reported a significantly higher Academic Sense of Concept (M = 120.00, SD = 16.59) than those who attended solely for academic help (M = 108.18, SD = 15.53). They also reported a greater Sense of Belonging (M = 3.95, SD = 0.53) than their peers (M = 3.60, SD = 0.55). These findings raise critical questions: Are office hours helping build these positive perceptions, or are students who already feel confident and connected more likely to use them in this way? By highlighting the "hidden curriculum" embedded in office hours, where academic help and informal networking coexist, this study suggests reframing office hours as a multi-functional space that could strengthen student-faculty relationships and contribute to more equitable academic experiences.

Presentation Format: Oral
Time: 12:45pm-2:15pm
Room: Arch Room
Number: 970

Im, Vincent Faculty Advisor: Eyal Kimchi

Effects of Systemic Inflammation on Neuronal Activity of Transgenic Alzheimer's Mice using c-Fos mapping

Understanding the interplay between Alzheimer's Disease (AD) pathology and systemic inflammation is crucial for elucidating the mechanisms underlying acute disorders of cognition such as delirium. We therefore employed a multifaceted approach to investigate the effects of systemic inflammation on neuronal activity in brain slices in a transgenic AD mouse model (5xFAD).

We studied 5xFAD transgenic mice overexpressing amyloid and their wild-type (WT) siblings. Lipopolysaccharides (LPS) from E. coli (0.5 mg/kg) induced systemic inflammation, while a control group received a saline injection. To quantify activity in mouse brains, we used c-Fos, an immediate early gene, as the marker for neuronal activity in brain tissue. We performed immunohistochemistry on brain slices using the DAB reaction to analyze c-Fos+ cells in multiple regions of interest involved in delirium pathophysiology.

Preliminary home-cage behavioral analysis revealed and validated that systemic inflammation suppressed spontaneous locomotion in both 5xFAD and WT mice, disrupting typical circadian rhythms and being more evident in dark periods. The imaged slices for the experimental groups are currently being analyzed via QuPath - a quantitative pathology software. We are quantifying individual cells in the prefrontal cortex (pFC), cingulate gyrus (CG), hippocampus (HPA), central amygdala (CeA) regions, with the primary motor cortex (MOp) and primary visual cortex (VISp) as controls.

Statistical analysis is ongoing to evaluate potential differential sensitivities between 5xFAD and WT mice to these manipulations.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 022

Inampudi, Pranav Faculty Advisor: Richard Smith

Spatial-Temporal Profiling of Scn2a in the Mammalian Cerebellum

SCN2A is a gene that encodes for a voltage-gated sodium channel (Nav 1.2) critical to action potential firing in neurons. Genetic variants in SCN2A have been linked to a spectrum of neurological disorders affecting children, including epilepsy, autism spectrum disorder, movement disorders, and intellectual disabilities. The onset of SCN2A in the developing brain is largely unknown, and its localization in the developing cerebellum is poorly understood. Here, we use sagittal sections of human prenatal cerebellar vermis and perform spatial RNA profiling of SCN2A expression. We analyze cell-specific markers for coexpression with SCN2A, showing an enrichment to Purkinje cell layer and Deep Cerebellar Nuclei in the prenatal, and Granule cell layer in early adolescent tissue. The prenatal localization in the midgestational human developing cerebellum suggests that SCN2A might support early cerebellar circuit formation. Future studies will extend this work to ferret and mouse in vivo models to determine whether SCN2A expression displays similar patterns across these species, providing greater insights into the potential for translational research.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 073

Incardona, Luke

Self-Perceptions of Socioeconomic Status at NU

Increasing access to higher education is gaining traction as a political and social goal. Yet as it stands now, children's access to higher education is heavily influenced by their socioeconomic status or parental education, meaning college campuses are increasingly wealthier. There exists plenty of evidence demonstrating that students of different socioeconomic backgrounds experience belonging, academic adjustment, social adjustment differently and will perceive class in varying ways. However, current research on belonging and socioeconomic status operates under the assumption that a student's self-perception of socioeconomic identity does not change, when research shows that changes in how people understand their identities can affect aspects of their wellbeing. This study operationalizes SES as a combination of factors including household income, parental education and self-identity, and draws on interviews from 15 Northwestern undergraduate students with a diversity of backgrounds. It aims to understand to what extent lower-SES, middle-SES, and upper-SES students have experienced a change in their perception of their own socioeconomic status after enrolling at NU, an elite university with a high concentration of students from wealthy backgrounds. Preliminary results suggest that students tend to unintentionally self-segregate into friend groups of similar economic standings, with students of different SES backgrounds justifying this phenomenon differently. Additionally, students of all backgrounds tend to broaden their perspective of the entire socioeconomic spectrum, which can facilitate (1) students to realize some of their own privileges if they are higher-SES and/or (2) express gratitude for their own situation despite the abundance of others around them.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 154

Insfran, Luca Faculty Advisor: Mercedes Spencer

Exploring the Contributions of Contextual Factors to Students' Performance on Statewide Achievement Tests

In recent years, there has been a growing interest in the relationship between neighborhood characteristics and life outcomes. Evidence suggests that neighborhood characteristics, such as crime performance; neighborhood disadvantage (e.g., higher rates of neighborhood violence) are associated with higher achievement. For the current study, we integrated data from the U.S. Census Bureau, Illinois State Board of Education, and Child Opportunity Index. We gathered school-based geographic identifiers, or numeric codes associated with geographic areas, to link public school data (Grades 3 to 8) to neighborhood opportunity indices from the Child Opportunity Index, which includes proximity to waste disposal, green spaces, and local employment rates, among others. this presentation, we descriptive information about neighborhood characteristics for Illinois. By combining multiple sources of data, we have the potential to gain a more comprehensive understanding of the multitude of factors that may be associated with students 'academic development and neighborhood characteristics.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 375

Jallepalli, Vikram Faculty Advisor: William Horton

Emotional intensity affects the interpretation of verbal frequency expressions

When someone says, "It often snows in Chicago," exactly how often is meant by "often"? Vague adverbs like "often," which convey frequency information in relative terms, may be interpreted quite differently by different people. Moreover, evidence suggests that when asked to estimate the numerical value of such expressions, individuals utilize contextual information such as the baseline frequency of the context event (e.g., snowfall in Chicago) to formulate a response. This study examined whether the emotional quality of the context event influences our interpretation of expressions like "often." Participants were presented with several brief scenarios that each featured an individual using a verbal frequency expression to make a claim about the frequency of some event. Following each scenario, participants were asked to provide 1) a percentage estimate for the frequency expression present in the scenario, and 2) a rating of their emotional response to the scenario on a scale from -6 to +6. Frequency expressions are directional; they indicate whether a given outcome is likely or unlikely to occur. Importantly, directionality moderates the strength of frequency expressions; positively directional terms like "often" become stronger as their numerical value increases, while negatively directional terms like "rarely" become stronger as their numerical value decreases. Indeed, in more emotionally intense contexts, frequency estimates were greater for positively directional terms but lower for negatively directional terms, indicating that emotional intensity is associated with frequency expression strength. These results may have implications for surveys containing sensitive content, such as those used by medical professionals.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 326

Jamil, Matthew

From Persecution to Prosperity: Iraqi Chaldeans, Forced Migration, and Search for Home

This paper traces the modern history of the Iraqi Chaldean community, examining how sustained persecution and displacement gave way to resilience and cultural flourishing in the United States. Drawing on first-hand interviews, historical records, and academic literature, the study explores three interconnected phases of Chaldean migration: the push factors of religious oppression and violence under regimes like the Ottoman Empire and Saddam Hussein; the pull factors that attracted Chaldeans to Metro Detroit, including economic opportunity, religious freedom, and immigration reform; and the processes through which Chaldeans established thriving diasporic communities in Michigan. The paper highlights how Chaldeans have preserved their faith, language, and identity while assimilating into American society. It argues that the Chaldean experience reveals the enduring power of community networks in overcoming displacement and redefining belonging in a new homeland.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 159

Jaurigue, Sophia Faculty Advisor: Sandra Waxman

Does Naming Support 12-Month-Old Infants' Individuation of Own- and Other-Race Faces?

By 12 months, infants' abilities to represent objects are shaped by language. Using different, distinct names for a set of objects from the same category supports infants' encoding of individuating details. Thus, applying distinct names to objects promotes infants' ability to represent objects as individuals. At the same time, infants are experiencing the other-race effect (ORE), retaining their ability to represent own-race faces as individuals and losing their ability to represent other-race faces as individuals. However, little is known about how naming supports infants' representations of other-race individuals. This study examined the role of distinct names on 12-month-old infants' face processing of distinct individual faces from their own- or other-race. During the learning phases, infants (N = 26, primarily White) viewed eight faces, each introduced with a distinct name; infants in the White and Black conditions viewed White or Black faces, respectively. At test, infants viewed one face they had seen in the learning phase paired with a novel face; these were presented in silence. As expected, infants in the White condition revealed a significant preference for the novel face. Yet, infants in the Black condition (none of whom were themselves Black) revealed a significant preference for the familiar face. The familiarity preference is consistent with the prediction that processing other-race faces is more difficult than own-race faces. These findings demonstrate that providing infants with distinct names for people—White or Black— supports infants' ability to individuate amongst them; this may attenuate the ORE, strengthening infants' representation of distinct individuals' faces.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 245

Jenouri, Phillip Faculty Advisor: Jason Brickner

RNA Metabolic Labeling in Lysed Yeast Cells.

RNA Transcription measurements are the primary means to which biologists can study proteins involved in transcription. A notable technique is Nuclear run-on assay, which uses the incorporation of radioactive nucleotides and their half-lives to measure transcription rates. Another technique is SLAM-Seq, which is labeled RNA with a uracil analog (4-thiouracil) to measure transcription in living eukaryotic organisms. In my research, I am determining if RNA can be labeled in lysed yeast cells with 4-thiouracil. I am also interested in using fluorescent labeling to track this RNA transcription as opposed to the radioactive nucleotides in Nuclear run-on assay. This research will provide a new method of studying proteins essential to transcription. Null mutations in essential proteins lead to inviable cells. However, transcription has been shown to take place even in lysed yeast cells. Thus by developing a method of tracking this transcription in lysed yeast cells, essential proteins can be inhibited with antibodies without worry of killing the yeast pre-maturely. In my research, I am trying to take advantage of a thiol group located on the 4-thiouracil, which can theoretically bind with the maleimide on Fluorescein-5-Maleimide. Using this fluorescence signal, it can be checked whether RNA is labeled in lysed cells. The positive control would be labeled RNA from SLAM-SEQ.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 207

Ji, Hana-Lei Faculty Advisor: Nitasha Sharma

Challenging the Tourist: How the Experiences of Growing Up in Hawai'i Influence Engagement with Dominant Narratives about Home while in the Continental United States

Often praised for its diversity, Hawai'i has been celebrated as a "racial paradise." However, co-existing with tourist narratives, these efforts to construct Hawai'i as some form of paradise justify the ongoing occupation of Hawai'i. Several scholars of race and indigeneity in Hawai'i have defined these critiques in-depth, demystifying racial relations in Hawai'i, as well as highlighting how these popular narratives actively harm the Indigenous community of Hawai'i. Yet, for those who grow up in Hawai'i, these unique contexts form processes of identity formation and inform perspectives on colonialism. With students from Hawai'i leaving home to pursue opportunities in the continental United States, their role as representatives of Hawai'i is significant to consider for narrative change. By conducting focus groups and interviews with 20 students who were born and raised in Hawai'i and attend college in the continental U.S., I unpack their shifting understandings of race and indigeneity as they relate to how they engage with popular narratives of Hawai'i. In this sample, all college students from Hawai'i of any background had some form of experience with Native Hawaiian cultural practices and education, informing their understanding of colonialism. However, as students encountered misconceptions about their home and tourism-centric ideas in the continental U.S., a struggle to contest these narratives derived from frustration, discomfort, or a tension with one's own positionality. This project asks us how we move forward in challenging dominant narratives, and calls for responsibility and accountability in the ways we resist colonial legacies in Hawai'i and all occupied lands.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 341

Jia, Victor Faculty Advisor: Jeffrey Richards

Synthesizing PEDOT:PSS Adsorbed on hBN Nanoplatelets for Flexible Electronics Applications

Materials capable of efficiently transporting both ionic and electronic charge are vital across a range of fields, from energy storage systems to healthcare technologies. Among these, organic mixed ionic-electronic conductors (OMIECs), such as poly(3,4-ethylenedioxythiophene) polystyrene sulfonate (PEDOT:PSS), are particularly valuable due to their inherent ability to facilitate ion motion and electron charge transport. Two-dimensional (2D) materials, including hexagonal boron nitride (hBN) and magnesium hydroxide (Mg(OH)2) possess anisotropic properties and have demonstrated various ionic transport behaviors under flow. To control both ionic and electronic transport behavior, we developed a synthesis technique to manufacture PEDOT:PSS-coated hBN. Previous efforts in our lab successfully produced PEDOT:PSS adsorbed onto spherical silica (PEDOT:PSS-SiO2), which enhanced conductivity in flow batteries and electrochromic devices. Similarly, hBN was surface functionalized by polyethylenimine to become cationic, which enabled the electrostatic adsorption of PEDOT:PSS onto hBN's surface. While the full synthesis of PEDOT:PSS-hBN remains ongoing due to challenges in hBN functionalization, this approach demonstrates the novel potential for coating OMIECs onto 2D materials' surfaces. As a future direction, we aim to apply a similar strategy to magnesium hydroxide (Mg(OH)2), which contains an abundance of surface hydroxyl groups. These can be readily functionalized using (3-aminopropyl)triethoxysilane (APTES) to introduce amine groups. 2D materials with adsorbed PEDOT:PSS are expected to exhibit improved thermal stability and ionic/electronic transport. Rheo-dielectric analysis will further provide insight into their behavior under mechanical deformation, informing the design of high-performance energy storage devices with faster charge/discharge rates and higher energy densities.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 382

Jia, Wenqi

Translating Culture: Ginseng and the Global Circulation of Knowledge between Qing China and Enlightenment Europe

This research explores how Chinese medical knowledge about ginseng was transformed and recontextualized within early 18th-century European scientific discourse. I was motivated by the question: how is knowledge reshaped as it travels across cultures, especially between non-Western medical traditions and Enlightenment science? In doing so, the project challenges Eurocentric assumptions about passive knowledge transfer and highlights the complexities of translation in the history of science.

Drawing on both primary and secondary historical sources, I conducted a close comparative textual analysis of Father Pierre Jartoux's 1714 botanical report *The Description of a Tartarian Plant Called Gin-Seng* and Chinese herbalist Zhao Xuemin's 1765 Chinese medical text *Bencao Gangmu Shiyi*. These sources reveal strikingly different methods of classifying and interpreting ginseng as a medical plant. Zhao employed Yin-Yang theory and emphasized the cosmos-body unity rooted in the prevailing philosophy of *gewu*, which refers to the broad learning and investigation of nature. Jartoux, on the other hand, drew on humoral theory and attempted to universalize ginseng's properties through numbered parts and empirical observation, reflecting the emerging methods of modern science. I also examine how Jartoux reshaped Qing social hierarchies in his portrayal of ginseng laborers to suit European expectations.

I argue that the transmission of scientific knowledge between Qing China and Enlightenment Europe was not unidirectional, but rather a dynamic process shaped by cultural context, translation, and power. This project contributes to scholarship on global intellectual history by questioning dominant narratives of scientific modernity and emphasizing the mediated nature of cross-cultural knowledge production.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 133

Jitklongsub, Sirin Faculty Advisor: Hao Li

A Thalamic Neurotensin Pathway May Regulate Reward-Seeking Behavior Under Motivational Conflict

The survival of all living organisms depends on their interactions with their environment. In many animals, behavioral strategies are chosen based on their predicted outcome-for instance, approaching a likely source of food or avoiding a likely threat. In naturalistic settings, behavioral decisions are often made under conditions where both risk and reward must be weighed. Therefore, how an organism decides on a behavioral response depends on how valence (the perceived positive or negative quality of a stimulus) is encoded in the brain. Recent research uncovered the role of neurotensin (NT), a neuropeptide, in valence encoding. Activity of NT neurons in the paraventricular nucleus of the thalamus (PVT), an area crucial for motivated behaviors, has been shown to produce a valence-dependent effect on specific neuronal populations and lead to the encoding of valence in the brain. However, the possible role of PVT NT neurons in regulating behavior during a motivational conflict are still unknown. This study examined NT projections from the PVT to the central amygdala (CeA), a brain region important for fear and incentive motivation. We optogenetically stimulated PVT-CeA NT neurons in male and female mice and examined their behavior during an operant conditioning task where both reward and punishment were expected. Our results showed that stimulating this neurotensin pathway increased reward-seeking behavior in female mice even when punishment was involved, but we found no effect in males. Further research building upon this project could lead to a better understanding of the neurological processes that guide motivated behavior.

Presentation Format: Oral
Time: 10:45am-12:15pm
Room: Lake Room
Number: 264

Kahn, Alex Faculty Advisor: Lilah Shapiro

Experiences of Younger Sisters of Eating Disorder Patients

When a child develops an eating disorder (ED), the impact often extends beyond the individual to affect the entire family system. Siblings, in particular, can experience deep isolation as attention shifts toward the ill child's recovery. For many, this means becoming secondary within the family dynamic. These experiences frequently go unrecognized, especially during the active treatment phase, and have been underexplored in existing literature.

This study investigates the experiences of younger sisters who lived in the same household as an older sister clinically diagnosed with an ED. It explores their family dynamics, relationships with their siblings, and the effects on their own identities, mental health, and relationships with food. Participants were college-aged U.S. individuals raised as female, interviewed through qualitative, semi-structured methods.

Preliminary findings reveal shared themes across participants, including significant shifts in their relationship with their sister, a perceived responsibility for the sibling's recovery, and an increased awareness of food and the body. Many described feeling invisible or emotionally unsupported during this period.

By centering the voices of siblings, this study brings attention to a group often overlooked in ED treatment contexts. It offers insight into how the ripple effects of EDs touch siblings and highlights the need for more inclusive approaches in mental health care. These findings can inform families, treatment facilities, and professionals seeking to better support siblings navigating the challenges of a loved one's ED.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 985

Kaka, Taera Faculty Advisor: Vijay Mittal

Investigation of the Relation between Social Media Asociality and Negative Symptoms in Clinically High-Risk Populations.

Psychosis spectrum disorders are marked by symptoms that disrupt perception and impair functioning. Negative symptoms are the earliest to emerge, marking reductions in motivation, emotion, and expressive behaviour. This study focused on the negative symptom of asociality, defined as reduced interest and engagement in social interaction. It is critical to have tools that can meaningfully assess asociality in social media as we are focused on a population consisting of primarily adolescents and young adults. Despite the rapid rise in digital communication, limited research has examined how social media asociality manifests in these contexts.

This study used the Negative Symptom Inventory - Psychosis Risk (NSI-PR), a clinical interview, to explore associations between asociality measures, total NSI-PR scores, and Global Functioning Scale (GFS) scores. Two samples were assessed using different NSI-PR versions: MAP (N = 191, beta version) and CAPR (N = 549, final version). Pearson correlations and qualitative interview analysis were conducted.

Across studies, in-person asociality showed significantly stronger correlations with total NSI-PR and GFS than social media asociality, with CAPR having the strongest correlation (z = 4.55, p < 0.001) (z = 3.462, p < 0.001). In MAP, social media asociality had a significantly higher correlation with total NSI-PR score than CAPR (z = 1.903, p = 0.029). Greater symptom severity was linked to more passive types of social media used.

Findings highlight the importance of assessing online patterns of communication. Differentiating between passive and active social media use may improve sensitivity to negative symptoms and enhance functional prediction in CHR-P populations.

Presentation Format: Oral
Time: 10:45am-12:15pm
Room: Rock Room
Number: 261

Kalluvila, Aryan Faculty Advisor: Jason Johnson

Clinically-Validated Automatic Lumbar T1-Weighted Spinal MRI Segmentation Tool via an Attention U-Net Algorithm

Spinal MRI segmentation has become increasingly important with the increasing utilization of lumbar spine imaging for evaluation of degenerative change, trauma, and neoplastic processes. Artificial intelligence can help spine surgeons and radiologists automate the process of segmentation. Currently, there is a lack of tools for T1-weighted spinal MRI segmentation, with the most focus on T2-weighted imaging. Thus, in this paper, we focus on creating an automatic lumbar spinal MRI segmentation tool for sagittal T1-weighted images. We employed an attention U-Net as the main algorithm because the architecture has seen success in many other segmentation applications. SSIM and Dice results demonstrate that the attention U-Net outperforms other state of the art architecture at 0.998 and 0.93, respectively. To assess the clinical relevance of the attention U- Net, two board certified neuroradiologists scored the output of the attention U-Net versus the other four algorithms tested in the study and found that the attention U-Net performed the strongest. Both radiologists agreed that the attention U-Net segmented lumbar spinal images with the highest accuracy on a 5-point Likert Scale (3.7 0.82). Cohen's Kappa coefficient was measured at 0.31 indicating a fair level of agreement between the radiologists. Segmentation loss functions were also compared, looking at the difference between BCE and MSE loss. MSE loss outperformed BCE with respect to both SSIM and MSE, serving as the loss function of choice. Qualitative observations demonstrated the attention U-Net and the nested U-Net as the top performing networks. However, the attention U-Net minimized the external noise and focused on internal spinal preservation.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 129

Kata, Shriya Faculty Advisor: Keara Lane

Spatial Dynamics of Macrophage Responses to Salmonella Typhimurium

Macrophages are immune cells that fight bacterial infections by coordinating inflammatory responses through the secretion of and response to ligands, but the outcome of infection can vary between individual cells. In the case of the foodborne pathogen *Salmonella Typhimurium* (STm), single-cell studies have shown that macrophage infection and bacterial replication are highly heterogeneous, yet it remains unclear whether communication between neighboring macrophages influences these differences. I'm investigating whether the proximity between macrophages affect their inflammatory gene expression and signaling responses during STm infection. To explore this, I analyzed single-cell data generated through single-molecule fluorescent *in situ* hybridization and immunofluorescence that measure gene expression and protein localization while retaining spatial information. I used Python to build functions that visualize infection distribution, calculate local cell density, and analyze correlations between spatial proximity and gene expression in both infected and uninfected cells. I am now using my functions to assess whether local macrophage density is associated with gene expression levels of anti- or pro-inflammatory markers in infected and/or uninfected cells compared to untreated cells. Ongoing work includes expanding the analysis to see whether local macrophage density impacts transcription factor activity and if infection status influences local density patterns. If I find patterns of gene expression or signaling associated with proximity to infected macrophages, I will then determine whether macrophages coordinate their responses based on local infection environments. This work contributes to a deeper understanding of how immune cells communicate during infection and could reveal new insights into infection control and regulation strategies.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 165

Kay, Dax Faculty Advisor: Hooman Mohseni

Characterization of Optical Modulators for Neural Implant and Satellite Technologies

Semiconductor quantum wells have enabled a multitude of novel technologies for light generation, detection, and modulation in specific frequency regimes. The bandgap is the energy difference between the conduction band (where electrons can move freely) and valence band (where electrons are stationary) in a semiconductor material. By sandwiching a narrow bandgap material (InGaAsP) between wide bandgap materials (InP), the conduction bands form a quantum well that confines discrete energy levels. This unique property of the junction allows for a sharp optical absorption edge, tunable by voltage, that may be used for optical modulation. Stepped quantum well optical modulators present a promising avenue for compact communication devices, easily integrable with semiconductor architecture, that can be utilized for both the detection of individual neural impulses and low power communication with satellites. Stepped wells in particular are favorable for these applications because of their high figure of merit (effectively their signal to noise ratio) and ability to operate at higher voltages. My task is to characterize these optical modulators both on and off chip. First, I've measured current-voltage (IV) curves without laser illumination to analyze the modulator's response to bias voltage and any leakage currents that may impair functionality. I also plan to present measurements of IV curves in the presence of various wavelengths of laser illumination to test the modulator's absorptive properties as well as capacitance-voltage (CV) measurements to analyze parasitic background charge. Future work will be needed for more application specific testing for both the Starfish Neuroscience and NASA JPL projects.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 457

Kerr, Maddie Faculty Advisor: Steven Epstein

Evidence, Expertise, and Exploration: Politics of Knowledge in Gender Therapy

The mental health fields have historically pathologized transgender (trans) experiences. Since the 2010s, however, professional mental health organizations have widely embraced a gender affirmative therapeutic approach that supports trans clients in living out their identities. In response to this shift, a new movement has emerged to promote an opposing gender exploratory therapy model. This model calls for therapists to probe clients' trans identities for presumed pathological causes rather than affirming them, although proponents claim that gender exploratory therapy differs from religiously motivated gender identity change practices. Drawing on approaches from sociology, science studies, and gender studies, I conducted a qualitative comparative case study to understand how proponents of gender affirmative, exploratory, and change therapies advance their models. I analyzed materials from three case organizations to examine the framing strategies, claims to scientific evidence, and assumptions about gender/sex underlying these competing efforts. I found that proponents of gender exploratory and change therapies share core assumptions about the nature of gender/sex and trans identity, shaping similar therapeutic practices that privilege gender normative outcomes. Gender exploratory and change therapy proponents also deploy similar strategies to discredit evidence supporting affirmative therapy and legitimate their own models. Ultimately, efforts to advance each of these three models promote different configurations of power among clients, families, therapists, professional institutions, and the state. This study demonstrates the inherent politics of struggles over gender therapy, both in their direct policy impacts and their effects on the production of knowledge and ignorance about gender diversity.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 059

Kiang, Skyla Faculty Advisor: Debra Weese-Mayer

Respiratory Deficits Uncovered During the Six-Minute Walk Test in Children with Congenital Central Hypoventilation Syndrome

Congenital Central Hypoventilation Syndrome (CCHS) is an ultra-rare disorder caused by PHOX2B gene variants, leading to impaired autonomic nervous system development and function. CCHS individuals lack normal responses to changing cardiorespiratory needs, increasing their risk of hypoventilation, hypoxia, and hypercapnia [1]. They require lifelong assisted ventilatory support during sleep, with severe cases requiring 24-hour assistance. Understanding exertion-related physiological responses in CCHS patients is essential for understanding disease management and treatment personalization. This project investigates the Six-Minute Walk Test (6MWT), a standardized exertion assessment with 2-minute baseline, 6-minute walking, and 2-minute recovery periods, in CCHS patients. We hypothesized that 6MWT would lead to an exaggerated decrease in blood oxygen saturation (SpO_2), increase in end-tidal carbon dioxide ($EtCO_2$), and diminished return toward baseline during recovery in CCHS compared to controls. Six spontaneously breathing CCHS patients and six healthy controls participated. SpO_2 and $EtCO_2$ measures were recorded, averaged over 1-minute epochs, and percent change from baseline was calculated during walk and recovery. Despite similar baseline values, CCHS patients had significantly lower SpO_2 and higher $EtCO_2$ levels than controls ($p<0.05$) during walk and recovery. Regarding SpO_2, no CCHS subjects recovered to baseline within 2 minutes compared to 5/6 controls, and their recovery was significantly impaired ($p<0.05$). For $EtCO_2$, no CCHS subjects recovered to baseline in 2 minutes compared to 3/6 controls, and recovery toward baseline was also significantly less ($p<0.05$). These findings highlight exertion-related deficits in CCHS patients, indicating the potential of the 6MWT to assess outcomes in future therapeutic trials and clinical strategies.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 062

Killian, Olivia Faculty Advisor: Sarah Bartolome

Sounding Out Stress: The Impact of Music and Breathwork on Teen Well-being

The Music for Childhood Well-being Initiative (MCWI) is a global program exploring how music can serve as an intervention to reduce stress and promote well-being in children. This pilot study evaluated an 8-week group singing and breathwork program delivered to cohorts in the US, England, and Mexico. This presentation focuses on findings from a US high school cohort. Biometric, psychological, and behavioral measures were used to assess intervention impact. Stress levels were tracked using heart rate variability (HRV) via wearable mechano-acoustic sensors. Participants recorded their mood with emojis on the WellCheq app before and after each session and completed the State-Trait Anxiety Inventory for Children (STAIC) to assess anxiety levels. Additional insights were gathered through participant interviews and a final focus group. As a research assistant through the Emerging Scholars Program, I supported literature review, transcribed ethnographic post-intervention interviews, and managed data for the Evanston cohort, ensuring accessibility for the broader project team. Preliminary data suggest a slight increase in HRV and improved mood following sessions as students reported feeling more "relaxed," or "energized," after sessions. Data analysis for the US high school cohort is ongoing and will be submitted for publication, while broader evaluation across all cohorts continues. Looking ahead, eight additional global cohorts are planned for the 2025–2026 academic year, including expansion into China and the launch of a new US cohort centered on Latinx participants in April 2025.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 009

Kim, Jamie Faculty Advisor: David Rapp

Canceling the Continued Influence Effect: The Role of Source Valence Perceptions in Retraction Acceptance

People show belief in event causes even after those causes have been discounted, referred to as the continued influence effect (CIE). Source characteristics prove relevant for CIEs. For example, causes from credible as compared to non-credible sources are more likely to be believed, even after being discounted. The present study examined whether people's likes or dislikes of a source also influence CIEs. Participants read a report describing a warehouse fire. A fire chief (the source) presented a cause for the fire, which was discounted later in the report. Participants were assigned to a positive, negative, or neutral source condition. The report also contained information that described the cause without correction, providing a correction of the cause, or providing a correction along with an alternative cause. After reading the report, participants answered questions such as open-ended questions about the cause of the fire and questions about their belief in the cause. Participants often referred to the initial cause, but less so when the cause was corrected. Preliminary findings suggest that participants in the negative source condition have a reduced belief in the original cause when they receive an alternative cause compared to when they receive a correction without alternative. However, this difference did not emerge for participants in the positive and neutral conditions. We are analyzing the data to examine any inferences participants make pertaining to the original/initial cause. The study has implications for understanding how source preferences influence people's reliance on discounted ideas.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 303

Kim, Michael Faculty Advisor: Jeffrey Burgdorf

NQ-13's Therapeutic Potential to Improve Learning and Restore Brain Signaling in Rett Syndrome: Preclinical Evidence from Behavioral and Molecular Assays

Rett Syndrome (RTT) is a progressive neurodevelopmental disorder that almost exclusively affects females due to a mutation of the X-linked MECP2 gene, resulting in deficits in synaptic structure and neural function. Problems with movement, speech, and learning characterize this disorder. Restoring MECP2 expression and downstream signaling has shown promise as a therapeutic. Such limited treatments, such as Trofinetide, exist but are riddled with unfavorable side effects, such as gastrointestinal stress, and are limited in potency. Here, we evaluate a novel compound, NQ-13, which binds to insulin-like growth factor 2 receptor (IGF2R) with ~100-fold greater potency than Trofinetide and shows potential for improving cognitive outcomes in RTT. Behavioral studies demonstrated that NQ-13 facilitates enhanced working memory compared to vehicle- and Trofinetide-treated groups. In addition, ELISA and BCA assays found that NQ-13 treatment increased levels of MeCP2 protein in both the brain and the fluid surrounding the brain and spinal cord-an encouraging sign given that low MeCP2 is a core feature of Rett Syndrome. This suggests that NQ-13 may help address the root molecular deficiency of the disorder. The compound also boosted levels of a signaling protein called pMAPK in a brain region involved in decision-making and learning. Since pMAPK plays a key role in how brain cells send signals and adapt to new information, its increase points to enhanced brain plasticity, a process that is often impaired in individuals with RTT. Together, these findings suggest that NQ-13 may support molecular recovery and functional improvement in RTT.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 057

Kim, Gayoung Faculty Advisor: Chamille Lescott

Improving First-Year Student Access and Engagement with Academic Resources in the McCormick School of Engineering & Applied Sciences

The use of academic resources is essential for student success, however the process of finding adequate resources for each student can delay the help a student receives. Understanding why students use certain resources and barriers that exist in academic resources can greatly help improve this search process. To design a tool that helps student engagement with academic resources, we first need to understand the needs of the student body and identify barriers and incentives to resource engagement. 20 interviews were conducted with engineering students about their academic experience and resource usage. Thematic coding method analysis and the Cultural-Historical Activity Theory (CHAT) framework revealed that high levels of busyness impact which academic resources students engage with. In other words, hustle culture-the pervasive pressure to overcommit academically, professionally, and personally-impacts resource use among engineering students. Furthermore, accessibility, flexibility, peer recommendations and clarity of resources are key features that can improve student resource engagement. When creating a tool at Northwestern, this means taking into consideration the hustle culture that exists and working with this culture in the design of the tool. This research also demonstrates how incorporating a student researcher into the process can help understand student language and aid in the interview responses. Additionally, there is an ongoing process of designing a tool to help students find adequate resources.

Presentation Format: Oral
Time: 12:45pm-2:15pm
Room: Arch Room
Number: 335

Koenig, Sophie Faculty Advisor: Katherine Amato

Human Immune Response To Microbes Varies Based on Gut Microbiome Composition

The gut microbiome is the collection of microbes colonizing the gastrointestinal tract of an animal, and their genetic material. There is a relationship between the gut microbiome and the host organism's immune system. The host immune system helps maintain a balance between species of bacteria. The gut microbiome is also important for immunity, playing an important role in protection from infection. Dysbiosis of the gut microbiome has been linked to non-communicable diseases like inflammatory bowel disease. Non-human primates are valuable in studies of the human immune system because of their similarity to humans. However, non-human primates exhibit different responses to pathogens like those causing HIV/AIDS, hepatitis C, and bacteria that commonly cause sepsis. There are limited studies on how the non-human primate gut microbiome interfaces with the immune system. This study used an ex-vivo immune cell culture protocol to assess the cytokine response of human whole blood samples when exposed to metabolites in either human or non-human primate fecal samples and 16s rRNA sequencing to determine gut microbiome composition. Gut microbiome composition of each individual was compared to their baseline levels of IL-6, TNF-α, and IL-1β in blood samples to determine how the gut microbiome is associated with host inflammatory profiles. We also assessed the inflammatory response of human immune cells to non-human primate fecal samples, to determine if specific pathogens found in the gut microbiomes of different primate species drove inflammatory responses. Greater understanding of what microbes are driving specific immune responses has important implications for understanding and treating diseases.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 116

Kogan, Emma

Faculty Advisor: Jesse Yeh

Pathways to Parenthood: Examining the Role of Insurance for Same-Sex Female Couples Accessing Assisted Reproductive Technologies

Insurance poses unique challenges for same-sex female couples who access assisted reproductive technologies (ART) than it does for heterosexual couples accessing these same services. Existing literature highlights some challenges these couples may face when using reproductive care, yet often focus on social discrimination, obtaining sperm, and high costs. To determine insurance barriers to access ART, I employed a mixed-methods approach, surveying fifteen individuals and interviewing an additional eleven women. I find that insurance creates four main barriers: insurance adheres to the discriminatory definition of infertility, prevents low costs, instills a false sense of hope, and requires supplementary support through employer-sponsored benefits. This thesis contributes to the understanding of queerness in society, specifically by exploring the discrimination placed upon same-sex female couples by insurance.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 448

Labastida Medina, Kelly Faculty Advisor: Tiffany Schmidt

Mechanisms of GABAergic ipRGC in light sensitivity

There are three types of photoreceptors: rods, cones, and Intrinsically Photosensitive Retinal Ganglion Cells (ipRGCs). ipRGCs are photosensitive because they express a photopigment called melanopsin (gene name Opn4), and respond directly to light (intrinsically photosensitive). ipRGCs regulate non-image-forming behaviors such as circadian photoentrainment, pupillary light reflex and contrast sensitivity. Furthermore, it was previously thought that the primary way of communication of RGCs was through excitatory neurotransmitters (glutamate). Later, the Schmidt lab identified GABAergic ipRGC subtypes. To find GABAergic ipRGC function, they used Opne4Cre;Gad2fl/fl (Gad2 cKO) mice and found that they had greater sensitivity in the pupillary light reflex and circadian photoentrainment in response to dim light. However, it is still not fully understood which GABAergic ipRGCs neural circuits are responsible for dampened light sensitivity.

To study the functions of GABAergic ipRGCs in circadian rhythms, Gad2cKO mice were examined in dim light sensitivity. Gad2cKO mice are better in negative masking when given a dim light pulse during ZT14 to ZT17. Then, to study the circuit mechanisms of dim light sensitivity, we compared the brain activity of control and Gad2cKO mice. We immunostained brain sections with c-fos antibody, confocal imaged and analyzed data. There were similar numbers of C-fos positive cells in dorsal lateral geniculate nucleus (dLGN), Intergeniculate Leaflet (IGL), ventral lateral geniculate nucleus (vLGN) and superior colliculus. C-fos positive cells are markers of activated neurons in ipRGC-recipient brain regions. In the future, we will analyze the hypothalamus. This furthers our understanding of ipRGCs and its effect on visual behavior.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 405

Ladhani, Andrew Faculty Advisor: Thomas Meade

Combating Antibiotic Resistance Using Cobalt(III) Schiff Base Complexes as Metallo-v-Lactamase Inhibitors

Antibiotic resistance poses a grave threat to medicine and public health. One form of resistance that Gram-negative bacteria use is the metallo-β-lactamase (MBL), an enzyme that degrades β- lactam drugs like penicillin and cephalosporins. MBLs break open the β-lactam ring present in these drugs using zinc bound to the amino acid histidine. One solution to restore existent antibiotic efficacy is inhibiting MBLs. Octahedral Cobalt(III) Schiff base complexes (Co(III)-sb) contain both an equatorial ligand and a pair of axial ligands and are capable of binding to histidine much tighter than zinc. These complexes could potentially knock out the zinc and bind to metallo-β-lactamases, inhibiting their activity. First, studies were performed to assess whether the New Delhi Metallo-β-lactamase (NDM-1) would be irreversibly inhibited by Co(III)-sb using the nitrocefin assay. Nitrocefin contains a β-lactam ring and changes color when cleaved, indicating NDM-1 activity. The activity of NDM-1 with or without Co(III)-sb and was found to be non-existent 24 hours post-treatment. Adding Co(III)-sb to NDM-1 was also found to decrease β-lactam cleavage over time. Ultimately, a library of complexes was generated, each with differing chemical substituents to optimize NDM-1 inhibition. The efficacy of each complex against NDM-1 was quantified. Preliminary data suggests that complexes display varying ability to inhibit NDM-1 based on their substituents, with more non-polar complexes strongly inhibiting activity. If a delivery method can be created, Co(III)-sb provides a potential co-treatment with antibiotics to overcome MBL-mediated antibiotic resistance.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 188

Lam, Sabrina Faculty Advisor: Wendi Gardner

The Interaction of Self-Concept Clarity and Advice Seeking in Decision-Making

People often face difficult decisions with no objectively "correct" answer—such as choosing between an exciting job far from home or remaining in a stable but boring job in their hometown. While some make these choices easily, others seek external input. Why do certain individuals rely more on others for guidance? Self-concept clarity (SCC) refers to the extent to which people have clear and consistent beliefs about themselves (Campbell et al., 1996). Prior research suggests that SCC influences well-being and decision-making, but the role of advice-seeking in this relationship remains understudied. We hypothesized that individuals with lower SCC will seek more advice to reduce uncertainty, which may make the decision process easier but increase post-decisional regret.

The study utilized a two-part methodology. First, we surveyed 246 participants, measuring trait SCC, decision difficulty, regret frequency, and advice-seeking using validated scales. Second, we experimentally manipulated SCC, then presented participants with a hypothetical job offer requiring relocation. Participants identified who they'd seek advice from, rated their closeness, and evaluated hypothetical advice-givers with varying degrees of closeness and relevance to the decision.

The findings support our hypothesis that individuals with higher trait SCC report lower decision difficulty, less frequent regret, and less frequent but more comfortable advice-seeking. High SCC individuals found decisions easier and experienced less regret overall. We found that trait SCC predicted general advice-seeking behavior. These results highlight how SCC influences not just whether we seek advice, but who we turn to and how we feel about it.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 995

Lauer, Ainsley Faculty Advisor: Stacie Furst-Holloway

Why Do Employees Prefer Remote Work? Positive Themes and the Effects of Disruption

In the wake of the COVID-19 pandemic, employers must now decide whether to bring employees back into the office. One key consideration is whether causing yet another disruption-a shift in employees' work styles and routines-will have negative effects for employees. To answer this question, we surveyed 261 employees, evaluating the effects of disruption and perceived organizational support (POS) on employees' work style preferences. We hypothesized that disruption would positively predict transformational growth-a common process during which challenging circumstances trigger personal development-and that this, in turn, would predict a greater preference for remote work. We also predicted that POS would play a moderating role; that is, there would be a weaker relationship between disruption and transformational growth for employees who experienced greater POS. Our findings partially supported these hypotheses: we found that organizational support, but not disruption, predicted positive transformational growth, which then predicted preferences for remote work. Qualitative analysis revealed positive and negative themes that further illuminated employees' remote work preferences. For example, employees appreciated the flexibility, work-life balance, and reduced commute that remote work offered, while they mentioned isolation and blurred boundaries among the disadvantages. Taken together, these findings suggest that employers may not need to be overly concerned about the disruptions they may cause by implementing a return to the office, but instead should focus on providing adequate support and incorporating some of the benefits of remote work into any new work arrangement.

Presentation Format: Oral
Time: 12:45pm-2:15pm
Room: Armadillo Room
Number: 049

Lauri, Olivia Faculty Advisor: Alissa Chung

The Kids Are Alright: College Environments, Student Wellbeing, and the Role of Institutional Selectivity

According to previous research, Generation Z undergraduate students, or students born between 1997 and 2012, are experiencing unprecedented levels of anxiety. The current study investigated whether anxiety is more strongly predicted by undergraduate students' cognition and thought processes (internal factors) or the university environment (external factors), and whether these factors play an equal role. Defined as highly ranked universities with low acceptance rates, elite institutions may bolster anxiety levels due to the perceived environment, as suggested by Role Strain Theory. Alternatively, anxious students may be self-selecting into elite universities, as those with a high need for achievement and high avoidance goals experience more anxiety. Participants were undergraduate students who attended a wide range of institutions with varying degrees of selectivity. They completed measures of anxiety (state-trait, general), internal factors (goal orientation, fear of failure, and achievement motivation), and external factors (class and professor perceptions). Results suggested that internal factors, specifically fear of failure, were the strongest predictor of anxiety compared to external factors. There were no significant differences between selective, moderately selective, and less selective schools in overall anxiety when compared in three groups, but students at the most selective schools were surprisingly less anxious than students in moderate and less selective schools when those groups were combined. Altogether, the findings suggested that internal factors are the largest determinants of undergraduate anxiety compared to institutional selectivity and environmental perceptions.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 105

Lazanyi, Irene Faculty Advisor: Atique Ahmed

Triapine (3AP) as a Radiosensitizing Agent in Breast Cancer Brain Metastasis

Breast cancer is the most commonly diagnosed cancer amongst women in the United States. Brain metastases from breast cancer (BCBM) develop in up to 40% of patients and are associated with poor prognosis. Therapeutic options are limited because most systemic agents cannot cross the blood-brain barrier (BBB). Consequently, whole-brain radiation therapy (WBRT) remains the standard of care, despite its suboptimal outcomes and severe cognitive side effects. Identifying radiosensitizing agents, which enhance the efficacy of WBRT, could improve clinical outcomes in patients with BCBM. This study investigates Triapine (3AP), an inhibitor of the RRM2 subunit of ribonucleotide reductase, as a potential radiosensitizer. RRM2 is essential for DNA repair and is associated with resistance to DNA-damaging agents. Since WBRT induces double-stranded DNA breaks, inhibiting RRM2 may enhance radiation-induced cytotoxicity. BCBM cell line, MDA-MB-231-BR, was cultured and treated with control (DMSO), WBRT, 3AP, and a combination of 3AP and WBRT. Western blots showed gh-H2AX, a marker of DNA damage, increased in the combination subgroup compared to radiation or 3AP alone. Colony formation and cell viability assays displayed decreased (BCBM) cell survival in the same subgroup, with 3AP applied. Ongoing immunocytochemistry will assess DNA damage through gh-H2AX foci visualization. Quantitative PCR will evaluate RRM2 transcript levels in irradiated 3AP-treated cells. Preliminary results suggest that 3AP enhances WBRT-induced DNA damage by inhibiting RRM2, reducing BCBM cell survival. This approach offers a promising strategy to overcome therapeutic resistance in BCBM and may serve as a foundation for future clinical investigation of 3AP as a radiosensitizer.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 071

Lee, Cassie Faculty Advisor: Terry Horton

Scenes of green: Neighborhood social cohesion and the measurement of greenspace exposure in Evanston, Illinois

Exposure to greenspace is shown to improve psychological wellbeing and reduce risk factors for mental illness. Prior research has suggested that social cohesion-a trusted network of relationships-is a mechanism by which exposure to greenspace can be beneficial to mental health. However, prior research reveals an inconsistent relationship between neighborhood social cohesion and greenspace exposure. The use of diverse methods to assess greenspace exposure may account for inconsistencies. My study seeks to address this gap by comparing the relationships between a single measure of neighborhood social cohesion and various measures of greenspace exposure in Evanston, Illinois. I collected participant data using a survey to assess neighborhood social cohesion and several measures of greenspace exposure. I calculated (1) subjective measures of greenspace exposure from participant survey data. Additionally, I calculated (2) conventional objective measures of greenspace exposure (e.g. measures derived from satellite data) and (3) visible greenspace in Google Street View (GSV) images using the geographic coordinates of the nearest intersection to participants' residence. I regressed neighborhood social cohesion on each standardized greenspace exposure variable using censored linear regression. Visible greenspace in GSV images were significantly positively associated with neighborhood social cohesion while all other measures of greenspace exposure were not. Results suggest that eye-level measures of greenspace exposure are stronger predictors of neighborhood social cohesion than subjective and commonly used satellite-derived measures of greenspace exposure. Some measures of greenspace exposure frequently used in research may not be adequate in assessing the impacts of greenspace exposure on neighborhood social cohesion.

Presentation Format: Oral
Time: 10:45am-12:15pm
Room: Rock Room
Number: 113

Lehr, Julia

Faculty Advisor: Sarah Rodriguez

The Evolution of the Perception of Risk of Childbirth in the US and the UK among Physicians and the Public (1993-present)

This project aimed to contextualize perceptions of risk of childbirth from 1993-2023 in the US and the UK to investigate patterns among its evolution. Investigating these perceptions among maternal healthcare workers and the public helps to better understand the high maternal mortality rate in the US. To investigate the public and professional perceptions of risk in labor, virtual research was conducted using SpringerLink, the American College of Obstetricians and Gynecologists, the NIH National Library of Medicine, and Northwestern Libraries. Archival research was conducted at the Wellcome Collection and the Royal College of Obstetricians and Gynecologists (RCOG)/ the Royal College of Midwives in London. In the UK, public views on risk in labor changed as birth activists pushed for more home births, autonomy in the birthing process, and as professional attention was increasingly placed on reducing the cesarean section rate, despite rates continuing to increase (NHS Digital, 2022). Activists in both the US and the UK were concerned about the overuse of interventions leading to higher maternal mortality and morbidity, although professionals viewed interventions as reducing risk, either to the mother or fetus, or both. Notably, some sources supported that doctors may rate risk in labor the lowest, compared to midwives or pregnant women (Lee et al., 2019). Our research highlights the need for better public education about the utility of certain interventions in labor, such as induction, in reducing maternal mortality and morbidity. Furthermore, it supports a greater emphasis placed on women's autonomy in labor for reducing birth anxiety.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 171/471

Liu, Ellen Faculty Advisor: Amy Paller

Exploring the Impact of Ceramide Synthesis Enzymes on Atopic Dermatitis Severity: Alterations in Serine Palmitoyl Transferase Composition Underlie the Poor Epidermal Barrier in Atopic Dermatitis

Atopic dermatitis (AD) is a chronic inflammatory skin disorder characterized by inflamed lesions and intense itch, driven by Th2 cell responses and increased expression of cytokines IL-4 and IL-13. Ceramides, crucial for epidermal barrier integrity, are altered in amount and composition in AD, contributing to its pathogenesis. The serine palmitoyl transferase (SPT) enzyme complex, which initiates ceramide *de novo* synthesis, includes subunits Sptlc3 and SPTssb, which are enriched in differentiated epidermis, but have unexplored roles in AD. RNAseq data from tape-stripped AD-lesional vs. healthy skin revealed reduced Sptlc3 and SPTssb expression and elevated Sptlc2. Concomitant immunofluorescence staining of IL-4/IL-13-treated AD-simulated skin explants confirmed decreased Sptlc3 and SPTssb, suggesting SPT complex alterations in AD. To investigate the functional role of Sptlc3, we generated an epithelium-specific Sptlc3 conditional-knockout (cKO) mouse model. AD was induced through MC903 (vitamin D3 analog) application to the ear, and disease severity was assessed serially based on erythema, scaling, edema, and erosion. To enhance behavioral assessments, we applied MC903 to the mouse nape in a second model and evaluated scratching behavior. While Sptlc3 was markedly reduced in Sptlc3 cKO mice, they did not develop spontaneous AD and showed no increase in AD severity or cytokine skewing after MC903 treatment. However, cKO mice exhibited a trend towards increased itch behavior in the nape model. These findings indicate that while Sptlc3 is critical for ceramide metabolism, its depletion alone does not induce AD, suggesting that other factors in *de novo* ceramide synthesis may compensate Sptlc3 depletion, which warrants further exploration.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 376

Long, Zach Faculty Advisor: Dayne Swearer

Light-enhanced propane dehydrogenation using plasmonic copper-platinum supported nanoparticles

Industrial processes accounted for 24% of greenhouse gas emissions in 2020, which is related to the fossil fuel dependence in industry. Propylene is an important building block for polypropylene, which is used in clothing, everyday household items and more, but currently requires steam cracking and very harsh conditions to be formed. As a result, photocatalysis has been explored as an alternative. This work centers on the light-driven gas phase formation of propylene from propane, using plasmonic copper nanoparticles doped with varying concentrations of platinum. These have important optical properties, such as localized surface plasmon resonance (LSPR). Nanoparticles were synthesized using the strong electrostatic adsorption (SEA) synthetic method. SEA leverages the point of zero charge (PZC) of nanoparticulate silica to adsorb positively charged metal ions on the surface. After reduction at 350°C under hydrogen, the formation of 3 nm nanoparticle alloys was observed with transmission electron microscopy (TEM). Further characterization determined the optical properties of these samples (DRUVS and DRIFTS), as well as their bulk and surface composition and resistance to harsh conditions. Samples were tested catalytically and showed significant increases in propylene production rates between 400-520°C in the light vs dark conditions, especially for samples with single atoms of platinum on the surface which have the character of free platinum atoms to adsorb propane gas and allow the copper to retain plasmonic properties. This enhancement was observed most drastically for samples with single atom dopant sites. This work sets the foundation for understanding how propylene production could become more sustainable.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 305

Long, Kumi Faculty Advisor: Adrian Rodriguez Contreras

The Impact of Hypoxic Exposure on Nervous System Development in Neonatal Rats

Premature infants commonly experience tissue oxygen deficiency, or hypoxia, which may impair neurovascular regulation during perinatal development. While literature indicates that hypoxia damages retinal tissue, its impact on the broader nervous system remains unclear. In our preliminary study, we investigated hypoxic effects on neonatal sensorimotor behavior using rat pups as a model of prematurity. We hypothesized that hypoxia may disrupt nervous system development, implicating motor control and sensory localization. 50% of a 14-pup litter was randomly assigned to an experimental group that was separated from the dam and exposed to hypoxic conditions (10.8% oxygen, 89.2% nitrogen) for 12 minutes at postnatal days 0 and 1 (P0 and P1). The control group also experienced maternal separation but remained breathing room air. We then conducted weight measurements (P0-P15, P21), 4-arm maze behavioral testing (P10-P15), and auditory brainstem response testing using pure tones from 2-36kHz (P21). Based on evidence that typically-developing pups prefer familiar scents, we placed pellets in each maze arm with one containing a sample from the litter's cage. Preliminary analysis of P10 revealed that 43% of the control pups navigated to the sampled pellets compared to 14% of the hypoxia-exposed pups. Furthermore, the experimental group had a 29% mortality rate while all control pups survived. These findings suggest that hypoxia may cause more extensive damage than we hypothesized, both affecting sensorimotor abilities and increasing mortality likelihood. A replicate experiment will test the validity of these findings, potentially advancing our understanding of the prognosis of hypoxia and premature births.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 149/270

Lu, Amber

Faculty Advisor: Sulafa Zidani

An Analysis of Digital Memes, Research Methods, and Cultural Impact

The sharp increase in the use of social media has paralleled the rise in the creation of digital memes, humorous images posted to the internet which have uniquely impacted the cultural landscape. Often considered casual forms of media, memes created and shared online serve as timely representations of the multitude of perspectives and experiences of diverse cultural groups. This project consists of a review and analysis of existing literature about digital memes from communication studies databases between 2010 and the present day. The aim of the project is to draw conclusions about effective methodology and frameworks that have been used to conduct past meme research, as well as to summarize the general impact that memes can have on cultural communities and events. Results will include qualitative analyses of common research methods and a discussion of the effects of digital memes in specific contexts. As the landscape of digital media continues to evolve, the conclusions from this project will serve to contextualize and guide future research about internet memes by providing both a background on the cultural positioning of digital memes and a comprehensive analysis of meme research strategies that have proved to be effective across the past decade.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 361

Lukela, Henry Faculty Advisor: Daniel Horton

Observing Excessive Heat-Related Mortality in Chicago with High Resolution Temperature Models

In 1995, an unprecedented Heat Wave struck Chicago, claiming the lives of over 700 people. In response, the city vowed to increase preparedness and develop a Heat Vulnerability Index (HVI). As part of this effort, Chicago collaborated with community members to run a city-wide initiative, Heat Watch, which gathered high-resolution temperature data. Previous research has mapped excessive heat-related mortality, but not at the precise resolution that Heat Watch provides. However, the Heat Watch observations are bound to one day and are not monitored over time. This research project hopes to model the temperature distribution pattern over time using the Heat Watch data to create a high-resolution temperature model. The model uses historical data sets, like Midway Airport records, as proxies to create a spatiotemporal temperature model. The model's validity was checked by comparing the heat-related mortality generated by the Heat Watch model between 2010 and 2018 to a model that uses well-established historical temperature data from Daymet. The study's results indicated that the Heat Watch model underperformed in predicting accurate excessive heat-related mortality because it operated under the false assumption that the urban heat island effect did not change over time. The results of this project indicate that high-resolution observational experiments can provide insight into the urban heat island effect, but a temporal component must be incorporated to capture excessive heat-related mortality effectively. With a temporal component, high-resolution data sets like Heat Watch can inform policy and help communities advocate for more equitable resource allocation to protect vulnerable communities.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 474

Lynch, Alina Faculty Advisor: Galen Bodenhausen

Exploring Correlates of Environmental Behavior Across Different Contexts

While previous research suggests that people's connection to their communities can influence environmental engagement, few studies have examined how emotional attachment to a place interacts with how climate messages are communicated. This research addresses that gap by investigating how individuals' connection to their local environment shapes their responses to climate messages framed at different spatial scales. In Study 1, students at Northwestern University reported how attached they felt to their campus. Several weeks later, they were randomly assigned to read a climate change message emphasizing local (campus-specific) or global impacts. Participants then reported their intentions to engage in pro-environmental behaviors and whether they would sign an environmental pledge. Results showed that higher attachment to Northwestern's campus predicted a greater overall intention to take climate action. Although the interaction between place attachment and message framing was not statistically significant, place attachment was associated with higher intentions to act across local, global, and collective action domains, as well as a greater likelihood of signing the pledge. Study 2 extended this approach to a more diverse, nationwide sample of U.S. adults recruited through Prolific. It is expected that the positive relationship between place attachment and environmental action observed in Study 1 will be replicated in this broader sample. Together, these studies suggest that emotional ties to place are a meaningful driver of climate action. The findings highlight the potential of place-based and identity-informed messaging to enhance public engagement with climate solutions and underscore its value as a strategy in climate communication efforts.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 177

Macy, Annika Faculty Advisor: David Uttal

The Impact of Informal Learning Experiences on Middle School Students' Communication About Climate Change: A Proposal

In the face of the climate crisis, equipping middle school students with the tools needed to understand and communicate scientific concepts may help the next generation engage with climate solutions. Research has shown active and personally relevant experiences are particularly important for effective climate change education. This project will explore how fifth and sixth grade students reflect on an informal learning field trip in Maine from 2022-2025. The experience uniquely allows students to engage with personally relevant climate information, which may be more memorable than learning in the classroom. We plan to analyze students' language use, by counting the number of words used to discuss climate concepts, during the 3-hour trip and 30 second reflection videos by groups of 4-5 students. We will compare word counts across three school years to see if the repeated annual field trips influence students' preparedness to discuss climate information. We will also investigate how locations of schools in coastal, non-coastal, urban, and rural areas may influence the types of language students use, categorized by climate, geographical, and marine biology word types to replicate and expand upon previous studies on location. Descriptive and inferential statistics (independent sample t-tests) will be used to compare groups of schools, separated by location and year. Students' word use across years may provide insight into how informal learning experiences impact communication and can be improved to increase student engagement with content and comprehension of material, both during the field trip and during preparation in schools prior to the trip.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 454

McCarthy, Molly Faculty Advisor: Renee Engeln

An Investigation of Young Women's Reactions to Body Positive Messaging: Correlates and Counterarguments

One response to concerns about body dissatisfaction among women is a growing focus on body positivity, where body acceptance is encouraged through affirmations (e.g., "You are beautiful!") (Cohen et al., 2020) However, there is limited research regarding how women react to these types of body-related messages. In the current exploratory study, we examined how women responded to different types of body positive messages and the correlates of these reactions. Women (n = 384, Mage = 22.67, SD = 4.39) were recruited via Prolific (n = 213) and a university's psychology participant pool (n = 171), to complete a survey rating seven categories of body positive messages and measures of body satisfaction, internalization of the thin ideal, and attitudes towards fatness.

While participant's body size was not a significant predictor of their ratings of messages, their attitudes around three dimensions of fat acceptance and activism were significant predictors of reactions to every category of message. Ratings of Fat Acceptance messages were positively correlated with three subscales of fat attitudes: empathy, r(382) = .31, p < .001, critical health, r(382) = .26, p < .001, and activism orientation, r(382) = .43, p < .001. Ratings of Fat Acceptance messages were negatively correlated with body dissatisfaction, r(382) = -.19, p < .001. Participants' internalization of the thin ideal was significantly correlated with ratings for all categories except Values and Anti-Diet messages, while indicators of participants' desire to be thinner was only significantly correlated with their ratings of You are Beautiful messages, r(382) = -.24, p < .001.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 409

McCubbin, James Faculty Advisor: Samuel Stupp

Characterization of Injury Induced Reactive Oxygen Species Using a Human Spinal Cord Organoid Model

Spinal cord injury (SCI) results in devastating consequences for afflicted individuals, including reduced motor abilities and increased lifelong mortality rates. Soon after initial injury, an overexpression of long-lasting reactive oxygen species (ROS) results in secondary injury due to rapid damage of vital biomolecules. The Stupp Laboratory investigates strategies for regenerative medicine using novel biomaterials and biological platforms of human tissue mimetics. This project focuses on the dynamics of injury-dependent ROS in a human spinal cord mimetic 'organoid' model, and how spatial and temporal dynamics change following treatment with materials developed in our laboratory. We hypothesized that ROS expression would immediately increase following injury and then begin decreasing 2 weeks post-injury, and that the curve of this expression could be reduced by treatment with a novel polymer. The localization and intensity of ROS was measured using the fluorescent probe CellROX Green in imaging experiments. We found that ROS expression began locally in the injury site, and then gradually spread throughout the entire organoid over 4 weeks. Live-dead analysis showed this pattern was correlated with secondary injury. Despite following the same localization pattern in the primary injury site, the abundance of dispersed ROS was greatly reduced by treatment with a polymer. Biochemical quantification experiments performed on the ROS downstream factor Nrf2 revealed that the polymer-treated group had Nrf2 levels closer to uninjured levels. In summary, use of the novel organoid model revealed injury dependent ROS dynamics and the model suggests that our polymer offers a potential therapeutic approach for neurodegeneration in SCI.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 175

McDonnell, Katherine Faculty Advisor: Lilah Shapiro

The Perceptions and Experiences of Attraction in College Students

Research on attraction has long emphasized the importance of similarity in the formation of interpersonal relationships. Script theorists and sociologists alike illustrate that people often evaluate others based on hegemonic and contextual scripts of behavior and identity. Attraction research has primarily focused on explaining underlying unconscious processes that constitute and create feelings of attraction, with less research on our conscious experience and cognitions regarding attraction. Additionally, much existing research on attraction and non-normative identities focuses on the experience of marginalization in relationship formation and maintenance, limiting existing information on how those with non-normative sexual identities experience attraction itself. This study offers a qualitative analysis of gay and straight individuals' perceptions and experiences of attraction to others, broadly defined. Data were collected through 16 semi-structured interviews with cisgender subgroups: lesbian women, straight men and women, and gay men. Preliminary findings suggests that non-normative identities, including lesbian women and gay men, and some straight women, define and conceptualize attraction in fundamentally different ways than do straight men and some straight women. The data indicate that having a non-normative or non-hegemonic identity can catalyze script generativity, in which individuals create their own language and cognitions regarding attraction. Simultaneously, some hegemonic scripts can be maintained. Furthermore, findings suggest that straight men differ from most other identity groups in their evaluations of potential relationships and the values they use to determine pursuing relational partners.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 316

McNiel, Jack Faculty Advisor: David Uttal

Dissecting Mental Rotation Tests: How Stimuli Influence Children's Spatial Performance

Spatial cognition refers to our ability to think about and mentally represent spaces and objects. Mental rotation (MR) tests are widely used to assess spatial thinking in both adults and children, yet significant variation exists, with 103 different MR tests identified for children. Despite the widespread use of MR tests, the influence of test design on children's performance remains unclear. This study examines how different test stimuli-animate (e.g., humans, animals) versus inanimate (e.g., geometric shapes)-affect children's performance. As part of a broader meta-analysis, we systematically reviewed 575 studies on MR performance in children aged 3.0 to 8.0 years. Data about the type of test used, the stimuli of the test, children's performance, and sample age was extracted from each relevant article. To analyze effects of stimuli, we compared mean scores using a t-test and assessed developmental trends with a one-way ANCOVA, controlling for age. Our results indicate that the specific stimuli used within a test does affect performance. There is a significant difference between the Animate (M = 0.58) and Inanimate (M = 0.95) scores, t(150) = -3.83, p < .001. Additionally, there are significant effects of animacy, F(1, 149) = 15.23, p < .001, and age, F(1, 149) = 6.71, p = .011, on scores. These results, in the lens of the broader project, indicate that the design of mental rotation should be examined when interpreting mental rotation results. Identifying how stimuli influence performance contributes to more valid cognitive assessments in developmental research.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 028/032

Mehta, Aarya Faculty Advisor: Luisa Arispe

Microtubule Acetylation Modulates Endothelial Cell Response to Shear Stress

Endothelial cells lining blood vessels respond to the physical forces of blood flow by aligning and elongating, a process requiring intracellular signaling and cytoskeletal reorganization, particularly involving microtubules. Microtubules, key components of the cytoskeleton, undergo post-translational modifications (PTMs) that modulate their function and dynamics. This study investigates the role of microtubule PTMs, specifically acetylation, tyrosination, and polyglutamylation, in endothelial cell responses to flow. Western blot analysis of endothelial cells under various flow conditions revealed that microtubule detyrosination decreased with flow, while acetylation significantly increased. Polyglutamylation remained largely unaffected. Pharmacological inhibition of HDAC6 and αTAT1 altered the timing of endothelial cell elongation and alignment under flow, and also affected the kinetics of microtubule acetylation. Furthermore, CRISPR-Cas9 mediated knockout of αTAT1 resulted in decreased α-tubulin acetylation, whereas HDAC6 knockout led to increased acetylation, confirming their opposing roles in regulating this PTM in endothelial cells. These findings highlight the dynamic regulation of microtubule PTMs, particularly acetylation, in mediating endothelial cell responses to fluid flow.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 282

Mendu, Kathyayini Faculty Advisor: Gregory Phillips II

Resources for Promoting Resilience and Belongingness within High Schoolers

Suicide is listed as the 3rd leading cause of death among teens. Therefore, understanding what protective factors help youth in addition to assessing the efficacy of school supports is incredibly important. As a result, Chicago Public Schools have implemented mental health resources within their schools, but there has been little assessment on their efficacy. Therefore, my study aims to understand if these resources are accessible and effective in addition to identifying which resilience or protective factors marginalized students find to be the most beneficial. To answer this question, a survey was distributed on qualtrics assessing student demographics; safety and belongingness in school; depression, anxiety, and stress; and an open ended question asking students what resource has had the most positive impact on their mental health. The findings indicate that more needs to be done to increase student trust in the administration and that school counselors are the number one support for students, especially those who have more severe mental health struggles.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 415

Mirghani, Jude Faculty Advisor: Jessica Ware

Predicting Circumboreal Stonefly Responses to Climate Change Using Species Distribution Modeling and Population Genetics

Climate change is driving global insect decline. Stoneflies (Plecoptera) have one of the highest extinction rates among insects, in part due to their requirements for cold, highly oxygenated, unpolluted water. Investigating the population structure of stonefly species is integral to their conservation as it has the ability to identify populations at risk of localized extinction. In this study, we extracted DNA from *Nemoura arctica*, *Nemoura cinerea*, and *Nemurella pictetii* specimens collected across Arctic Alaska, Sweden, and Finland. We sequenced the mitochondrial COI gene and the nuclear 28S gene of 96 specimens from 9 locations. We constructed haplotype networks for these three species by combining our sequences with publicly available data from the Barcode of Life Database (BOLD) and NCBI Genbank. We then modeled past, present, and future habitat suitability using species distribution models in the program Wallace. Haplotype networks suggest that *Nemoura arctica* and *Nemoura cinerea* have higher COI genetic diversity than *Nemurella pictetii*. Species distribution models predict that all three species will lose most or all of their current suitable habitat by 2070, no matter the climate scenario. Arctic stoneflies with low COI genetic diversity like *Nemurella pictetii* may be less suited to adapting to rapidly changing environments and should be a focus of conservation efforts.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 058

Mou, Felicia Faculty Advisor: Joseph Lau

Neurophysiological contributors to polarizing trends of speech-in-noise perception in Autism

Systematic reviews of experimental evidence reveal a distribution of polarizing patterns in autism, including speech-in-noise hearing (SiN), i.e., the perception of speech information amidst background noise. While some autistic individuals demonstrate challenges in SiN, others have enhanced abilities. The increasing recognition that there is no single "autism", but rather a spectrum encompassing a neurodiverse population, underscores the importance of the underlying biological mechanism behind such polarizing patterns. This study aims to test a hypothesis that the variability in neural auditory encoding mechanisms contributes to the polarizing trends in SiN performance. Six autistic participants and six non-autistic controls completed the coordinate response measure (CRM) SiN test with elicitation of the neural Frequency Following Response (FFR). This neurophysiological biomarker provides a comprehensive snapshot of the auditory brain as it encodes an auditory signal. On a group level, autistic individuals had a marginally lower SiN performance ($U=7.500$, $p=.09$) than controls. Qualitative analysis revealed that among autistic individuals, some had strong SiN performance while some others had lower performance, replicating the polarizing trend found the literature. Importantly, as predicted, a significant correlation between SiNand pitch encoding strength in FFR ($rho=-.663$, $p=.019$), suggesting that participants with stronger SiN performance tend to be the ones who are more adept at encoding speech acoustic information. Exploratory qualitative analyses revealed that autistic individuals with stronger SiN performance had more robust FFRs than their low-performing autistic counterparts. Together, results suggest that the polarizing behavior observed in SiN perception reflects the range of neurodiversity intrinsic within the autistic population.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 470

Munene, Imani Faculty Advisor: Liming Li

Creating Four Isogenic Strains with Different Prion states in Yeast

Prions are infectious proteins that can exist in either normal non-prion or aggregated prion conformations. The mammalian prion PrP^{sc} is considered the causal factor of many fatal and aggressive neurodegenerative diseases known as Transmissible Spongiform Encephalopathies (TSEs), which includes Creutzfeldt-Jakob disease. Numerous prions have been identified in yeast, which are transmitted as inheritable protein conformations similar to that of PrP^{sc}. This project aims to create four isogenic strains of the yeast, *Saccharomyces Cerevisiae* with prion and non-prion conformations of Sup 35, a translation termination factor and Rnq1, a protein with mostly unknown functions. The prion form and non-prion form of Sup35 are termed as [PSI^{+}] and [psi^{-}], respectively, while the prion form and non-prion form of Rnq1 are termed as [RNQ^{+}] and [rnq^{-}].Through our research, we have successfully obtained the four strains containing: [RNQ^{+}][PSI^{+}] , [rnq^{-}] [PSI^{+}] , [RNQ^{+}][psi^{-}], and [rnq^{-}][psi^{-}]. These results were accomplished by curing [*PSI*] and/or [*RNQ*] from a parental strain containing both prions with guanidine hydrochloride. This technique causes inhibition of Hsp-104, a protein that is essential for prion propagation. Our results are confirmed by a combined analysis of phenotypic and fluorescence microscopic assays. We hope that our findings can be used in single-cell transcriptome analysis to further understand the function of Rnq1 and [RNQ^{+}] in yeast.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 331/491

Murrieta, Dan

Faculty Advisor: Lina Britto

Music, Protest, and The People: Developments of Nueva Cancion Chilena From Violeta Parra to Allende's Election

This thesis traces the emergence of the musical and social movement known as Nueva Cancion from the 1950s to 1970. This movement of folk musicians and their fans played a major role in electing Marxist politician, Salvador Allende, to the Chilean presidency in 1970. Most prior academic work on this subject focuses on the success of the movement during and after the election. Thanks to the use of archives in Santiago de Chile, this thesis explains how and why the movement emerged as the "authentic" sound of political protest in the first place.

As I show in my first chapter, this form of music had its origins in the success of Violeta Parra, a musician and researcher who sparked a folkloric revival in the 1950s and early 1960s by reinterpreting populist folk traditions. Then in my second chapter, I show how a younger generation of musicians infused a strand of pan-Latin Americanism into Chilean folk in the 1960s. Finally, in my third chapter, I demonstrate how some of these musicians connected directly with leftist movements and parties around the world and at home, distinguishing themselves from other young folk musicians as the authentic voice of revolutionary change. In each phase, I show how what counted as an authentic musical expression of "the people" shifted over time.

This is based on an analysis of archival sources: public documents, ephemeral materials (like photos, personal journal entries, correspondence, posters), and an analysis of the music itself: its lyrics, music arrangements, and performances.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 046

Muzaffar, Nadir Faculty Advisor: Lucas Pinto

A Complete Workflow for Determining the Axonal Projection Patterns of Neurons

Studying neuronal connectivity in the brain is an important avenue for understanding cognitive processes and disorders. A key ex-vivo method for doing so is utilizing microscopy to determine the projection patterns of axons, which are long, channel-like extensions from neurons that determine synaptic targets, in a process known as tracing. However, axon tracing is logistically challenging, as it traditionally requires slicing the brain tissue and often leads to distortion and damage. To address this issue, I have adapted a comprehensive workflow for the tracing and computerized reconstruction of axons in mouse brains without the need for tissue slicing. This process consists of brain clearing, fluorescent labeling of neuronal structures, tissue expansion, imaging using microscopy, and finally image analysis using open-source axon reconstruction software. Central to this methodology is the brain clearing step, which involves treating the brain tissue with chemical detergents to make it transparent and allows for long-range imaging without slicing. Moreover, tissue expansion results in easier visualization of axonal projections when compared to cleared brains that are not expanded, and I have concluded that this step is essential for improving image quality and facilitating the tracing process. The complete workflow is effective, and I have been able to collect and start analyzing axonal data from mice. Moving forward, I plan to apply this methodology to examine the projection patterns of neurons in the mouse prefrontal cortex, a brain area implicated in decision-making and problem-solving, to understand the mechanisms behind its function.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 124

Nakagawa, Kristi Lynn Faculty Advisor: Songi Han

Developing an Electron Paramagnetic Resonance (EPR) Based Assay to Study Structure-specific Positron Emission Tomography (PET) Ligand Binding to Tau Fibrils In Vitro

Tau proteins are intrinsically disordered proteins which bind and stabilize microtubules in neurons. Misfolded and aggregated tau form uniquely structured amyloid fibrils, characterizing a variety of neurodegenerative diseases known as Tauopathies. Diagnosis and progression assessment of Alzheimer's Disease (AD), a highly studied but poorly understood Tauopathy, remain longstanding challenges. This project investigates the structure-specific PET ligand binding of spin labeled OXD2419, which has been computationally designed to bind to AD fibrils. We hypothesized that Continuous Wave Electron Paramagnetic Resonance (CW-EPR) would reveal OXD2419's preferential binding to AD fibrils over other Tauopathies, such as progressive supranuclear palsy (PSP). Additionally, a beta cyclodextrin, Captisol, was hypothesized to prevent PET ligand self-aggregation in aqueous solutions prior to binding, allowing critical investigation into whether PET ligand stacking observed in literature is a characteristic feature of binding or an artifact of in vitro ligand concentrations exceeding physiological levels. An OXD2419 and Captisol 1:1 complex was mixed with a concentration gradient of AD and cell-derived PSP fibrils and analyzed through CW-EPR. It was found that CW-EPR can robustly report on ligand binding through peak analysis. Additionally, Captisol effectively prevented ligand self-aggregation prior to binding, yielding data more representative of in vivo conditions. Furthermore, in the presence of Captisol, OXD2419 appeared to bind to AD fibrils in a concentration-dependent manner and preferentially over PSP fibrils. A deeper understanding of PET ligand binding conformations to AD fibrils may enhance binding specificity and efficiency, increasing the clinical utility of PET imaging for Alzheimer's visualization and diagnosis.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 422

Neal, Elise Faculty Advisor: Magdalena Osburn

Leaf wax patterns reveal landscape changes through an extreme climate shift in southern Greenland

Greenland ice sheets are melting due to anthropogenic climate change, which may dramatically alter ecosystem dynamics, especially in the Northern Hemisphere. During the last deglaciation 12,900 years ago, meltwater influx abruptly reversed Earth's warming trend and returned northern regions to near-glacial conditions. This event, the Younger Dryas (YD), altered landscapes by changing vegetation and precipitation patterns. However, there are sparse arctic records where the effects were likely most severe, complicating efforts to understand the magnitude of this climate event. My project uses lake sediment from southern Greenland spanning the last 13,000 years to reveal how the region was impacted by YD cooling through investigating leaf wax lipid biomarkers. Lakes incorporate and preserve inputs from surrounding landscapes over time. Components that are highly resistant to degradation such as leaf waxes and other lipid biomarkers can then be used as records of these landscapes. Leaf wax composition is linked to the presence of terrestrial and aquatic vegetation and hydrological patterns, which all change with climate. Lipids have been extracted from 34 samples spanning 13,000 years that vary in organic matter content and concentration with depth. Preliminary mass spectrometry data reveals dramatic shifts of lipid biomarkers in response to YD effects. The change in vegetative dominance through time, shown predominantly through varying n-alkane chain lengths, indicates a strong response to the changing environmental conditions. Ultimately, my work will reveal how a watershed in southern Greenland responded to and recovered from a climate shift that potentially parallels a future climate state.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 103

Nevett, Danielle Faculty Advisor: Lilah Shapiro

The Impact of Sports Participation on Gender Expression and Self-Perceptions of Female Athletes

Women's sports in the United States are growing exponentially, with record amounts of viewership, attendance, revenue, and investment at all levels of competition. However, sports are traditionally a male domain, and women in sports have historically been met with exclusion, prejudice, and discrimination. Western society associates sports and athleticism with traditionally masculine traits, such as strength and toughness, while it places increased value on women who align with traditionally feminine characteristics, such as weakness and docility. Female athletes therefore inherently diverge from both athlete and gender norms, which may influence how they experience themselves in sport and navigate their femininity and roles as women in society. This study explores how participating in women's sports affects the identities of female athletes and impacts their understanding and personal expression of gender, with data collected from qualitative interviews with 18 female student-athletes on Northwestern University varsity women's sports teams. Preliminary findings suggest that female athletes may find it difficult to balance being a woman, being feminine, and being an athlete, with these various identities intertwined. Female athletes hold personal schemas of femininity that are distinct from their understandings of a traditional societal framework, often finding ways to express their personal definition of femininity while playing their sport. While not without challenges, these female athletes discussed learning to accept and appreciate themselves, their bodies and athleticism, and their roles in society.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 948

Nguyen, Kien Faculty Advisor: Christian Malapit

Electrochemical Fluorination of Organic Molecules via Phenothiazine

Incorporating trifluoromethyl (CF3) groups to pharmaceutical compounds has garnered interest in medicinal chemistry because it enhances drugs' metabolic stability, solubility, and binding affinity. Recently, the Malapit lab developed an electrochemical method for functionalizing a carbon-hydrogen (C-H) bond in molecules with a trifluoromethyl group (trifluoromethylation). Trifluoromethylation can also be achieved by functionalizing the C-H bond with an alcohol that already contains CF3 groups, such as hexafluoroisopropanol (HFIP). This project aims to achieve this transformation on an aromatic ring, a cyclic structure that is commonly found in drug molecules. Since this reaction traditionally relies on expensive metal catalysts and harsh conditions, my research work aims at developing a sustainable green chemistry method for it. To this end, I utilize a compound known as phenothiazine as a redox mediator in my electrochemical reaction system. Phenothiazine can help oxidize an aromatic ring, turning it into a reactive, positively charged molecule known as an aryl radical cation. Upon encountering hexafluoroisopropanol, this positively charged molecule reacts with the alcohol to form the desired trifluoromethylated product. Details on reaction development and optimization, including screening of mediator, effect of electrochemical parameters (such as current, potential, solvent, and electrolyte), and mechanistic studies will be discussed. Preliminary results suggest that this method could be useful for introducing trifluoromethyl groups into aromatic structures. Furthermore, the proposed mechanism could be expanded to incorporate other types of organofluoride groups into aromatic C-H bonds in the future.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 260

Nunez Magana, Alexa Faculty Advisor: Adriana Weisleder

Where is the perro?: Developing an inclusive approach to analyze bilingual communication

Although 22% of US children speak a language other than English at home, bilingual children's communication disorders are often misdiagnosed. Research has focused on monolingual populations and methodologies, thus leaving language development outside the average range an under-researched subject for bilingual populations. The current study attempts to develop a more inclusive approach to characterizing language and communication in 2-year-old Spanish-English bilinguals. Pairing the findings that children in collectivist cultures tend to have a lower expressive vocabulary early on with our hypothesis that gesture might be a uniquely important communication tool for bilingual children, this approach takes into account a child's verbal language and nonverbal gesture use. By tracking both modalities in naturalistic interactions between children and their caregivers, we hope to get a more complete understanding of bilingual children's communication that better predicts their language outcomes. In my work as a Research Assistant through the Emerging Scholar Program I helped develop the behavioral coding scheme that categorizes verbal and nonverbal communicative episodes. Once the coding scheme was finalized, I coded pilot data both at the child and caregiver level, while helping transcribe the child's spoken language. Preliminary descriptive statistics show that all children used nonverbal behaviors when communicating with their caregiver. This highlights the importance of investigating how bilingual children use gestures during language development since, we hypothesize, they might rely more on them for communication than their monolingual counterparts. Better understanding bilingual language development helps to inform and develop efficient screening, diagnosis, and intervention programs for communication disorders.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 012

Nwafo, Nzubechukwu Faculty Advisor: Igor Efimov

The Role of Cell Structure Proteins in Heart Health

The SUN2 protein, an inner nuclear membrane protein, is a core component of the Linker of Nucleoskeleton and Cytoskeleton (LINC) complex. The LINC complex provides structural and functional support to cells by linking the nucleoskeleton and cytoskeleton and transmitting mechanical stimuli. Disruption of the LINC complex can lead to a variety of diseases, such as laminopathy (loss of lamin A/C) and Emery-Dreifuss muscular dystrophy (loss of emerin or nesprin). Previous studies suggest that SUN2 is associated with mechanical sensing and nuclear positioning in non-cardiac cells. However, its precise role in the heart remains largely unknown. Determination of the role of SUN2 in cardiac cells may provide grounds on which to advance methods of reducing risk of heart-related issues. To explore if SUN2 plays a critical role in cardiac function, echocardiogram data was collected and analyzed for mice in three experimental groups: Wild type (WT), SUN2 heterozygous knockout (SUN2+/-), and SUN2 homozygous knockout (SUN2-/-). As a result, The SUN2-/- mice had significantly longer QRS wave duration than WT mice ($p=0.0145$), while P waves, PR intervals, QT intervals, and RR intervals showed no difference across the three groups. The prolonged QRS indicates a slower conduction velocity in ventricles with the absence of SUN2, which may provide an arrhythmogenic substrate. The discovery of the role of SUN2 in risk of arrhythmiahas implications for further cardiology research, and application within the clinical setting. This finding can also serve as a basis for future research on the development of arrhythmias.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 017

Oesterheld, Eli Faculty Advisor: Daniel Shanahan

'Birdvibe': Examining Interdomain Representations of Birds in 19th and 20th Century Classical Music

While representations of birdsong in music have a long-standing precedent, there is a significant body of classical works that represent birds by evoking their non-auditory characteristics, such as size, movement type, or temperament. These representations, referred to here as 'birdvibe' representations, are interdomain, and involve mapping features from one sensory domain onto the specific auditory domain of music. The exact cognitive mechanisms through which interdomain mapping succeeds is debated. Analogy-based theories of meaning derivation, such as Zbikowski's idea of conceptual blending, argue that by mapping structurally significant traits of non-musical phenomenon onto parallel musical events, musical events can directly represent non-musical ones. Conversely, theories such as Antovic's six-level hierarchical grounding theory argue that meaning is created when a musical event evokes a similar response to a real-world one, thus bringing that event into the listener's mind.

Through analysis of melodic material in a corpus of 'birdvibe' representations (n=8), this project uses both music analytic techniques and frameworks from the cognitive sciences to examine the ways in which composers use musical parameters such as pitch content, melodic contour, articulations/ornamentations, and instrumentation to evoke the motion, size, and/or character of the bird they are portraying. Additionally, using case studies of Saint-Saens' "Poules et Coqs" and Sibelius' "Der Schwan von Tuonela", this project attempts to unpack the experiential implications of both conceptual blending and hierarchical grounding, concluding that, while each approach results in the successful communication of extra-musical meaning, they suggest two entirely different musical experiences: one in which the listener draws meaning from the musical surface, and one in which the listener draws meaning from what lies beneath it.

Presentation Format: Oral
Time: 12:45pm-2:15pm
Room: Rock Room
Number: 172

Olsen, Will Faculty Advisor: Mar Reguant

Data Centers as Grid Assets: Microeconomics of Virtual Power Plants

This paper evaluates whether battery energy storage systems (BESS), when integrated into data centers, can serve as reliable backup power systems while earning revenue through participation in electricity markets. As energy demand surges due to AI-driven data center expansion, batteries offer a promising dual function: ensuring internal reliability and providing external grid reliability through price volatility smoothing. Prior research has assessed the economics of BESS, however, few studies account for the operational constraints of data centers or the trade-offs between profit and reliability. To address this, this paper develops market structures, a mixed linear optimization problem, and simulates a behind-the-meter BESS in the Electric Reliability Council of Texas (ERCOT) market. The model spans a full year of hourly market data across multiple nodes, battery configurations, and transmission outage scenarios. Results show that integrated data centers can generate substantial revenue-particularly from ancillary grid support services-while preserving full data center reliability. However, profitability is highly sensitive to node selection, price volatility, and transmission outages. Larger battery systems provide greater operational flexibility and higher revenue, but exhibit diminishing returns under frequent outage conditions. By incorporating data center-specific load constraints and probabilistic outage factors, the model offers a more realistic framework for evaluating hybrid infrastructure performance. This paper extends existing literature by demonstrating the dual-role potential of data centers as both consumers and flexible grid assets, and by offering a quantitative foundation for investment and policy decisions in an increasingly electrified, AI-powered energy landscape.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 486

Ortiz, Nikolai Faculty Advisor: Galen Bodenhausen

Applicant Perceptions: The Role of Descriptive Stereotypes on Gender and Race-Based Discrimination within Job Hiring Processes

Despite increasing efforts to reduce bias in hiring, gender and race-based discrimination persists, particularly within gender-typical industries. This paper examines how descriptive stereotypes about race and gender influence perceptions of applicant suitability through two studies simulating hiring decisions. Drawing on Heilman's Lack of Fit Framework, we examined whether personality traits that were congruent or incongruent with prototypical industry members influenced evaluations of Black and White applicants for female-typic (elementary teaching) and male-typic (technical instruction) positions. In study 1, participants evaluated female applicants varying in race and reference letter content. Results indicated that feminine descriptors enhanced evaluations across groups but disproportionately benefited Black women, consistent with literature suggesting Black women face hypo-femininity stereotypes. In study 2, we extended the design to include male applicants, both occupational contexts, and time constraints reflecting real-world hiring. While feminine traits continued to benefit applicants in female-typical roles, in male-typic roles, Black applicants were penalized for any deviation from gender-neutrality. Across both industries, gender-neutral Black applicants were rated among the most favorably, suggesting that neutrality may serve as a "safe" identity presentation under aversive racism. Additionally, our results indicate that participants' perceptions of industry prototypically influence stereotype-based evaluations, complicating assumptions within traditional fit-based models. These results highlight the nuanced ways race and gender interact in hiring judgments, and suggest that stereotype-congruent framing can mitigate bias - but only under specific conditions.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 450

Osborne, Cate Faculty Advisor: Kim Suiseeya

Global Climate Governance: Finding the Meaning Behind Loss & Damage at COP29

Climate change is one of the greatest challenges facing the world. International institutions, like the United Nations, have the potential to facilitate dialogue amongst countries to produce meaningful policy solutions. One of the newer developments in international climate negotiations is the creation of the Fund for Responding to Loss and Damage, which seeks to compensate communities for losses resulting from climate change, such as language, livelihoods, and cultural heritage. One of the barriers to operationalizing the Fund and distributing money to those who most need it most is a fundamental disagreement over the meaning of loss and damage. A collaborative ethnography, conducted at the 29th Conference of the Parties to the United Nations Framework Convention on Climate Change in Baku, Azerbaijan, revealed that meaning-making behind loss and damage is contested and complex. After attending and observing official negotiations, side events, and press conferences, it is clear that loss and damage is a highly politicized topic, with representatives from the Global South typically much more vocal than those from the Global North. There is no one universally accepted meaning of 'loss and damage,' but for those most affected and often silenced in climate negotiations, the mechanism is given meaning through themes of inclusivity, personal loss, and community. While conceptualizing the meanings behind loss and damage cannot explicitly solve disagreements over the Fund's implementation, they are key to understanding disagreements in spaces of global environmental governance and how to create progress in future climate negotiations.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 070

Palkar, Riya Faculty Advisor: Eyal Kimchi

EEG and Video Monitoring via Open-Caged Monitoring to Understand Sickness Behavior in Mice During Sleep

Delirium is an acute neuropsychiatric condition characterized by attention and cognitive disruptions, significantly complicating care and worsening outcomes in hospitalized patients. Although its pathophysiology remains unclear, increased slow-wave EEG activity has been consistently associated with delirium. Given its superficial resemblance to Non-Rapid Eye Movement (NREM) sleep, this project aims to differentiate the EEG signatures of these two altered consciousness states. Using wild-type mice, slow-wave EEG activity was measured between two groups: those displaying inflammation-triggered sickness behavior (a model for delirium) and those undergoing NREM sleep during control conditions.

To do this, EEG electrodes were implanted, and mice were injected with E. coli-derived lipopolysaccharides (LPS) to induce systemic inflammation known to model EEG slowing observed in Delirium. Saline injections were used as vehicle control. Both injections occurred at the start of the light phase to align with natural sleep onset. EEG recordings were collected the following week using OpBox, an open-source system for simultaneous EEG/EMG acquisition and video monitoring. Automated pose estimation was used to extract behavioral data, allowing simultaneous behavior and brain activity analysis.

Preliminary findings and ongoing analysis suggest that although both LPS and saline groups exhibited slow-wave activity during the experimental period, distinct differences emerged in their frequency and distribution patterns. We expect analysis and future project extensions to reveal potential differential slow wave activity patterns to these manipulations.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 429

Pareja, Izzy

Faculty Advisor: Leslie DeChurch

Exploring Relationships Between Digital Work Arrangements and Well-Being: The Mediating Roles of Social Support, Work-Home Conflict, and Experienced Awe

Though organizations were exploring telecommuting and alternative work arrangements well before the COVID-19 pandemic, the near sudden shift to remote work brought on by lockdowns and social distancing prompted many organizations to rethink the power and place of digital tools at work. Accompanying the widespread adoption of a variety of digital work arrangements is a question that has become increasingly important to organizational researchers: how do these arrangements affect worker well-being? The current study explores this question through the assessment of relationships between digital work arrangement (hybrid, stationary remote, or digital nomad), relevant well-being indicators (social support, work-home conflict, and experienced awe), and general well-being. After surveying participants online, regression and mediation analyses were used to determine the extent to which these work modalities were related to participants' experience of well-being generally and through the chosen indicators. Ultimately, this study presents a configuration of the digital work categories that is novel compared to prior research: it introduces digital nomads-a recently emergent and exceptionally mobile group of digital workers-into a quantitative research context, as well as the broader conversation of how well-being fluctuates throughout the digital work landscape.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 482

Park, Rowan Faculty Advisor: Jesse Yeh

He Hit Me But It Felt Like Love: An Analysis of the Cultural Messaging in Law and Order: Special Victims Unit's Depictions of Intimate Partner Violence

This presentation discusses my thesis that explored the cultural narratives surrounding intimate partner violence (IPV) and the role of media in shaping societal perceptions, focusing specifically on the television series Law & Order: Special Victims Unit. Past scholarship has done thorough research on IPV as a public health issue, but there exists a gap in research focusing on the media's depictions of it, and the cultural messaging this perpetuates. Methods included an extensive viewing and coding process of 15 episodes spanning 26 seasons, followed by qualitative media and discourse analysis. While the show is successful in raising awareness and often highlights the importance of advocating for victims, it also reinforces harmful tropes that blame survivors and minimize abuser accountability-reflecting a broader societal desensitization to gender-based violence. These depictions mirror real-world dynamics, where intimate partner violence is treated as a private matter of the home. Drawing from survivor testimony and public discourse, this research situates IPV as a public health crisis, exacerbated by patriarchal norms, institutional betrayal, and the romanticization of domestic abuse. This presentation advocates for a cultural revolution centered around believing and empowering survivors and confronting the institutional failures that continue to enable this abuse. Intimate partner violence is a global health epidemic that continues to threaten young girls and women everywhere. The solution is a holistic response consisting of legislative reform, increased accountability, and transformative media representation, in order to eradicate violence against women.

Presentation Format: Oral
Time: 10:45am-12:15pm
Room: Rock Room
Number: 131

Park, Beatrice Faculty Advisor: Jeremy O'Sullivan

Combinatory Siglec-6 and Siglec-8 Treatments on IgE-Mediated Mast Cell Activation

Mast cells are a type of immune cell that release inflammatory mediators through degranulation. Excessive or inappropriate activation of mast cells contribute to a wide range of diseases characterized by Type 2 inflammation. Current treatments for these diseases are not curative and only offer symptom alleviation. Therefore, finding a method to selectively inhibit mast cell activation would offer significant clinical advance. A good target for this aim are the inhibitory receptors Siglec-6 and Siglec-8, which are selectively expressed on mast cells and interact with the activatory IgE receptor FcεRI. While the mechanisms of these Siglec receptors are not fully understood, both showed promising results with inhibiting IgE-mediated mast cell activation in previous studies. Thus, this project aimed to understand the effects of combinatory Siglec-6 and Siglec-8 antibody treatments on IgE-mediated mast cell activation. Flow cytometry experiments were conducted to quantify CD107a levels—signifying degranulation—of mast cells with single and combinatory treatments of Siglec-6 and Siglec-8 in various concentrations and incubation times. Contrary to expectations, both single and combinatory Siglec-6 and Siglec-8 antibody treatments increased mast cell activation after FcεRI stimulation. Single Siglec-6 treatments had the strongest ac effect, and single Siglec-8 treatments had the weakest amplifying effect. These findings confirm that both Siglec receptors are involved in the IgE activation pathway and suggest that Siglec-6 has greater involvement in the pathway than Siglec-8. Increased activation levels may indicate that soluble Siglec antibodies at higher concentrations than previously studied prevent Siglec receptors from performing their functions, rather than enhance their performance.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 174

Park, Jun Faculty Advisor: Reuel Rogers

Unequal Shares: Airbnb and Racial Dynamics in Chicago Neighborhoods

This study investigates how Airbnb influences racial dynamics and economic opportunities within Chicago neighborhoods, emphasizing the platform's effects on minority hosts in historically disadvantaged areas such as Bronzeville. Utilizing Airbnb listing data from InsideAirbnb and demographic data from the American Community Survey (ACS), we analyze correlations between neighborhood racial composition and Airbnb metrics, including pricing, reviews, and potential revenues. Our analysis reveals significant disparities, notably fewer reviews for minority hosts, thereby affecting their visibility and profitability. Although pricing and potential revenue showed negative trends related to minority neighborhoods, these findings were not statistically significant. These outcomes underline persistent racial inequalities within the sharing economy, calling for targeted measures to ensure equitable economic opportunities across diverse communities.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 336

Park, Aram Faculty Advisor: Vinayak Dravid

Effect of water chemistry on the phosphorus adsorption by PEARL

The excessive discharge of phosphorus into aquatic systems can lead to severe environmental consequences, including eutrophication. The removal and recovery of phosphorus are crucial amid the global scarcity of clean water and essential nutrients. Adsorption is an efficient method for contaminant removal due to its simplicity and low cost. We developed the Phosphate Elimination and Recovery Lightweight (PEARL) media, which consists of a cellulose sponge substrate coated with iron nanoparticles. PEARL has a high specific surface area and has been reported as a promising adsorbent for phosphorus removal in deionized water. This study investigates the influence of water chemistry on phosphorus removal. The adsorption of phosphorus onto PEARL is examined under varying conditions, including different coexisting cations (Mg2, Ca2, Na), anions (Cl, NO3, CO32), and a different range of pH levels.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 120

Park, Yooha Faculty Advisor: Shawn Davidson

Metabolic Consequences of Huntington's Disease in Mice Brain and Skeletal Muscle

Huntington's Disease (HD) is a genetic, neurodegenerative disorder that leads to loss of motor coordination, cognitive decline, and personality changes. While often characterized as a disease of the brain, HD also broadly affects the body's metabolism, leading to difficulty in maintaining weight and changes in key energy processes. Understanding these whole-body effects could inform new treatments, especially for patients already with significant damage. In this study, we investigated how HD affects the way glucose-the body's primary energy source-is used in both the brain and skeletal muscles in a mouse model of HD. We used labeled glucose (13C) to trace its utilization in various energy-producing pathways, including the tricarboxylic acid (TCA) cycle and glycolysis. Using two complementary techniques-bulk metabolomics, which provides overall metabolite levels, and spatial metabolomics, which generates a map of metabolite levels across the tissue-we analyzed how metabolism shifts in HD tissues. We found that glucose use differs across muscle types, and the brain relies more heavily on glucose overall. Notably, spatial data reveal that less glucose was used to produce glutamate, a key neurotransmitter, in the brains of HD mice. This suggests HD brain cells may be turning to other sources for energy, which could impact brain function and disease progression. These findings emphasize the importance of studying HD as a whole-body condition and reveal changes in key metabolites. Furthermore, spatial metabolomics can help reveal hidden changes that may inform more effective treatments and warrant further study of HD metabolism.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 108

Parra, Valentina Faculty Advisor: Alyssa Garcia

Hitchhiking en Botella: Race, Gender, and Politics of Mobility in Cuba

Dr. Alyssa Garcia, assistant professor in Gender and Sexuality studies, argues in her revision of a journal article paper, "Race, Racialization, & Rehabilitation: Intersectional Insights into the Cuban Revolution's Campaign to Eliminate Prostitution" for the Publication of the Afro-Latin/American Research Association (PALARA), and her upcoming book project, Moral Discourses, Regulated Bodies: Sex, the State, and Subjectivity in Cuba. In my role as research assistant for the Emerging Scholars program, I reviewed books and sources to supplement the peer-reviewed process and translate testimonios- personal, oral narratives pulled from Latin American tradition. Pre-existing testimonio translations raised key ethical reporting conflicts as the original integrity was lost through a series of translations. I approached the translation by grounding my work in existing interpretative oral history methodologies. All of this work was rooted in a lens of intersectionality, race and gender, Afro-Cuban women, Critical Race studies, sex work, and Black-Feminist critical thought. I looked at who was speaking and their positionalities - as opposed to going word by word - to honor their stories and not lose their voices in their own narratives. In the future, this work has been integral as I continue my own research in different fields, allowing me to understand how race and prejudice are contextualized, interpreted, created, and enforced in other countries.

(This abstract will be edited).

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 010

Patel, Dhruv Faculty Advisor: John Rogers

Transcatheter Aortic Valve Implantation with Wireless, Battery Free Pacemaker

The Transcatheter Aortic Valve Implantation (TAVI) project focuses on a dual-function system that integrates a pacing device with a catheter-loadable artificial aortic valve. This study evaluates the deployment of this integrated system using in-vivo porcine models, aiming to streamline treatment by combining heart valve replacement and cardiac pacing into a single procedure. The device harnesses wireless power transfer technology, which eliminates the need for a battery and significantly reduces its size, enabling direct mounting onto a stent. A significant technical achievement of this project was successfully miniaturizing the device's coils and circuits to allow crimping onto the stent's loading system, which led to successful system deployment and the capture of the pacemaker signal. This innovation overcomes the traditional limitations that typically require separate procedures for valve replacement and pacing. By offering a less invasive approach with advanced pacing technology that more closely mimics natural cardiac physiology, this integrated system represents a significant advancement in reducing the clinical burden associated with managing aortic valve disease and pacing requirements separately. Ultimately, this project aims to enhance patient outcomes through improved technological integration and procedural efficiency.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 033

Patel, Armana Faculty Advisor: Katherine Sadleir

Exploring the therapeutic potential of single-chain variable fragment antibodies in inhibiting amyloid plaque growth in Alzheimer's disease

Alzheimer's disease (AD) is a progressive neurodegenerative disorder affecting millions worldwide, marked by amyloid v-peptide (Av) plaques and tau tangles, both closely associated with cognitive decline. Av plaques impair neuronal communication and contribute to tau hyperphosphorylation and axonal dysfunction. This study evaluated a therapeutic approach using single-chain variable fragment antibodies (scFvs) derived from gantenerumab and lecanemab to selectively bind Av plaques, forming a protective barrier to inhibit plaque growth and reduce associated toxicity.

In 5xFAD mice, we confirmed that the Av-targeting scFvs bound specifically to plaques, while a non-specific scFv showed no plaque affinity. Using adeno-associated virus (AAV), we expressed gantenerumab-, lecanemab-, or non-specific scFvs in 5xFAD mice with plaques pre-labeled in vivo using methoxy-X04. After 10 weeks, mice were sacrificed and brain sections stained with thiazine red to label plaques at endpoint. By comparing initial methoxy-X04-labeled plaques with thiazine red-labeled plaques, we quantified changes in plaque size and number.

Both Av-directed scFvs attenuated plaque growth compared to controls, with gantenerumab showing greater effect. scFv treatment also reduced dystrophic neurite burden, as measured by LAMP1 and BACE1, and decreased local pTau181 accumulation. Although overall cortical Iba1 coverage remained unchanged, gantenerumab-treated mice exhibited localized microglial clustering around plaques, suggesting a targeted immune response. These results indicate that scFv antibodies can reduce Av pathology without widespread inflammation.

This work supports the use of Fc-silent scFvs as a potential strategy to target early plaque growth in AD. Further investigation is needed to assess long-term safety and immune engagement.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 275

Patel, Mira Faculty Advisor: Mercedes Spencer

Exploring Study and Participant Characteristics Across Studies Focused on the Executive Function Skills of Children with Specific Reading Comprehension Deficits

Research into the role that executive function plays in specific reading comprehension deficits in children is needed to better understand effective interventions for this population of readers. According to cognitive psychologists, executive function encapsulates several different forms of higher-level cognitive processing including working memory, self-monitoring, inhibition, planning, cognitive flexibility, and behavioral regulation. Prior work indicates that there may be differences in the specific weaknesses that children with specific reading comprehension deficits have. The present meta-analysis aims to 1) identify the executive function profiles of children with specific reading comprehension deficits and typical readers; and 2) view the differences between linguistic and non-linguistic measures of executive function in both groups. Linguistic measures of executive function include those with words and pictures, while nonlinguistic measures include those with shapes and numbers. The literature search included empirical studies that reported the means and standard deviations for measures of executive function in children at or under the age of 18 with specific reading comprehension deficits and in typical readers. To be included, studies also had to be reported in English and identify students based on measures of reading comprehension and decoding. Studies could not include children identified as having an intellectual disability, visual or hearing impairment, psychiatric disorder or neurologic disorder. We present descriptive information including participant ages and language(s) spoken for a sample of studies that met inclusionary criteria (N=28) and explore patterns of variation in these study characteristics for children with and without specific reading comprehension deficits.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 373

Peng, Chelsea Faculty Advisor: Noshir Contractor

TEAMSTaR: Designing and Testing Tools for Space Team Success

As space teams become more autonomous and aim to complete longer missions, informed decision-making becomes increasingly important to efficiently identify and adapt to fluctuations in team dynamics and ensure effective completion of mission objectives. To support teams in their decision-making, we deployed and tested the effectiveness of a graphical dashboard called TEAMSTaR (Tool for Evaluating and Mitigating Space Team Risk) alongside various intervention activities intended to improve team success. Our primary focus was on the development and execution of a research protocol to assess how teams interacted with the dashboard and responded to related interventions. The TEAMSTaR dashboard was implemented in NASA's Human Exploration Research Analog as part of a series of four 45-day earth-based space analog missions. Crew members evaluated predictions of their teamwork and taskwork potential based on dashboard simulations and made informed decisions about what intervention activities to complete. We collected data in real-time using a set of Qualtrics surveys crew members took before and after the dashboard and intervention activities. We managed data collection logistics, emphasizing flexibility, organization, and communication in a dynamic data collection environment. Through this process, we identified key best practices for conducting human subject research with NASA, particularly around coordinating tasks, adapting swiftly to issues, and maintaining documentation. These key practices can serve as a guide to successful future real-time data collection in spaceflight analog environments and beyond. The TEAMSTaR project itself provides insight on how to integrate computational predictive tools into team operations and intervention design for improved team outcomes.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 381/398

Peterson, Anna Faculty Advisor: Jesse Yeh

Beyond the Black Box: The Use of Formal Channels in Addressing Surveillance Harm, as Shown Through the Chicago Police Department's CLEAR "Gang Database."

This study examines the limitations of formal channels in addressing government surveillance misuse, using *Chicagoans for an End to the Gang Database v. City of Chicago* (2020) as a case study. Through a qualitative document analysis (QDA) of *Catalan-Ramirez v. Wong* (2018), *Chicagoans for an End to the Database v. City of Chicago* (2020), Chicago's Welcoming City Ordinance, and the 2023 Community Commission for Public Safety and Accountability (CCPSA) vote on the revised Criminal Enterprise Information System (CEIS), three key dynamics were identified regarding surveillance and formal channels. First, the inherently individualizing nature of the courts prevents the adjudication of surveillance as a holistic system. While *Chicagoans v. City of Chicago* plaintiffs framed Chicago's gang database as a structural issue, defendants relied on legal precedence to individualize their grievances. Second, data blackboxing and federal procurement drive the persistence of surveillance systems, even in the face of legal scrutiny. The attempted implementation of the CEIS and continued use of Citizen Law Enforcement Analysis and Reporting (CLEAR) data exemplifies how law enforcement data is rarely erased but instead recycled and rebranded. Third, activists strategically leverage legal proceedings not as an end goal but as a means of generating public knowledge and information access. Despite the court's inability to dismantle the gang database, litigation played a critical role in mobilizing community action, increasing transparency, and facilitating subsequent advocacy efforts. Legal channels alone are insufficient to dismantle entrenched surveillance infrastructures; rather, legal revisions and alternative political strategies are necessary to counteract the cyclical nature of law enforcement data collection.

Presentation Format: Oral
Time: 12:45pm-2:15pm
Room: Armadillo Room
Number: 066

Place, Chaeli Faculty Advisor: Christian Petersen

Examining discoidin domain receptor as a regulator of planarian eye regeneration

A central goal of regenerative biology is understanding how stem cells, which can become various types of specialized cells through a process called differentiation, generate organized, functional tissues in the correct locations. Regeneration, the ability of an organism to replace damaged or lost tissues, depends on stem cells. The planarian Schmidtea mediterranea, a flatworm capable of whole-body regeneration through adult stem cells called neoblasts, is an excellent model to study how stem cells form complex, functional organs like the eyes during regeneration. Planarian eyes comprise two main types of cells: dark-pigmented cells that express *tyrosinase* and photoreceptor neurons that express *opsin*. To identify genes involved in eye regeneration, we used single-cell RNA sequencing (scRNAseq) to study gene expression in eye stem cells and mature eye cells during regeneration, revealing *discoidin domain receptor* (*ddr*) as a novel regulator of eye regeneration. Disrupting *ddr* expression caused loss of white color associated with photoreceptor neurons and formation of extra eyes in incorrect locations. However, we found that the loss of white color did not correlate with loss of differentiated eye cells, as *opsin* and *tyrosinase* were still expressed, and the eyes maintained axonal projections to the brain, suggesting they may still be functional. We also observed no changes in position control gene expression, which regulates regional tissue identity and can cause extra eyes under perturbation, indicating that ddr regulates eye cell differentiation or targeting rather than body patterning. These findings support efforts to manipulate stem cells for therapeutic applications.

Presentation Format: Oral
Time: 12:45pm-2:15pm
Room: Lake Room
Number: 998

Pradhan, Puja Faculty Advisor: Daniel Brat

Mechanisms of Stemness and Quiescence in Brain Tumor Progression

The dismal survival rates of glioblastoma (GBM) patients are due to therapeutic resistance of GBM stem cells (GSCs) and their capacity to drive tumor recurrence. Our goal was to study the mechanisms that allow GBM to evade radiation therapy, potentially revealing new strategies to overcome tumor radioresistance and prevent recurrence. We first evaluated whether tumor-associated macrophages (TAMs) influence the GSC population in GBM. GSCs are a critical subpopulation driving tumor regrowth due to their self-renewal abilities. We incubated TAMs with patient-derived GBM cells under normoxic and hypoxic conditions and found that TAMs significantly increased the number of GSCs in GBM after 72 h hypoxia. We then explored how hypoxia and radiation influence cell cycle dynamics using flow cytometry. We incubated GBM cells under normoxia and hypoxia for 24 h with and without 3 Gy radiation. Flow cytometry analysis of the GBM cells revealed that the number of G1 cells decreased and G2/M cells increased 24 h after radiation compared to non-irradiated cells in normoxia. In contrast, GBM cells exposed to hypoxia had an enriched population of cells in G0 in both radiated and non-irradiated cells. This suggests that hypoxia may promote radioresistance by locking GBM cells in a quiescent G0 state, allowing them to evade radiation-induced cell death. Together, these findings highlight how components of the tumor microenvironment, namely TAMs and hypoxia, contribute to GSC enrichment and cell cycle quiescence, offering valuable insight for developing therapies that disrupt these protective mechanisms and improve GBM treatment outcomes.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 348

Prakriya, Kiran Faculty Advisor: William Halperin

Development of High Porosity Silica Aerogels

Silica-aerogel is a highly porous material composed of intricate networks of intertwined silica strands and has an extremely low density. These properties make it valuable for applications in ultra-low temperature physics, particularly in liquid ^{3}He studies. ^{3}He shares key properties with unconventional superconductors, materials that exhibit zero electrical-resistance under specific, low temperature (<100K), conditions. I aim to use silica-aerogel to introduce a tunable impurity density into liquid ^{3}He to test the effects of impurities on superconductivity as well as the behavior of low temperature phases of ^{3}He. Previous research has shown that studying ^{3}He with minimal disorder is especially valuable, driving strong interest in producing ultra-low-density silica-aerogel. However, producing aerogels with ultra-low density and high uniformity required for experimental use is technically challenging and there are no previously established methods. Here, I developed new methods to produce ultra-low-density silica-aerogel (> 99.1% porosity). Samples were prepared utilizing an altered version of the “sol-gel” process, followed by ultra-delicate supercritical drying. I found that heating the alcogel solution during gelation, decreasing the gelation time, and preventing evaporation of methanol resulted in lower density silica-aerogel. The silica-aerogel samples produced were characterized using electron microscopy (SEM/TEM), stress-strain tests, and birefringence analysis to evaluate homogeneity and isotropy, or structural uniformity. These new methods yielded consistent silica-aerogel samples with low density (>99.4% porosity) and high uniformity. These techniques will be used to produce samples for upcoming ^{3}He experiments to explore the effects of the impurity density on superconducting materials, allowing for a better understating of unconventional superconductors.

Presentation Format: Oral
Time: 10:45am-12:15pm
Room: Lake Room
Number: 988

Punar, Metehan Faculty Advisor: Thomas Meade

CoGli-GOPEI Reduces Cancer Cell Migration Activated by Cutaneous Mechanosensory Nerves

Basal cell carcinomas (BCC) are the most frequently diagnosed cancers globally, affecting about one in five Americans. The progression of these cancers involves the production of Hedgehog (Hh) ligand from cutaneous mechanosensory nerves, which activates the hedgehog signaling pathway by initiating the transcription of cancer-causing BCC genes. Current treatment for BCC entails surgical removal, which often leads to disfigurement and scars. Recent studies suggest that biochemically targeting the Hh signaling pathway may provide a less invasive treatment for patients. In this project, we are targetting Gli1 transcription factors (TFs), one of the components activated by the Hh signaling pathway. We developed a chemical drug called CoGli-GOPEI that delivers a Cobalt (III) Schiff Base-DNA molecule (CoGli) targetting Gli1 TFs. Graphene oxide polyethyleneimine (GOPEI) improves the introduction of CoGli because it enhances cell uptake and acts as an effective delivery vehicle for the DNA conjugate. To test the compound's efficacy, we introduced different doses of this compound to a Gli-dependent BCC cell line called ASZ. Our data show that low doses of this compound more efficiently inhibited cell migration in comparison to GANT-61, a promising Gli1 TF inhibitor, and Vismodegib, an FDA-approved drug for BCC. This increased inhibition of cell migration provides strong evidence that targeting the Hh signaling pathway with CoGli-GOPEI offers a promising alternative to traditional treatment routes. The future trajectory of this work may examine the effects of how CoGli-GOPEI affects the feedback loop between Gli1 TF inhibition and Hh ligand production from cutaneous mechanosensory nerves.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 273

Qin, Alicia Faculty Advisor: Alfonso Mondragon

Conformational Dynamics of Enzyme Topoisomerase I in its Interactions with DNA

DNA topoisomerases are essential enzymes that regulate DNA supercoiling through cutting, strand passage, and resealing, which is crucial for keeping genetic material stable while copying and reading DNA. Topoisomerases have emerged as key targets for cancer therapy, but current inhibitors face challenges such as toxicity and resistance, highlighting the need for drug design informed by deeper understandings of enzyme dynamics. Despite detailed structural insights, the conformational changes enabling Topoisomerase I (TOP1) to perform strand passage remain unclear, with models proposing various movements between its four domains. The present study explores the role of domain movements in DNA relaxation by TOP1 using a technique called single-molecule FRET (smFRET). One domain of the TOP1 enzyme is labeled with a Cy3 fluorophore (a fluorescent tag) and another with a Cy5 fluorophore. The MASH-FRET software is then used to find traces where the Cy5 signal exhibits an anti-correlation with Cy3 fluorescence, confirming direct energy transfer from one domain to another due to spatial proximity and interaction. Mutant analysis between Domains III and IV reveals that introducing DNA induces more defined FRET states, proving that the enzyme alters its structure in specific ways while interacting with DNA. While further analysis is needed to visualize these interactions in greater detail, these findings demonstrate for the first time that FRET can be used to observe TOP1 conformational dynamics, which is a critical insight. We will continue to investigate the interactions between all domains of TOP1, ultimately providing the foundation for designing better inhibitors to overcome current therapeutic challenges.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 293

Rai, Aashna Faculty Advisor: Elizabeth Son

"To be A Loudmouth American Woman": South Asian American Mothers, Cultural Resistance, and Theatrical Disruption

The South Asian American mother occupies a place of middle-ness, traversing paths between convention and contemporary; love and loss; and, heritage and healing. However, through the transformations of physical, intellectual, and cultural place that accompany geographical migration, immigrant women use performances of the South Asian American present to actively challenge the ideals of desi motherhood and American assimilation. As artists, they grapple with their self-presentation as physical, feminized subjects onstage and carefully craft production, script, and dialogue to reclaim their narrative and be perceived on their own terms. In this paper, I specifically examine the character of Kirtana in Han Ong's play *Swoony Planet* and comedian Zarna Garg in her solo comedy special *One in a Billion* as social, physical, cultural, and theatrical actors-operating within their diasporic context; models of immigrant acculturation and behaviour; and the politics of intersectional, postcolonial, and global south feminisms. Drawing connections between Takaki's "community of memory", Khubchandani's critical aunty studies, and Lee's sites of collective formation, I argue that the artists' use of voice, language, body and environment, the 'aunty' persona and portrayals of desire, and maternalistic narratives dismantle the culture of silence and subservience around South Asian American motherhood, reconstructing the character of the desi immigrant mother as an active performer of sociocultural community and transformation. I therefore present modern performances of immigrant motherhood as a disruptor of systems of cultural assimilation and capitalist patriarchy, where the theatrical-political actor facilitates a collective form of political resistance for current and future generations of immigrant women.

Presentation Format: Oral
Time: 10:45am-12:15pm
Room: Armadillo Room
Number: 138

Rajappa, Nithan Faculty Advisor: Ahmmad Brown

Abolitionist Futures vs. The Status Quo: Northwestern racial/ethnic affinity spaces and Black and Brown students' post-undergrad goals

Racial/ethnic college affinity spaces originated in the 1960s-70s Black Campus Movement, when Black students fought for self-determination and education for Black liberation. They brought in and inspired other racial/ethnic groups to mobilize for their communities too. This project asked: what are today's students in racial/ethnic affinity spaces wanting for their communities and lives? How do these spaces influence those goals? Northwestern University Black and Brown students involved in campus racial/ethnic affinity spaces were surveyed (n = 58) and a subset of respondents were interviewed (n = 25) about their spaces and goals for their communities and post-undergrad lives. While some students expressed goals of liberation for their communities that required the abolition of systems of white supremacy, others wanted their communities to ascend within those systems. Additionally, abolitionist-minded students emphasized wanting lives that do not harm and instead support other people while ascent-minded students emphasized wanting personal security and comfort. Overall, students said they wanted their communities' wellbeing improved and personal happiness and relationships. Students want their spaces to build inter-group solidarity and develop members' critical consciousness, and for students to refuse to let their spaces die. The Trump administration's attacks on these spaces and universities' compliance is not a new crisis, but rather part of a long history of state interference in Black and Brown communities' self-determination. This research argues that we must foreground our own perspectives on what our spaces provide and how we need to move through this moment to be more effective at serving our communities going forward.

Presentation Format: Oral
Time: 12:45pm-2:15pm
Room: Arch Room
Number: 251

Ramos, Maya Faculty Advisor: Mercedes Spencer

Characteristics of Measures Used to Assess Working Memory Across Studies Focused on Children with Specific Reading Comprehension Deficits

Reading ability, in terms of fluency and comprehension, has been consistently linked to executive function skills in existing research, and evidence suggests that executive function weaknesses are associated with reading comprehension difficulties. However, few studies have comprehensively explored executive function in children with Specific Reading Comprehension Deficit (S-RCD) - a reading difficulty characterized by reading comprehension deficits despite age-proficient word-level reading. The aim of the current meta-analysis is to elucidate if a unique executive function profile is associated with S-RCD and also if this profile differs based on whether linguistic or non-linguistic measures of executive function are examined. We conducted a systematic literature search, screening for studies that included samples of children (<18 years of age) with and without specific reading comprehension deficit. All included articles additionally reported data on at least one measure of executive function (e.g., working memory and updating, inhibition, cognitive flexibility and shifting). We compiled study data by coding information from the included studies to extract data for quantitative analysis. In this presentation, we provide descriptive information (e.g., assessment format, stimuli characteristics) for the different types of working memory assessments administered across a sample of included studies. Knowing the role that executive functioning plays in reading comprehension is important because it has the potential to inform the development of targeted interventions for students with reading disabilities.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 332/359

Ravirala, Neerav Faculty Advisor: Karen Tsay

Optimizing Conditions for Tau Protein Crystal Formation for Electron Microscopy Analysis

The aggregation of misfolded Tau proteins in the brain has been associated with the onset of neurodegenerative disorders including Alzheimers and CorticoBasal Degeneration. Therefore, understanding the molecular structure of these Tau aggregates can yield critical insights into the causes of misfolding and open the door for additional therapeutic targets. To get a detailed analysis of protein structure, MicroElectron Diffraction (MicroED), an advanced chemical microscopy technique, can be used to show the specific atomic level interactions that cause the Tau protein to misfold. However, using MicroED requires a highly ordered crystal of a small Tau protein fragment, which has yet to be reliably formed in a laboratory setting. To create protein crystals, subsections of the Tau protein core were dissolved in a buffer then induced to assemble into disease-like folds. The protein samples were then analyzed using a Transmission Electron Microscope to assess protein shape and crystal formation. Experimental conditions including pH, buffer, peptide concentration, salt concentration, and peptide length were altered to optimize crystal formation. Based on experimental results, the most highly ordered crystals were formed with the Tau subsection known as SLS2 Half-Capped when grown in Hepes buffer with a 2M salt concentration in a glass vial. However, these crystals were still not of sufficient purity for MicroED analysis so additional testing is needed to produce more homogenous crystal shapes. To further refine crystal production, additional experimental conditions including shaking, temperature, and electrical fields will be tested to eventually produce crystals of sufficient purity for MicroED analysis.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 385

Reddy, Nithin Faculty Advisor: Richard Zinbarg

Mindfulness Coaching: Do the coaches experience benefits themselves?

Given the rising concern over mood disorders such as anxiety and depression among youth, there is a need for innovative interventions. Past research reveals the significant benefits of teaching and peer tutoring across various educational and clinical settings, suggesting potential positive outcomes in mental health coaching as well. This study aims to examine whether coaches engaged in delivering mental health interventions experience improvements in mindfulness, resilience, affectivity, and coaching impact. This will test the hypothesis that coaching leads to positive psychological benefits for the coaches themselves. This observational study involves coaches from three institutions (Northwestern, Vanderbilt, and UCLA), and surveys were distributed over the course of four timepoints (pre-training, pre-coaching, post-coaching, and 10 weeks after coaching) to collect longitudinal data. Participants were 14 coaches, however due to the voluntary and ongoing nature of this study, there is some missingness across the 4 timepoints. Nonetheless, mean mindfuless, stress resilience, coaching impact and identity, and positive affect scores increased over the time points. Negative affect decreased. This study potentially enriches our understanding of the broader impacts of mental health interventions and the potential for mutual growth in the context of peer-delivered coaching. The preliminary results suggest that mindfulness coaches may incur positive psychological benefits themselves.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 114

Reitz, Natalie

The Role of Factor XII in Glioblastoma Progression

Cancer-related thrombosis is the second-leading cause of death in cancer patients, with glioblastoma (GBM) patients exhibiting a 30% risk of venous thromboembolism. GBM, the most common primary malignant brain tumor, is highly resistant to treatment due in part to its population of cancer stem cells (CSCs), which drive tumor growth and contribute to an immunosuppressive tumor microenvironment (TME). Previous work from our lab showed that CSCs intrinsically contain all coagulation factors that make up the coagulation cascade, including thrombin, a major platelet activator. However, there is limited information on how this hyper-thrombotic state and platelet hyperactivity contribute to the development and maintenance of the immunosuppressive TME.

This study investigates the role of coagulation factor XII (F12) in supporting CSC maintenance and explores potential therapeutic strategies targeting F12. Using both in vitro and in vivo murine models, F12 was knocked down in patient-derived CSCs and changes in proliferation, self-renewal, and tumor growth were assessed. The therapeutic potential was also explored by pharmacologically targeting F12 in murine models of GBM. Preliminary findings indicate that loss of F12 decreases CSC maintenance in vitro and prolongs survival in vivo, highlighting F12 as a contributor to GBM progression.

These results suggest that the hyper-thrombotic state in GBM sustains tumor-promoting CSC populations. Targeting F12 not only reduces CSC viability but may also mitigate the immunosuppressive effects of coagulation-driven platelet activation. These findings point to F12 as a promising therapeutic target and offer potential for sex-specific treatment strategies, given known differences in platelet activity and immune responses.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 198

Richardson, Samuel Faculty Advisor: Chad Mirkin

Expanding the Design Space of Cancer Therapeutics with DNA Dendrimers as Novel cGAS-STING Immunotherapies

Novel immunotherapeutic approaches are needed to treat cancers that foster immunosuppressive tumor microenvironments (TMEs). Activation of the cyclic GMP-AMP synthase (cGAS)-stimulator of interferon genes (STING) pathway to generate pro-inflammatory TMEs is promising. Therapeutics targeting the STING enzyme have disappointed in clinical trials. We postulate that activating the upstream cGAS enzyme is preferred due to stimulation of additional inflammatory pathways and its catalytic activity. cGAS is stimulated by double-stranded DNA (dsDNA)in a length-, concentration-, and orientation-dependent manner, but therapeutic DNA exhibits low cellular uptake and rapid nuclease-mediated degradation. To overcome these obstacles, interferon stimulatory DNA (ISD) can be formulated as DNA dendrimers, which consist of multivalent DNA clusters radiating from a molecular core. However, dendrimer synthesis with DNA of sufficient length to potently activate cGAS (45 bp) is low-yielding. We hypothesized that adding surfactant, organic solvent, and salt may increase strain-promoted azide-alkyne cycloaddition (SPAAC) reaction yields of six-branched 25-base-pair interferon stimulatory DNA dendrimers (ISD25-6). These synthetic parameters enabled a 2.93-fold yield increase compared to analogous literature reactions. Resulting ISD25-6 acts as a template to generate longer ISD45-6 dendrimers through template-mediated chemical ligation. We find that increasing the valency and length of DNA dendrimers improves cGAMP catalysis and the therapeutics' ability to form GAS:DNA liquid-phase condensates. Additionally, we find that ligated dendrimers outperform their hybridized counterparts in a RAW-Lucia Macrophage IRF3 induction assay. Here we report a synthetic methodology to generate DNA dendrimers, and we show that cGAS activation can be potentiated by presenting DNA ligands as multivalent nanotherapeutics.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 098

Rios, Sierra Faculty Advisor: Michael Newcomb

Between and inter-generational differences in discriminatory experiences among LGBTQ+ individuals assigned female at birth

This study compared data on LGBTQ+ identity-based microaggressions and victimization experiences from two cohorts of LGBTQ+ individuals assigned female at birth (SMG-AFAB) based on models of and prior research on minority stress. Two cohorts, Q2 and FAB400, completed measures assessing microaggressions and victimization experiences in 2009 and 2017/2018, respectively. Researchers assessed the effects of gender conforming/non-conforming identity and racial/ethnic identity on microaggressions and victimization experiences using MANOVA analyses. The study found no significant difference between victimization and microaggression experiences between cohorts. There was, however, a significant effect of racial/ethnic identity and gender identity, separately, among both the Q2 and FAB400 cohorts. Additionally, transgender/gender-diverse (TGD) FAB400 participants experienced significantly higher levels of victimization experiences than their cisgender counterparts. The findings from this study indicate elevated levels of discriminatory experiences among certain populations of SGM-AFAB individuals, and further research should be done to examine implications for mental health outcomes. It is also critical to acknowledge the context in which this study was completed. As of April 2025, FAB400 (and many other research ventures dedicated to LGBTQ+ health) has been defunded in accordance with federal executive orders dictating the acceptability of research topics. Work in this field is essential to understanding the experiences of a historically marginalized group of people. Research in this niche, which should be expanding, is instead being systematically censored. In light of this reality and considering the findings of this study, it is pertinent that researchers in the field and laypeople alike dedicate additional time, energy, and resources to this community and its well-being.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 989

Rogers, Nathaniel

SnapVac: An Innovation in Video Laryngoscopy

Intubation is an emergency procedure required when a patient's airway is impaired. A laryngoscope is used to view the vocal cords and provide a guide for the insertion of the endotracheal tube used for assisted breathing. A suction catheter is frequently used to clear the airway of secretion during intubation. Repeated insertion of the suction catheter can lead to angioedema and acute epiglottitis. The Laryngoscope SnapVac is a GlideScopeTM suction-based attachment used to reduce visual obstruction by fluids during intubation for ER patients, thereby decreasing the number of attempts for intubation and reducing risk of complications.

The SnapVac was built through an iterative design process defined by CAD modeling followed by rapid prototyping. OnShape was used to create a 3D model, which was then printed out of PLA filament. Tubing similar to that used in the ER was connected to a handheld vacuum before being attached to the SnapVac to complete the full proof-of-concept assembly.

We began by acquiring straight and curved laryngoscope blades from Lurie Hospital, testing initial prototypes at the Feinberg Simulation Lab, and gathering feedback from several ER physicians/anaesthesiologists as we did so. We also received mentorship from a global health faculty from the BME department. While initial testing was run using a model intubation mannequin, extensive further validation is required before SnapVac becomes market-viable as a Class I medical device. This testing would begin with non-emergency operating room intubations and proceed to deployment in the ER as the design's efficacy is verified.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 215/327

Saad, Malak Faculty Advisor: Tala Al-Rousan

Mind and Heart: Perceived Risk and Cognitive Impact of Hypertension Among Refugees

Refugees face heightened cardiovascular and cognitive health risks due to complex sociocultural and structural barriers. Growing evidence among non-refugee cohorts suggest a potential relationship between these risks. Uncontrolled hypertension remains a concern within refugee populations, yet the cognitive and management implications remain underexplored. This study investigates perceived associations between hypertension and cognitive decline, and the structural and psychosocial factors affecting hypertension management among Arabic-speaking refugees Participants (n = 109) were recruited through a Federally Qualified Health Center system in San Diego, California, and completed surveys and interviews. Quantitative analyses examined associations between forgetfulness, BMI, and hypertension beliefs. Thematic analysis explored language barriers, psychological distress, hypertension self-management, and cultural interpretations of hypertension. This study is a substudy of a larger investigation into refugee patients' barriers to hypertension care and self-management improvements, examining remote hypertension self-management feasibility among resettled refugees in San Diego. 83% of participants reported increased forgetfulness, statistically significantly associated with belief in ability to prevent stroke and heart attack ($p = .009$), but not with BMI or belief in hypertension-related brain damage. Distrust in monitoring devices and stress-related avoidance or overchecking impaired hypertension control. Language barriers impacted healthcare access and understanding, while having Arabic-speaking providers improved trust and treatment adherence. Refugees associated hypertension to cognitive decline, expressing the need for culturally responsive care. Preliminary findings reveal intricate interactions between cognitive health, hypertension beliefs, and systemic barriers. Mental health, health literacy, and language access interventions are imperative to improving cardiovascular and cognitive outcomes within refugee populations.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 214

Salman, Batool Faculty Advisor: Igor Efimov

Characterizing the Progression of the interleukin biomarkers in Vivo, for Heart Failure Management

Current methods of monitoring heart failure (HF) commonly include blood testing and medical imaging techniques, which are limited by invasiveness, cost, and time to process the results. To improve early detection of HF, there is a need for real-time strategies capable of identifying pathological changes as they occur. Circulating proteins can serve as biomarkers of HF progression, particularly those involved in inflammation, which plays a critical role in HF pathogenesis. This study investigates the temporal relationship between inflammation and cardiac dysfunction in a Sprague Dawley rat model of acute doxorubicin-induced cardiotoxicity, a chemotherapy-associated form of HF. Electrocardiograms (ECGs) and serum samples were recorded and collected at baseline and daily for four days following doxorubicin (DOX) administration (n = 6). Inflammatory mediators and cardiac injury markers were quantified using the Rat Cytokine/Chemokine 27-Plex Discovery Assay® and a cardiac troponin I-plex assay. Early increases in IL-1α ($p = 0.0437$) and CXCL10 ($p = 0.0250$) were observed beginning Day 1 post-DOX, with levels returning to baseline by Day 4. In contrast, cardiac troponin I ($p = 0.0758$) levels trended toward increasing on Day 4, while changes in cardiac electrophysiology, specifically in P wave ($p = 0.0007$), PR interval ($p = 0.0285$), and QRS duration ($p = 0.0457$), emerged on Day 2 post-DOX. These findings indicate that an acute inflammatory activation precedes both electrical remodeling and myocardial injury in DOX-induced HF. This temporal progression highlights the potential of inflammatory biomarkers as early, non-invasive indicators of cardiac dysfunction.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 072

Sands, Beckett Faculty Advisor: Claudia Haase

Positivity Resonance in Youth at Clinical High Risk for Psychosis and Caregivers: Findings from a Dyadic Automated Facial Expressions Analysis Approach

Shared positive emotions (i.e., positivity resonance) can be essential for social connection, mental health, and physical health. This laboratory-based dyadic interaction study examined positivity resonance in 67 youth-caregiver dyads who discussed an area of disagreement (i.e., conflict conversation) and a topic of mutual enjoyment (i.e., pleasant conversation). Dyads included youth at clinical high risk for psychosis (N=30) and healthy control youth (N=37) and their caregivers. Positivity resonance was measured continuously during the 10-min videorecorded conversations based on an automated facial expressions analysis algorithm (i.e., FaceReader) and analyzing the frequency and duration of moments where each dyad shared happy facial expressions that lasted over half a second. Linear regression analyses revealed that (1) CHR dyads showed fewer moments of positivity resonance across conversations, p=.002. This result held when controlling for conversation type but not youth gender. Analyses also revealed that CHR dyads showed shorter duration of moments of positivity resonance across conversations, even when controlling for youth gender and conversation type, p=.014. These findings suggest that CHR youth and caregivers may have difficulty maintaining positive emotional connections during conversations, resulting in shorter moments of positivity resonance. Findings highlight the potential of automated facial expression analysis in advancing research on positivity resonance and provide some of the first insights into alterations in positivity resonance in psychopathology.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 356

Scheide, Adrienne Faculty Advisor: Terri Sabol

When Home Becomes a Hospital Room: The Intersection of Caregiver Expectations, Lived Experience, and Child Interactions During Extended Hospital Stays

Caregivers' involvement in their children's medical care has increased, particularly for dire conditions such as pediatric cancer. Hospital length of stay is positively correlated with illness severity and parental distress. Few studies have addressed the experience of pediatric cancer caregivers whose children endured extended hospitalization. Insight is needed into the perceived efficacy of supports, hospitalization expectations, and potential experience moderators. This project examines the experience of caregivers whose children (ages 2-12 at treatment) endured a consecutive, three-week or longer hospitalization. Primary caregivers (n=12) completed a survey on demographics, psychological distress, optimism, and parenting beliefs, followed by a semi-structured interview on hospitalization expectations, experiences, and parent-child interactions. Survey results indicated participants held high progressive parenting beliefs, experienced moderate psychological stress, and were moderately optimistic, coinciding with qualitative data. Interviews were open-coded using a Grounded Theory method. Analysis revealed: 1) Caregivers had little expectations regarding their child's treatment and illness, though many expected higher-quality care from providers.; 2) Caregivers mitigated harm by advocating for their child to medical professionals. They stressed the importance of child-centered communication and integrating familiar activities into the hospital.; 3) Many caregivers experienced guilt and anxiety throughout hospitalization, compounded by an inability to engage in self-care or attend to other responsibilities.; 4) Many caregivers coped by adopting a more relaxed parenting style and seeking community through social media. Several emphasized the value of unsolicited support. These findings offer insight into challenges and coping for pediatric cancer caregivers, providing implications for healthcare communication, wellness strategies, and familial support.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 478

Schwartz, Alexis

Faculty Advisor: Jesse Yeh

Rhetoric Over Rights: How Mississippi Lawmakers Frame Anti-Trans Legislation

This paper examines the rhetorical strategies used in Mississippi legislative floor debates on anti-transgender laws passed between 2020 and 2024. Through a rhetorical analysis of these debates, this study identifies how lawmakers opposing these bills avoid centering transgender rights, instead focusing on legal technicalities, legislative necessity, and potential harm to non-trans individuals. Findings reveal that both proponents and opponents strategically shift their arguments based on the bill at hand, reflecting the political dynamics of a deeply conservative state. Furthermore, the study underscores the overwhelming absence of transgender individuals from these debates, highlighting how their rights are legislated upon without direct engagement or acknowledgment. These findings offer insight into broader legislative trends in the Deep South. This study contributes to understanding how anti-trans rhetoric is framed in policymaking and provides critical insight for advocates seeking to engage in these arguments.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 134

Shamah, Haley Faculty Advisor: Michelle Driscoll

Peeling, Cracking, and Swelling Patterns of Hydrogels

Hydrogels are materials that are able to absorb water while still maintaining their shape and structure. Some common examples of hydrogels include Jello, Orbeez, and diaper cores. Specifically, I aim to study the cracking and peeling patterns of hydrogels to better understand their behavior as fluid travels in (swelling) and out (evaporation). More concretely, hydrogels are cross-linked water soluble polymers; we use a mixture of two polymers to create hydrogels: PEGDA (a crosslinker) and PEGMEA (a backbone)Cross-linking refers to the connection of polymer chains with chemical bonds to create more rigid structures. A smaller concentration of PEGDA corresponds to less cross-linking points, and a material that is more flexible (and less rigid than that of a larger concentration). For this project I studied hydrogels in the shape of a disc with a 20:80 PEGDA to PEGMEA ratio to understand their behavior, measuring peeling and relaxing initiation times, cracking density, and maximum heights of the gels.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 351

Shea, Lila Faculty Advisor: Jay Grossman

The Writing Girl: Narrative and Sexuality in Girls' Literature Across Time

Children's literature is a space where children encounter complicated ideas for the first time, including those of gender and sexuality. In novels aimed at young girls, it provides an outline for growing into a woman. Girls' literature has often been considered socially traditional; previous cross-temporal studies of the genre claim it inculcates girls toward marriage and motherhood. In this project, I instead argue that girls' literature has an ongoing engagement with queerness in three capacities. I examine *Little Women* (1868), *Rebecca from Sunnybrook Farm* (1903), *Are You There God? It's Me, Margaret*. (1970), and *The Sisterhood of the Traveling Pants* (2001), performing close reading analysis and synthesizing queer, feminist, and narrative theory. These four popular girlhood novels all feature authorial protagonists, which I define as a character who writes within their text and utilizes said writing to leverage control. These characters write to build queer futures and express queer desires, intertwining narrative production with sexuality. Each text also resists heterosexuality within its narrative structure, reimagining girls' social positioning and prioritizing female bonds. Furthermore, these novels invite discourse with their readers, reflecting and interacting with girls' realities to proliferate writing beyond the text. The existence of all three facets in popular girlhood novels across time suggests that girls' literature is not always a literary reinforcement of compulsory heterosexuality but rather a standing space for girls' experimentations in narrative and sexuality.

Presentation Format: Oral
Time: 12:45pm-2:15pm
Room: Rock Room
Number: 475

Shlipak, Kyan Faculty Advisor: Daniel Horton

Air quality, health, and equity impacts of winter residential wood combustion in the United States

Residential wood combustion (RWC) is the primary heating fuel source in just 2% of U.S. homes and a secondary source in just 8%. However, the National Emissions Inventory estimates that RWC emissions contribute 99% of annual fine particulate matter (PM2.5) emissions from residential sources and 8% of total annual U.S. PM2.5 emissions, suggesting nationwide PM2.5 emissions could be substantially reduced if RWC was curtailed. Previous studies have investigated the regional and national impacts of RWC, however, studies have yet to quantify the air quality impacts of RWC across the contiguous U.S. (CONUS) with recent improvements to RWC emissions estimates in the 2020 NEI release. Here, we use a high-resolution (4 km) air quality model to evaluate the air pollution and public health impacts of winter-time RWC over the CONUS. We find that RWC contributes 2.4 g/m3 (21.9%) of population-weighted winter PM2.5 concentrations across the CONUS, with the highest concentrations located in major cities including Philadelphia (4.52 g/m3), Denver (6.22 g/m3), Seattle (4.84 g/m3), and Minneapolis (5.47 g/m3). Over CONUS, we estimate that PM2.5 exposure from winter-time residential wood combustion is responsible for ~15,500 (95% confidence interval (CI) 11700 - 17300) premature deaths per year. Moreover, both RWC concentrations and health burdens disproportionately affect non-White communities, particularly in urban areas. We suggest that policies targeting RWC emissions could be an attractive strategy to mitigate air pollution, reduce public health impacts, and address health disparities.

Presentation Format: Oral
Time: 10:45am-12:15pm
Room: Lake Room
Number: 093

Shroff, Preena Faculty Advisor: Sai Nimmagadda

Addressing Safety Measures For Students With Food Allergies In College Dining Halls

Food allergy (FA) affects approximately 10.8% of college students, impacting students' social lives, on-campus dining experiences, and financial expenses. Fatal food anaphylaxis is most common among adolescent populations, often due to increased risk-taking behavior; nevertheless, data quantifying the resources available to food-allergic students in university dining halls is limited. During the summer of 2024, 217 verified schools on the FARE College Search site were investigated for various FA accommodations in dining halls. The presence of labeled ingredients, allergy-friendly station(s), and undesignated stock epinephrine were documented for small, medium, and large institutions of higher education. Of universities with an undergraduate enrollment under 5,000 students, 10% posted full ingredients in dining halls and 2.9% had epinephrine auto-injectors (EAI) available for public use. At dining halls of institutions with 5,000-15,000 students, 12% posted full ingredients and 2.6% stocked undesignated EAI. For large schools with over 15,000 undergraduate students, 16% labeled all ingredients and 10% had EAI available at dining halls. Of the 217 schools, approximately 76% had FA-friendly stations, 42% did not label any ingredients, and over 95% of college dining halls and two-thirds of campus emergency responders lack epinephrine on-hand in case of emergency. Although many schools provide FA-friendly alternatives in dining halls, the lack of ingredient labeling and access to emergency EAI may result in delayed epinephrine administration, putting food-allergic students at a higher risk of anaphylaxis. Labeling and EAI access will improve the college experience and safety of students with food allergies.

Presentation Format: Oral
Time: 10:45am-12:15pm
Room: Rock Room
Number: 966

Silva, Hailey Faculty Advisor: Julia Kalow

Synthesizing a Photoactive Molecule with Stability in Water

The stem cells in a human embryo can develop into many forms. How to orchestrate such development has evaded researchers for centuries. Only recently did researchers discover that the mechanical environment around the stem cell determines its growth. This environment, typically tissue, directs stem cell growth by becoming more or less stiff. The exact mechanism, however, must be probed through experimental cell studies. Hydrogels, or water-swollen polymers, mimic the tissue environment well. Manipulating the hydrogel to imitate the dynamic tissue environment requires a stimulus like concentration or temperature. The ideal stimulus, however, is light because its application is reversible (unlike concentration) and tissue-friendly (unlike high temperatures). These other stimuli could kill the stem cells, whereas light does not. My goal is to create a hydrogel whose stiffness can be altered with light. This can be done by embedding photoactive molecules within the hydrogel. Previous gels like these underwent dissolution once submerged in water, rendering them ineffective for cell studies. To improve this hydrogel, I want to create a molecule that retains its product once water is added. Synthesizing a better photoactive molecule will create a gel whose stiffness changes with irradiation and whose integrity remains stable in water. Conducting cell studies atop these hydrogels will deepen our understanding of the mechanisms behind organ formation, which could benefit the biomedical sector by improving the creation of prosthetic ears and noses.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 004

Silver, Ethan Faculty Advisor: Nicholas Diakopoulos

AI in the Newsroom: Use Cases and a Framework for Integration

Newsrooms are rapidly implementing new AI tools, experimenting with everything from automated fact-checking to AI-assisted document processing. Keeping up with the sheer number of articles, papers, and videos covering AI developments can be challenging. In what ways do journalists currently use AI for news making, and how might their activities be characterized? From January to April 2025, I researched scholarly papers, news articles, press releases, and newsletters that referenced AI policies and use recommendations in news making. Using these sources, I wrote an article and constructed a table showcasing helpful resources and use cases. These use cases-ways that AI was being used in the journalism industry-ranged from summarizing articles to scanning social media for breaking news. I organized them into seven categories: news discovery, news gathering, content production, content transformation, content management, content distribution, and user interaction. For each category, I described the use cases and provided real-world examples from local and global media organizations. The findings show that AI primarily optimizes existing workflows: analyzing large datasets, suggesting headlines, or transcribing interviews. AI is also opening up new ways to produce and engage with content, such as chatbots and multimedia transformation. Although human oversight remains essential, these tools assist journalists in handling time-consuming tasks more efficiently. For smaller, local newsrooms, AI can enable higher quality reporting and help them reach larger audiences. Overall, this project contributes to the growing conversation about AI in journalism with a framework to guide implementation of emerging AI tools into the newsroom.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 094

Simon, Jordyn Faculty Advisor: Richard Ashley

Expanding Knowledge of Music Perception: Analyzing Listeners' Reactions to Justin Timberlake's "Mirrors"

In the age of popular music, as well as the catchy tunes found in YouTube and TikTok videos, people consistently interact with music. Given that music has such a significant social presence, this project highlights how participants observe the different groups of actions, or "ideas," that sequentially comprise a song. Following the approach pioneered by Lerdahl and Jackendoff (1983) and Clarke and Krumhansl (1990), this study utilizes a segmentation experiment to analyze participants' responses to Justin Timberlake's "Mirrors." Participants (n=12) indicated whenever they identified a new idea while either listening to the piece (audio only) or viewing the video (no audio). Seven participants listened to the audio and five watched the video. Eight other audio segmentations stemmed from simulations from the Sonic Visualizer software. Overall, participants consistently detected contrast and/or repetition. All fifteen segmentations of the audio indicated a new musical idea happening between 4.38 and 4.40 seconds. At that moment, Timberlake's pitch rises; his notes lengthen; and the instruments' intensity increases. Likewise, between 56 and 57 seconds, eighty percent of the participants who watched the video observed when the main characters returned and stood in contrasting lighting. This project indicates that people use knowledge of human movement, musical rhetoric, and surface-level cues-i.e., register, dynamics, timbre-to notice contrast and repetition while interacting with pop music in both audio and video form. Considering music reaches a variety of listeners, exploring the journey that each person goes on while digesting a particular song proves incredibly interesting.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 020

Siskel, Nathan Faculty Advisor: Dan McAdams

"Story of My Freaking Life" Thematic Integration of Suffering in Life-Story Narratives

Narrative psychology studies how individuals construct identity and make meaning through the stories they tell about their lives. These autobiographical narratives- especially accounts of pivotal emotional experiences- help people understand who they are, how they have changed, and what gives their lives purpose. This study explores how midlife adults integrate suffering into their life narratives and how these patterns relate to well-being and identity. Building on Jennings, Siskel, & McAdams (in preparation), who found that low-point narratives high in situational clarity, emotional expression, closure, and positive meaning correlated with greater well-being, this project examines the full life-story interviews of the 10 highest and 10 lowest scorers on that coding scheme. Using grounded theory and thematic analysis, the study identifies key differences in how these two groups of participants structure and integrate suffering into their personal narratives. High-scoring participants tend to center positive meaning in their identities and describe clear connections between significant parts of their lives to form a coherent, well integrated story-often directly linking their suffering to their personal philosophy and daily work. In contrast, low-scoring participants often lack thematic integration, with some centralizing negative meanings that contaminate positive themes in their lives. The three Black women in the low group, however, reveal positivity and resilience that does not align with the broader trends identified. This study highlights the importance of meaning-making and thematic coherence in fostering psychological well-being and deepens our understanding of how people narrate, resist, and transform suffering in their life stories and in their daily action.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 321

Slonaker, Brookelyn Faculty Advisor: Marisha Speights

Evaluating the Accuracy of Preschool Speech and Language Screeners Across Diverse Populations

The U.S. Preventive Services Task Force calls for more research before endorsing universal screening for speech-language disorders during early development. This study examines the sensitivity and specificity of four screeners in a representative sample of children to inform equitable identification practices. 420 four-year-old children and caregivers from eight U.S. cities participated. A balanced sampling approach ensured uniform representation across racial/ethnic, economic, and regional groups. Caregivers completed the Ages and Stages Questionnaire (ASQ) and the Intelligibility in Context Scale (ICS). Trained data collectors administered the Preschool Language Scale- 5th Edition screener (PLS-5) and the Clinical Evaluation of Language Fundamentals Preschool- 3rd Edition screener (CELF-P3). Speech-language pathologists reviewed caregiver surveys, scored screeners, and analyzed spontaneous speech recordings to determine risk for SLD. Each screener was evaluated for sensitivity (true positives) and specificity (true negatives), using the clinical decision as the reference standard. Values above 0.80 are generally considered acceptable for diagnostic accuracy. Results show that the ICS had unacceptable sensitivity (0.457) and good specificity (0.875), while the ASQ had excellent sensitivity (0.947) and unacceptable specificity (0.103). The PLS-5 Language had good sensitivity (0.892) and fair specificity (0.783), while the CELF-P3 had excellent sensitivity (0.993) and poor specificity (0.456). The PLS-5 Articulation showed excellent sensitivity (0.964) but unacceptable specificity (0.389). These findings reveal discrepancies between clinician judgments and screening tools, potentially leading to over- and under-identification. More research is needed to improve screener accuracy before implementing universal screening measures.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 318

Slutzky, Tali Faculty Advisor: Joe Mazzulli

Investigating synuclein-dependent ER-network transcriptional changes in response to protein misfolding stress in Parkinson's disease patient-derived neurons

Parkinson's disease (PD) is a devastating neurodegenerative disorder characterized by midbrain dopaminergic (DA) neuron degeneration. Cellular dysfunction is largely attributed to the toxic accumulation of alpha-synuclein (a-syn), a protein encoded by the SNCA gene. Certain forms of familial PD are caused by rare gene multiplication events wherein the entire wild-type SNCA genomic regionisduplicated or triplicated. Our group recently found that there is also a toxic accumulation of immature lysosomal hydrolases, in particular wild-type v-glucocerebrosidase (GCase), in patient iPSC-derived neurons harboring the SNCA triplication mutation (SNCA-3X). In addition to accumulated GCase, these neurons fail to activate the unfolded protein response (UPR). Our group has previously found that key ER chaperones, GRP78 and GRP94, are not transcriptionally upregulated, and the ER does not expand to accommodate an increased protein burden - responses indicative of UPR activity. Importantly, this failure is seemingly specific to misfolded protein stress and *can* be activated through chemical ER stressors. To further explore impaired UPR activation in this context, we overexpressed a mutant form of GBA1 (L444P), encoding a protein known to misfold in the ER, in SNCA-3X and isogenic SNCA-knockout control neurons and performed RNA sequencing to evaluate ER network changes. We found synuclein-dependent transcriptional differences between the three UPR branches as well as altered activity across two essential ER degradation pathways, ERAD and ER-phagy. Future work aims to explore the crosstalk between ERAD and ER-phagy and whether they can compensate for each other by shuttling canonical misfolded or damaged substrates through their noncanonical degradation pathway.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 029

Smirnova, Anastasia Faculty Advisor: Neha Kamat

Lipid membrane properties of peptide-encapsulating biosensors

Sensor systems are a growing subfield of synthetic biology which aims to construct a device, typically referred to as a biosensor, where a biological component detects a specific target molecule, and that detection is easily connected to quantifiable response.

In this project, we have developed a cell-free biosensor with RRNPP-family transcriptional regulators that detects peptides. The biosensor is encapsulated in an artificial lipid membrane with a composition optimized to limit the permeability.

To do so, synthetic peptides and transcription factors are encapsulated with high efficiency through double emulsion. The resulting vesicles are incubated at 30C, and imaged under a confocal microscope at t =0, 4 hours. Our positive control contains peptides and the biosensor; GFP signal is turned on in these samples. Our negative control only contains the biosensor. The experimental sample has the biosensor encapsulated within the vesicles with the peptide in the outer solution. We quantify the fluorescence using ImageJ.

In the future, once we have a relatively impermeable membrane, we would switch to investigating active transport, using OPP permease or other ABC transports. This sensor system could be used to develop translational circuits in vesicles for compartmentalized sense/respond mechanisms.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 026

Smith, Elizabeth Faculty Advisor: William Klein

Targeting Autophagy: The Neuroprotective Potential of NU-9

Abnormal protein aggregation is a common cause of many neurodegenerative diseases, damaging cells and disrupting neural communication. NU-9 is a drug developed by researchers at Northwestern University's Silverman Laboratory and has been shown to prevent neurodegeneration in ALS cellular and animal models. Additionally, NU-9 reduces the buildup of amyloid-β oligomers (AβOs), a key pathogen in Alzheimer's disease. This project aimed to validate if the mechanism behind NU-9's neuroprotective effects involves autophagy activation. Autophagy is a cellular process that degrades unwanted components, and its impairment is associated with numerous neurodegenerative diseases. Immunofluorescence and super-resolution microscopy were used to assess how NU-9 affects the formation of autophagosomes and autolysosomes, established markers of autophagy. Autophagosomes are vesicles that form to engulf and transport cellular waste, such as misfolded proteins, and later fuse with lysosomes to form autolysosomes, where degradation occurs. HT22 cells, a mouse hippocampal neuronal line used in neurodegeneration studies, were treated with one of the following: NU-9, a negative control, or one of two positive controls known to activate autophagy. Cells were fixed, stained with fluorescent LC3B and DAL-Green autophagosome/autolysosome markers, and imaged using the Nikon SoRa super-resolution microscope. Results showed that NU-9 enhanced autophagosome formation, indicated by increased fluorescent signal compared to the negative control. These findings prompted investigation into whether AβOs are present within autophagic vesicles. Preliminary studies found colocalization between fluorescently tagged AβOs and autophagosomes in the cytoplasm. This suggests that NU-9 may promote toxic protein clearance via autophagy and supports autophagy-based neuroprotection as a therapeutic strategy.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 047

Snyder, Alexandria Faculty Advisor: Marco Gallio

Substrate Temperature Preference During Egg-Laying in Drosophila

Thermosensation provides animals with critical information about their environment. This is especially important for "ectotherms" or cold-blooded animals, like fruit flies from the genus *Drosophila*. *Drosophila* cannot regulate their internal body temperature, instead, they rely on behavioral strategies to avoid temperatures outside of their optimal range. Unlike adult flies, the larvae are limited in their ability to escape unfavorable conditions, and thus, female flies carefully evaluate the quality of the substrate where they lay their eggs to increase the survival of their progeny. However, little is known about how temperature affects egg-laying behavior in *Drosophila*. My project aims to test whether female flies evaluate the substrate temperature when choosing where to lay their eggs. For this, we constructed a new 2-choice assay, where gravid female flies are given a choice between substrates kept at different temperatures. My results show that *Drosophila* flies evaluate substrate temperature when choosing where to lay their eggs and that this preference is different in *Drosophila* species adapted to life in different thermal environments. In the future, I plan to combine the genetic silencing of candidate neurons with the surgical removal of different sensory organs to identify the thermosensory neurons contributing to egg-laying preference in *D. melanogaster*.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 325

Son, Dayeon Faculty Advisor: Sherry Hsiang-Yi Chou

A scoping review of sleep disorders in subarachnoid hemorrhage survivors

Subarachnoid Hemorrhage (SAH) is a type of stroke caused by a life-threatening brain aneurysm rupture. It disproportionately affects younger patients and women, and is the leading cause of persistent disabilities and socioeconomic burdens in stroke survivors. Even SAH survivors with "good outcome" at hospital discharge often live with prolonged disabilities, particularly cognitive problems and sleep problems which can last decades. There is very little information on sleep dysfunction after SAH. The goal for this project is to identify the prevalence and characteristics of sleep problems that affect SAH survivors, in order to inform best treatment strategies. The primary method that I'm utilizing is the PRISMA-ScR protocol to perform a scoping review through Medline using specific search terms "Subarachnoid Hemorrhage Sleep" and "Subarachnoid Hemorrhage Sleep Disorder." Restricting results to human studies, initial results showed a total of 18 publications on sleep dysfunction following SAH. Five studies examined sleep disturbances within 0-3 months, 2 looked at 3-12 months, a total of 7 reported on sleep issues at 1 year or beyond post-SAH, and 4 were literature reviews. Key sleep problems reported include insomnia, inability to maintain sleep, sleep apnea, daytime sleepiness, and fatigue. There are significant correlations between sleep disorders and associated disorders such as depression and anxiety. A key issue is that studies used very different tools for sleep assessment. Results of this study will have an important impact on the ongoing care for SAH survivors and help identify how to develop interventions to improve long-term symptoms, particularly sleep health.

Presentation Format: Oral
Time: 12:45pm-2:15pm
Room: Lake Room
Number: 162

Song, Serena

TEAMS (Teamwork-Enhancing Adaptive Machine Synergies)

Modern organizations increasingly rely on multiteam systems (MTSs)-networks of teams working toward shared and individual goals-yet these systems often suffer from misalignment, communication breakdowns, and process losses. Project TEAMS (Teamwork-Enhancing Adaptive Machine Synergies) investigates whether large language model (LLM)-powered AI can enhance coordination in MTSs by serving as an adaptive team member that supports information management, goal alignment, and decision-making. This research addresses a critical gap in understanding how AI can mitigate system-level failures in complex collaborative environments, offering potential solutions to improve performance in high-stakes organizational settings. To test this, we will conduct a between-subjects experiment using a simulated space exploration task, where undergraduate students from Northwestern University will be assigned to multiteam groups with or without an AI teammate. We will examine outcomes including task performance, inter-team trust, and conflict levels. The findings will provide insights into whether MTS-aware AI improves coordination and reduces friction between teams, with implications for task complexity and team dynamics. This work contributes to the growing body of research on AI-augmented teamwork, demonstrating how intelligent agents can bridge gaps in human collaboration. The results will inform real-world applications in healthcare, disaster response, and corporate environments, where effective MTS functioning is critical. By integrating AI as a team member, this project advances both theoretical and practical frameworks for optimizing collaboration in increasingly interconnected workplaces.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 160

Stanciu, Nicolas Faculty Advisor: Andrew C. Meltzer

Current State of FDA-Approved AI Diagnostic Tools: Regulatory Pathways and Evidence Requirements

The integration of artificial intelligence (AI) and machine learning (ML) technologies into medical diagnostics has been marked by an exponential increase in FDA-approved AI/ML-enabled devices. However, the regulatory pathways and transparency standards that govern approval remain insufficiently characterized. To address this gap, we conducted a review of the FDA's Digital Health Center of Excellence database, identifying 1,016 AI/ML medical devices approved by December 24, 2024. Devices were classified according to regulatory pathway and analyzed for the nature and depth of clinical evidence, study design parameters, and disclosure of algorithmic architecture and data sources. Our analysis reveals that 96.5% of devices were cleared via the 510(k) process, relying on claims of substantial equivalence rather than independent clinical trials. In contrast, only 3% and <1% of devices utilized the De Novo and PMA pathways respectively, which require a higher level of scrutiny and clinical data. Radiology applications dominated approvals (76%), followed by cardiovascular tools (9.8%), reflecting market priorities. Critically, 27.3% of submissions lacked information on model development, highlighting a clear transparency gap. These findings underscore the need for standardized reporting and enhanced clinical validation requirements to ensure patient safety and foster trust. By mapping current approval trends and transparency challenges, our study supplies regulators, clinicians, and manufacturers with actionable insights that can guide policy refinement, drive rigorous evaluation, and support responsible innovation in AI-enabled healthcare. Future research should assess post-market performance to determine long-term clinical impact, cost-effectiveness, and ethical considerations across diverse healthcare settings.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 992

Stoll, Leila Faculty Advisor: Mesmin Destin

Are Students' Mental Health Needs Being Met? Evaluating the Effectiveness of Northwestern's Counseling and Psychological Services from the Perspective of Student Users

Counseling and Psychological Services (CAPS) is Northwestern's mental health services hub, offering programs such as individual and group therapy, psychiatric medication consultations, and a crisis hotline to students. Despite increased public attention to worsening student mental health at U.S. universities and Northwestern students' reported concerns about CAPS' inability to support their mental health, there has been no formal research conducted on the effectiveness of CAPS' programs at meeting student mental health needs. As such, this mixed-methods study evaluated Northwestern undergraduate students' satisfaction with CAPS' mental health services, as well as how this satisfaction varied across student socioeconomic status and personal identities, including race, ethnicity, gender, sexuality, parental education, and family income. Quantitative data was collected by surveying 28 students about their experiences using CAPS, and more in-depth qualitative data was collected through interviewing 16 of these students. Students held a moderately high opinion of CAPS overall- especially the referral process- but expressed lower satisfaction with therapist quality and the equitability of access to information about CAPS services. Students of marginalized and minority identities often felt that their identity-related experiences were respected but not always adequately understood by therapists who did not share their identity. Finally, participants tended to attribute CAPS' shortcomings to a broader societal inadequacy of mental health resources rather than blaming CAPS. These findings will be shared with CAPS administrators to encourage improvements in their services where necessary. The study adds to the limited literature on student satisfaction with university mental health services, which could benefit other universities and their students.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 379

Stone, Dylan Faculty Advisor: Keith Summa

Investigating the Role of Circadian Genes in Intestinal Health

Our bodies rely on internal circadian clocks to regulate daily rhythms like sleep, metabolism, and digestion. When these clocks are disrupted-by shift work, jet lag, or genetic mutations-health problems can follow. This project explores how a specific genetic mutation in the circadian clock gene (Clock D19) impacts gut health and inflammation in mice. Prior research has linked disrupted sleep to worsened symptoms in colitis, an inflammatory bowel disease, but less is known about the effects of internal, genetic clock disruption. To test this, we compared mice with the Clock D19 mutation to normal mice after inducing colitis using a chemical called dextran sodium sulfate (DSS). We monitored symptoms using weight, stool quality, and signs of intestinal bleeding, and collected tissue to measure gut permeability and inflammation. We expect that mutant mice will show more severe symptoms and increased inflammation, helping to clarify how genetic circadian disruption affects the gut. These findings may have broader implications for understanding how our internal clocks influence chronic diseases and could help guide treatment strategies that account for biological timing.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 268

Stringer, Cooper Faculty Advisor: Richard Carthew

Unconventional Trafficking of a Novel Amphipathic Alpha-Helical Peptide During Drosophila Oogenesis

Recent advancements in technology have revealed an understudied class of peptides, translated from short open reading frames (sORFs), that are becoming increasingly appreciated for their roles in development and disease. Dafcin, an evolutionarily conserved peptide recently discovered in *Drosophila melanogaster*, is translated into an amphipathic alpha-helix from one such 63 nucleotide sORF expressed during egg development. A Dafcin-GFP fusion protein, generated using CRISPR/Cas9 at the endogenous *Dafcin* locus, is secreted from the ovarian follicle cells and imported into the egg cell via endocytosis of membrane-bound yolk vesicles. However, the particular Dafcin trafficking mechanisms are still unclear, as is whether this process is generalizable to other tissues. To investigate these, I have designed a transgenic *Drosophila* line with the Dafcin-GFP fusion protein under control of an inducible promoter. The ability to control the level and timing of Dafcin-GFP expression enables comparative uptake measurements using confocal microscopy. Surprisingly, when this transgene was tested in the ovarian follicle cells, Dafcin-GFP uptake into the oocyte did not scale with expression levels in the follicle cells. Preliminary experiments suggest this is due to limitations in the rate of secretion of Dafcin-GFP, rather than in the rate of uptake. To clarify Dafcin's trafficking, I am using the transgene to express Dafcin-GFP in other secretory systems, starting with the larval imaginal wing discs. These results will help inform how the secretion and uptake of small peptides, including many important to human health, are controlled in the absence of signal sequences or other common regulatory features.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 055

Suleimen, Islam Faculty Advisor: Christina Paschyn

Unveiling Gender Dynamics in Early Kazakhstani Cinema: A Feminist Analysis of Kyz-Zhibek

This research explores how early Kazakhstani cinema negotiated evolving gender roles through a feminist analysis of *Kyz-Zhibek* (1972), a foundational Kazakhstani Soviet-era film directed by Sultan-Ahmet Khodzhikov. The film tells the story of Zhibek, a young woman navigating the tension between personal autonomy and societal expectations, especially regarding arranged marriage and filial duty. Set against the backdrop of Kazakh nomadic traditions and Soviet modernization policies, the film becomes a powerful lens through which to examine how patriarchal norms were maintained or challenged during a period of intense cultural and political transformation.

Drawing on feminist film theory and media historiography, I analyzed the film's narrative structure, character development, and ideological framing to understand how it reflects, and quietly resists, dominant gender expectations. While *Kyz-Zhibek* is often celebrated for its cultural significance, this research argues that the film also serves as a site of subtle critique, shedding light on the constrained roles of women and the limited space for female agency in both traditional and socialist frameworks.

Feminist scholarship on Central Asian women in media remains notably underrepresented, and this study contributes to filling that gap by offering a focused analysis of gender representation in a key national cinematic text. Ultimately, this project demonstrates how cinema can function not only as a record of historical and cultural values but also as a vehicle for reimagining gendered identities and advocating for more inclusive understandings of national narratives.

Presentation Format: Oral
Time: 10:45am-12:15pm
Room: Armadillo Room
Number: 342

Takahashi, Brandon Faculty Advisor: Marina Luccioni

Should Pillar Point be closed to harvesting? Integrating social and ecological perspectives

The Pillar Point State Marine Conservation Area in Half Moon Bay is an important ecological site home to over 300 marine species. The area is also an intersection between the intertidal ecosystem and Half Moon Bay community members, serving as an important location for locals and many Latine and Asian American harvesting and fishing groups. Apparent upsurges in visitor counts during COVID-19 have raised concerns about over-harvesting and the disruption of the ecosystem. At the same time, many families have come here generationally and people use the space to harvest food and teach children about connecting with marine life. To better understand the varied perspectives surrounding the area and its harvesting rules, we conducted questionnaires with local harvesters, fishers, and community members who use the Pillar Point tide pool area. To inform our sampling methods we analyzed the ethnic composition of Half Moon Bay City based on publicly available census data. We counted the number of cars and visitors and categorized the number of visitors according to their activities for the hour before, during and after low tide over 15 days from June to August 2024. We transcribed questionnaire responses and conducted preliminary analysis for common themes and key quotes. We recorded a range of perspectives on changes over time at Pillar Point, as well as suggestions for new rules and improvements to existing regulations. We hope to synthesize these perspectives into a report for the MPA to use when making policy-related decisions about Pillar Point and other State Marine Conservation Areas.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 354

Tan, Nicole

Faculty Advisor: Jesse Yeh

Sedition on Trial: The Bounds of Dissent in Hong Kong Under the National Security Law

Hong Kong's reactivation of its colonial-era sedition law under the National Security Law (NSL) has raised concerns about judicial independence, the erosion of free speech, and uncertainty regarding the application of the sedition offense. Existing scholarship has looked at the historical foundations of foreign sedition laws and the NSL's impact on civil liberties, but little research has explored the judicial reasoning underlying sedition convictions. This thesis analyzes three major sedition cases prosecuted between 2020 and the present by coding judicial discourse to identify patterns in legal justification. I argue that Hong Kong courts have broadly interpreted sedition, privileged state-aligned interpretations of speech, framed dissent as a threat to national security in light of the 2019-2020 protests, and assumed intent without substantive evidence. This examination contributes to understanding how the NSL has reshaped Hong Kong's legal landscape and how sedition is used as a tool to suppress political speech.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 024

Tang, Cheryl Faculty Advisor: Tsutomu Kume

Notch1 regulation of Schlemm's canal integrity and endothelial junctional stability

Schlemm’s Canal (SC) is a specialized hybrid vessel essential for aqueous humor drainage and intraocular pressure regulation. SC dysfunction contributes to primary open-angle glaucoma, yet the molecular mechanisms governing its maintenance remain poorly understood. Given Notch1’s established function in lymphatic endothelial cell proliferation, differentiation, and barrier integrity, we investigated its specific role in maintaining SC structure. Using flat eye whole mount staining, we assessed the overall expression, distribution, and intensity of key endothelial markers to evaluate Notch1’s influence on SC endothelial barrier integrity and vessel morphology. Endothelial-specific Notch1 knockout (KO) was induced in Cdh5-CreERT2; Notch1 flx/flx mice via oral tamoxifen administration from P1–P5. SC morphology and endothelial junction integrity were assessed with CD31/Prox1 and CD31/Tie2/VE-Cadherin markers, respectively at P21. Additionally, Notch signaling activity was analyzed using CD31/DAPI immunostaining at P21 and adulthood in the CBF:H2B-Venus mouse strain. We observed Notch signaling in SC endothelium at both P21 and adulthood, indicating its sustained activity in mature SC endothelium. EC-Notch1-KO mice showed increased SC area, proving Notch1’s role in maintaining SC integrity and restricting excessive endothelial proliferation. Reduced Tie2 fluorescence intensity and fewer cell-cell junctions were observed, hence EC-Notch1-KO mice exhibited discontinuity in the cell junctions as compared to littermate controls. These findings establish Notch1 as a critical regulator of SC integrity, highlighting its role in maintaining endothelial junction stability and preserving SC structure.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 054

Terrelonge, Kayla Faculty Advisor: Imon Banerjee

Swing the Stats: The Influence Of Widespread Sports Betting Legalization on Player Performance in Major League Baseball

Since the overturning of the Professional and Amateur Sports Protection Act (PASPA) in 2018, sports betting has cemented itself as a delicacy in American sports. This exploratory data analysis examined the relationship between the legality of sports betting and Major League Baseball (MLB) player performance trends. Current research focuses on revenue generated from sports betting or its addictive nature. The emphasis on revenue fails to account for changes in player performance. To understand this relationship, a data cleaning function was created and utilized with web scraping techniques to collect, compile, and prepare player data for exploratory analysis. With these techniques, I aimed to highlight how the widespread legalization of sports betting in the U.S. affected player performance in the MLB. A time-series analysis was conducted to assist in identifying performance trends. Statistical testing was conducted to confirm the identified trends and to quantify the strength of the observed numeric relationships. My findings uncovered an offensive performance increase and a defensive performance decrease in the season after legalization, which is indicative of the zero-sum dynamic of baseball. Statistical testing, using a p-value threshold of < 0.05, indicated that the offensive performance increase was not a product of chance and most teams were performing offensively better than average offensive performance pre-sports betting legalization. Thus, when considering the influence of sports betting, the role of the professional athlete must be re-conceptualized to account for the potential monetary incentives and the increasing value of the fan experience.

Presentation Format: Oral
Time: 12:45pm-2:15pm
Room: Armadillo Room
Number: 397

Tolman-Bronski, Isabel Faculty Advisor: Taco Terpstra

Demystifying a Dedication to Artemis Anaitis and Men Tiamou

This project aims to illuminate a rather opaque dedication to two important deities of Roman Lydia: Men Tiamou and Artemis Anaitis. Despite the prominence of the two gods, especially Men, in Roman Lydia, their cults are understudied and poorly understood: few literary references survive, and much of what can be gleaned comes from epigraphic evidence. The same can be said of the dedication itself: its provenance is unknown and its purpose, which is not stated in the inscription, is unclear. Neither question has been addressed in any detail since the stele was acquired by the Boston Museum of Fine Arts in 1895. In order to better understand the dedication, I synthesized the limited available information on the gods, emphasizing in particular epigraphic comparanda. My analysis of other dedications to Artemis Anaitis and Men, as well as other Roman Lydian dedications that made use of similar formulaic language, led me to conclude that the dedication was performed in gratitude after the dedicators' child fell ill and was subsequently healed by the gods. The formulaic language used in the dedication also reflects the local character that the worship of Greco-Roman and native Anatolian deities alike took on in the province, where emphasis was placed on the submission of the human to the gods, who were treated with great fear and reverence. This research provides a framework to better understand other dedications to these gods, many of which are ambiguous in function, and offers further evidence for their characterization as healing gods.

Presentation Format: Oral
Time: 12:45pm-2:15pm
Room: Rock Room
Number: 150

Tou, Donny Faculty Advisor: Walker Hanlon

Pollution's Invisible Hand: Air Quality's Role in Neighborhood Sorting by Income in the United States

This paper examines how air quality influences where residential movers of different income levels choose to live, and how such choices in turn transform the socioeconomic fabric of neighborhoods in the United States. Combining a panel of consistent-boundary U.S. neighborhoods from 2006-2020 with satellite-derived air pollution data, I exploit quasi-random variation in pollution driven by shifting thermal inversion patterns-atmospheric events that trap particulates near the ground-to identify causal effects. I find that increases in air pollution, holding other factors constant, disproportionately repel high-income movers and attract lower-income residents. This sorting response generates downstream effects on neighborhood-level outcomes: areas experiencing high levels of in-migration see disproportionately large declines in both housing values and median earnings following positive pollution shocks. My findings empirically support the idea that households "vote with their feet" for cleaner air, highlighting air pollution's hidden role in shaping the geography of economic opportunity.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 424

Truong, Anna Faculty Advisor: Mesmin Destin

Educators' Beliefs About Students' Background Specific Strengths As a Means to Foster Motivation and Academic Success

Students' understanding of their identity plays a critical role in shaping motivation, academic achievement, and educational equity. Educators' beliefs about students' backgrounds may significantly influence these identity-based processes, representing a key opportunity to support students from marginalized groups. In this study, we find that when middle school students (N = 463) perceive their educators as believing that students' strengths gained from their backgrounds can help them succeed, it positively predicts students' identity-based motivation (b = 0.33, SE = 0.03, t(520) = 10.30, p < .001). Moreover, students perceiving educator belief in students' strengths significantly predicted higher grades for students (b = 0.94, SE = 0.26, t(541) = 3.58, p < .001). Finally, identity-based motivation itself was a strong predictor of academic achievement for Black, Latinx, and Indigenous students (b = 2.60, SE = 0.73, p < .001). These findings underscore the importance of perceived teacher beliefs in students' background specific strengths as a lever for fostering motivation and reducing racial disparities in academic outcomes.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 126

Vasnani, Krisna Faculty Advisor: Mark Beeman

Hypnagogic Thoughts and Creativity

Understanding how different stages of sleep and awareness affect cognition has become a growing area of interest in cognitive neuroscience research. This study investigates whether thoughts experienced during hypnagogia (N1), the sleep stage between wakefulness and sleep, may influence creativity. Participants begin by completing a set of problem-solving tasks. Those in the control, wake condition then watch an unrelated video designed to induce distraction and answer content-based questions to assess mind wandering after 30 minutes. Those in the experimental, hypnagogic condition are guided into a 30-minute rest period while wearing an EEG headband that monitors brain activity and sleep stage through a mobile application, Muse. When the EEG detects that the participant has reached N1, they are prompted to verbally report any current thoughts or mental imagery. These responses are recorded and after the rest period, participants review their own thoughts and attempt the problem-solving tasks again. If they succeed in solving tasks they were unable to complete earlier, they are asked to reflect on whether any of their recorded thoughts played a role. Creativity in the tasks is also evaluated. While results are not significant due to the small sample size, preliminary results suggest that hypnagogia might increase creativity for certain tasks. This research helps understand how states like hypnagogia and mind-wandering may boost creativity. Future research aims to continue gathering data for this study and in the long term, can be oriented towards exploring how breaks can be used in schools or workplaces to improve performance.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 078

Veriotti, Luca Faculty Advisor: Samuel Stupp

Developing a New Biomaterial to Break Down Proteins Linked to Injury and Disease

Proteins are linked to a variety of diseases. For instance, in Alzheimer's disease, proteins called amyloid-beta tangle together into plaques. These plaques then build up both inside and outside of brain cells, causing damage. Normally, cells have specific structures, called lysosomes, where proteins can be broken down. In this project, we developed a new type of peptide amphiphile (PA), a biomaterial, that takes advantage of a cell's lysosomes to target and degrade disease-related proteins. PAs are small molecules that can form various structures in water, such as spherical shapes called micelles. They can also be modified to display molecular tags that affect their function. Here, we created one group of PAs with a sugar tag that tells a cell to bring the PAs into its lysosomes. Another group of PAs were chemically linked to antibodies, which are structures that bind to a target protein with a high degree of specificity. We then combined the sugar tag PAs with the antibody PAs into micelles. To test our system, I first verified that the PAs formed micelles. Then, I tested the PAs with various cells and proteins, including brain cells and amyloid-beta. I evaluated results qualitatively, by examining if PAs and the target proteins entered lysosomes, and then quantitatively, by evaluating the amount of the target protein over time. I concluded that the PA micelles successfully broke down the protein targets by bringing them into lysosomes, thus offering a promising approach to treating various diseases.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 080

Viana de Souza Andrade, Katarina Faculty Advisor: Allison Strom, Bryan Scott

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Let Them Shine: Revealing Faint Galaxies with the Spectral Stacking technique

DNA carries the fundamental information of living beings, encoding their biological structure and function. However, this concept extends beyond Earth-galaxies across the universe have their own "chemical DNA" expressed in emission lines. The light emitted by galaxies spreads out to form a spectrum, which acts as a galaxy's unique fingerprint and contains specific markers called emission lines. Captured by sophisticated telescopes, these lines carry information such as the galaxy's gas density and how much hydrogen, oxygen, and other elements are present. The study of these lines is called spectroscopy. However, these lines become increasingly faint with distance, making spectroscopic studies challenging. To overcome this, astronomers use a technique called spectral stacking. Stacking spectra combines diverse observations of similar galaxies into one improved spectrum. It enhances data quality by increasing clarity, similar to combining whispers from multiple people to make a clear sentence. Yet, the relationship between individual galaxy properties and those measured from stacked spectra is unclear, demonstrating the need for further research in stacking. Using spectra from ~150 galaxies from the Keck Baryonic Structure Survey and 24 from the CECILIA Survey, which relies on data from NASA's James Webb Telescope, this research has demonstrated that stacking enhances the detectability of faint emission lines. Now, it aims to assess whether stacking accurately represents individual galaxy properties, ensuring its reliability for studying distant galaxies. This work will advance our understanding of galaxy evolution and may revolutionize a technique astronomers have relied on for decades.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 976

Vuchic, Maya Faculty Advisor: Karrie Snyder

Beyond Risk: The Changing Influences of Social and Physical Contexts on theHealth-Promoting Behaviors of Undergraduate Students

Abstract: Social relationships influence health-related behaviors in myriad ways. The major life transition of moving to college, however, upends the social worlds of undergraduates and places them in a setting with new peer groups, different physical resources, and newfound agency over their physical well-being. While undergraduates demonstrate nuanced understandings of physical health entering college, little research has explored how the social dimension of undergraduates' lives influences their health-promoting behaviors during this period of development. Using a survey (n = 78) and semi-structured interviews (n = 20), this study explores the influences of social ties on undergraduates' health-promoting behaviors by analyzing respondents' health-related beliefs and behaviors as well as those of their parents, close friends, and roommates. Data reveal three key findings. First, cross-tabulation details how basic health behaviors are primarily learned from and associated with behaviors of parent-figures, with friends playing a minimal role in the formation of initial understandings around health. Second, when entering the context of college, students experience two competing forces: the increase of access to physical resources and the simultaneous reshaping and seeming diminishment of time due to the increased academic, social, and extracurricular expectations of college life. Finally, data reveal processes of homophily among peer groups based upon health behaviors, including eating three meals a day and exercising. To cope with temporal limitations, health behaviors become social behaviors as well. These findings provide evidence in favor of creating university policies and norms aimed at individual students with the goal of minimizing the academic-social-health trade-off.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 317

Wang, Winnie Faculty Advisor: Wendi Gardner

Me vs We: Optimal Distinctiveness and Attachment Style in Romantic Relationships

There is a variability in the amount of closeness people desire in their romantic relationships. This may parallel optimal distinctiveness theory, which describes how people negotiate the balance between the desire to feel affiliated with versus distinct from others at the collective level. In attachment theory, people who are anxiously attached desire extreme closeness to their partner in times of distress, whereas people who are avoidantly attached draw away from their partner in times of distress to reestablish their independence. This research examines whether attachment style informs one's desired level of optimal distinctiveness in relationships.

In Study One, 500 partnered adults responded to our survey including their romantic attachment, optimal distinctiveness, and relationship satisfaction. In Study Two, 300 partnered adults responded to manipulations of distinctiveness levels to assess differences in thresholds for affiliation and independence as a function of attachment style. Results of Study 1 suggest that, as predicted, attachment anxiety was positively associated with ideal time spent with partner, as well as to ideal closeness and ideal similarity; whereas avoidance was negatively related to ideal time with partner. Relationship quality was negatively correlated with discrepancies between ideal and actual closeness and similarity. Results of Study 2 are pending, but are hypothesized to demonstrate that attachment anxiety will be associated with a lower threshold for affiliation, whereas attachment avoidance will be associated with distinctiveness. Optimal distinctiveness and attachment style in relationships have never been examined in conjunction before. This research helps further education on relationship dynamics, and thus healthier relationships.

Presentation Format: Oral
Time: 10:45am-12:15pm
Room: Arch Room
Number: 978

Wang, Glenna Faculty Advisor: Noshir Contractor

TEAMSTaR: Designing and Testing Tools for Space Team Success

As space teams become more autonomous and aim to complete longer missions, informed decision-making becomes increasingly important to efficiently identify and adapt to fluctuations in team dynamics and ensure effective completion of mission objectives. To support teams in their decision-making, we deployed and tested the effectiveness of a graphical dashboard called TEAMSTaR (Tool for Evaluating and Mitigating Space Team Risk) alongside various intervention activities intended to improve team success. Our primary focus was on the development and execution of a research protocol to assess how teams interacted with the dashboard and responded to related interventions. The TEAMSTaR dashboard was implemented in NASA's Human Exploration Research Analog as part of a series of four 45-day earth-based space analog missions. Crew members evaluated predictions of their teamwork and taskwork potential based on dashboard simulations and made informed decisions about what intervention activities to complete. We collected data in real-time using a set of Qualtrics surveys crew members took before and after the dashboard and intervention activities. We managed data collection logistics, emphasizing flexibility, organization, and communication in a dynamic data collection environment. Through this process, we identified key best practices for conducting human subject research with NASA, particularly around coordinating tasks, adapting swiftly to issues, and maintaining documentation. These key practices can serve as a guide to successful future real-time data collection in spaceflight analog environments and beyond. The TEAMSTaR project itself provides insight on how to integrate computational predictive tools into team operations and intervention design for improved team outcomes.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 381/398

Wehmeyer, Andy Faculty Advisor: Jeremy Keys

Optimizing Thrust Performance in Hybrid Rocket Engines through Fuel Grain Geometry and Boundary Condition Modifications

This work explores the effect of fuel port geometry on hybrid rocket performance using 3D-printed acrylonitrile butadiene styrene (ABS) fuel grains. Prior research has shown that helical port geometries enhance fuel regression rates, but the impact of additional finned structures remains unexplored. To investigate the impact of these structures on performance, we produced 3D-printed cylindrical, helical, and finned-helical fuel grains, which were then tested in an ABS/nitrous oxide (NOS) hybrid rocket engine. We performed both computational fluid dynamics simulations and static hot-fire tests to assess the combustion stability, thrust performance, and regression rate of each geometry. Our results demonstrate that finned-helical grains produce enhanced thrust and an improved regression rate over previously studied cylindrical and helical grain geometries.

Presentation Format: Oral
Time: 12:45pm-2:15pm
Room: Lake Room
Number: 100/558/559

Wen, Marisa Faculty Advisor: Dilan Gokyer

Investigating the role of FBN-1 in Ovarian Aging

The human ovary is one of the first organs to age. Ovarian aging results in a rapid decline in oocyte quality and quantity, contributing to infertility, miscarriage, and broader health consequences such as impaired cardiovascular and immune function. While cellular mechanisms like aneuploidy and mitochondrial dysfunction have been explored, the epigenetic underpinnings of ovarian aging remain poorly understood. Preliminary spatial ATAC-seq data from the Babayev Lab identified Fibrillin-1 (FBN-1), a key extracellular matrix gene that modulates tissue elasticity and TGF-v1 signaling, as epigenetically down-regulated in aged murine ovaries. This project aims to investigate the role of FBN-1 in ovarian aging.

Using mouse and human ovarian tissues across the reproductive lifespan, I will employ Western blotting and immunohistochemistry (IHC) to quantify FBN-1 protein levels and localize its expression within ovarian substructures. Elastic fiber staining and TGF-v1 pathway analysis through IHC for phosphorylated SMAD2 and RT-PCR for collagen gene expression (Col1a1, Col3a1) will help assess whether FBN-1 loss contributes to disorganized elastic fibers and upregulated pro-fibrotic signaling in aged ovaries.

My hypothetical results are that FBN-1 expression decreases with aging, weakening elastic fiber integrity, and enhancing TGF-v1 activity, thereby promoting ovarian fibrosis. If confirmed, these findings will reveal a novel epigenetic regulatory axis in reproductive aging.

This study holds significance for women's health by advancing our understanding of how structural and signaling disruptions in the ovarian microenvironment contribute to reproductive decline. It may also contribute to developing future epigenetic or ECM-targeted therapies to extend ovarian function and improve long-term health for women.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 164

Wilkerson, Elizabeth Faculty Advisor: Steven Epstein

Inferring Features and Imagining Futures: How Donor Sperm Recipients Use Race, Ethnicity, and Ancestry Information When Selecting a Donor

Donor sperm recipients use donor sperm for many reasons, such as male infertility or when no partner's sperm is available (i.e. lesbian couples and single mothers by choice). Previous studies investigated how sperm banks provide recipients with information about the race, ethnicity, and/or ancestry of donors and advocate for matching categorical backgrounds of recipients and donors to promote kinship bond formation. Kinship bonds are ties that connect family members together and are complicated by introducing non-familial genetic material into a family. While these studies broadly investigated the impacts of race, ethnicity, and ancestry on donor selection, they fail to reveal the complexity of the lines of reasoning that recipients employ when selecting donors based on categorical information presented on donor profiles. I analyzed semi-structured interviews with 25 former or potential recipients of donor sperm to understand how donor sperm recipients grapple with balancing multiple subgoals related to kinship formation while facing limited available donors. Many recipients believed physical resemblance was important for kinship formation and used categorical information to infer the presence of racialized and ethnicized physical traits in the donor. Some recipients also believed the donor's background could promote kinship by establishing a sense of shared history and culture. This project also analyzes how recipients prioritize categories and accept or reject variance between themselves and the donor unevenly depending on the goal. The findings in this project speak to the greater literature on the perceived impact of race, ethnicity, and ancestry on kinship formation more broadly.

Presentation Format: Oral
Time: 10:45am-12:15pm
Room: Arch Room
Number: 997

Willis, Joshua Faculty Advisor: Kenneth Poeppelmeier

Greener Energy Requires Greener Batteries: Design and Evaluation of the Mixed-Metal Pyrochlore as a Battery Cathode

Current battery technologies still pose a high cost towards grid-scale applications due to the scarcity of component materials and need for frequent replacement, which serves as an impediment toward greater use of green energy. Batteries are composed of a positive and negative end: a cathode and anode. One emergent cathode material is the iron (III) fluoride pyrochlore, which is both light and composed of earth-abundant materials. This material struggles, however, with consistently holding charge after multiple cycles and delivering a high voltage. The aim of this study is to investigate whether partial substitution of manganese for iron in this compound is (i) possible and (ii) improves the quality of batteries containing this material. This work has demonstrated the ability of this material to be made through a three-step process of ball-milling, oxidation, and annealing; this has been demonstrated through multiple spectroscopic methods including XPS, XRD, and IR. An electrochemical analysis of this novel material's performance in lithium-ion batteries is currently underway, which will demonstrate whether the inclusion of manganese improves cycling performance and voltage. If this is demonstrated, this work would mark a significant step towards optimizing earth-abundant cathode materials to replace less sustainable cobalt- or lead-containing batteries.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 079

Willison, Morgan Faculty Advisor: Jillana Enteen

Beyond Surgery & Hormones: Community-Specific Gender-Affirming Care, Research, & Innovation

Despite the World Professional Association of Transgender Health's (WPATH) Standards of Care, version 8 (SOC-8) recognizing that the goal of gender-affirming care is "to partner with [trans and gender-diverse] people to holistically address their social, mental, and medical health needs and well-being while respectfully affirming their gender identity," SOC-8 fails to expand upon vague calls for social services and accessibility, offering limited actionable guidance for clinics to provide non-clinical care and ensure their care is available, affordable, and relevant to their local communities. This paper analyzes crucial community-specific gender-affirming practices that extend beyond hormones and surgery, contributing specificity to populate SOC-8's general recommendations. I provide tangible examples from clinics in three urban environments in the U.S. and Thailand: Tangerine Community Health Clinic in Bangkok, Thailand; Fenway Health in Boston, MA; and Howard Brown Health in Chicago, IL. I conduct and analyze interviews with clinicians and staff members, record participant observations, and assess patient-facing materials from the three clinics. These clinics implement various initiatives, including community-based research, clinician training, patient and family education, and holistic, social and financial support services that enable greater accessibility of care. Rather than secondary additions to clinical care, I argue that these services are an integral part of offering gender-affirming care, deserving of greater attention in the field to advance WPATH's mission of improving the quality and accessibility of trans health.

Presentation Format: Oral
Time: 10:45am-12:15pm
Room: Rock Room
Number: 099

Wilsnack, Anika Faculty Advisor: Sylvia Perry

Stereotyping and Racial Perception of Multiracial Individuals

Multiracial people are one of the fastest growing demographics in the United States, yet they continue to face high levels of stereotyping and identity denial. This study explores how exposure to racial stereotypes may influence how multiracial individuals are socially perceived, and whether the valence of those stereotypes (positive vs. negative) shapes these perceptions. In an online experiment (N = 246), participants were asked to assign multiracial individuals to a single racial category based on a photo and a short biography. The biographies were experimentally manipulated to include either positive, negative, or no racial stereotypes. This research aims to deepen our understanding of the processes underlying racial categorization and stereotype application, particularly as they relate to multiracial identities. Insights from this work may have important implications for understanding how stereotype exposure contributes to identity denial and its psychological consequences.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 163

Winick, Carly Faculty Advisor: Lilah Shapiro

After the Highland Park Mass Shooting: Impacts on Gun-Ideology, Identity, and Community

Between 2014 and 2023, there were 4,684 mass shootings in the United States. The societal costs of these tragedies extend beyond those who directly experienced the event and can have lasting impacts on the community involved. Mass shootings do not just impact personality and psychology but can also influence political activity and discourse surrounding gun laws and policy. The frequency and impact of mass shootings underscore the importance of understanding their effects on individuals, communities, and gun ideology to improve recovery processes and advocate for gun control. This project focuses on the mass shooting in Highland Park, Illinois, on July 4th, 2022, through interviewing 10 Highland Park residents who were present and not present at the shooting. Using a semi-structured interview and grounded theory coding approach, we investigated the influence of this shooting on personalities, community, gun ownership, and gun ideology without preconceived notions about results. Preliminary findings show that residents connected with others to share experiences in the aftermath. Residents described the tight-knit community before and after, and claim to be more conscious of the reality of gun violence. Three individuals purchased guns following this event, and previous gun owners noted no change in their feelings toward their gun ownership after the shooting. Still, all individuals desire stronger gun control policies, relating this desire to the shooter's father, who approved his gun purchases. With continued research into this area, we can hope to mitigate the effects of these events and advocate for stronger gun control.

Presentation Format: Poster
Time: 1:30pm-3:00pm
Room: Louis Room
Number: 224

Wu, Binhao Faculty Advisor: Wendi Gardner

What Is "East Asian"? Who Gets to Decide?

Existing research on ethnicity-/race-based person perception has primarily focused on out-group processes, documenting in-group favoritism in perception. This study supplements this corpus by incorporating research on ethnic-racial identity (ERI) and in-group perception. It investigates (1) whether the way people construct their ERI (i.e., ERI content) influences their perception of others in ethnic-racial terms and (2) whether the same ethnic-racial group is perceived differently by its in-groups vs. out-groups. East Asian participants (n = 145) and White participants (n = 166) completed four tasks through Qualtrics: (1) reporting of their ERI content; (2) the reverse correlation task (RCT), in which they selected which of two blurry face images better resembled an East Asian target for 300 trials; (3) a description judgment task (DJT), where they rated how 60 behaviors and traits (30 culturally relevant, 30 irrelevant) influenced the perceived East Asian-ness of an unfamiliar person; and (4) open-ended questions about how they perceive in-groups and define boundaries for social groups. Analyses compared across ERI content groups (ascribed vs. hybrid vs. acquired) and across ethnic-racial groups (in-group/East Asian vs. out-group/White). Findings revealed: (1) high similarity in visual mental representations across both groups of interest; (2) differences in the DJT across ethnic-racial groups but not across ERI content groups; and (3) differences in qualitative responses across both types of groups. These findings suggest that while the in-group experiential knowledge may influence socio-behavioral and narrative understanding of the group, neither ERI content nor in-group membership influences the automatic process of perception.

Presentation Format: Oral
Time: 10:45am-12:15pm
Room: Armadillo Room
Number: 263

Xia, Mia

Faculty Advisor: Nitasha Sharma

Equalizer No More: Chinese, Black, and Choctaw Education in The Age of Separate and Unequal Policies

In 1924, Chinese students Martha and Berda Lum were barred from attending high school in Rosedale, Mississippi due to their status as non-white. Subsequently, in the legal battle Lum v. Rice, the U.S. Supreme Court affirmed the right of Mississippi schools to deny entry to "colored" students. The Lum family thus traveled westward to Arkansas, where the sisters were allowed to attend a white school. Though facing their share of struggles, the Lums exercised a degree of agency in fighting for their children's education and relocating to a new state - one that Black and Indigenous communities explicitly lacked. Further, while Asian children appeared to integrate into education systems of the South, schools for Black and Indigenous children instead sustained strict hierarchies of race and civility. What can we draw from these seemingly incommensurable histories? How might the Lum family's choices fit into a deeper story of antiblackness and settler colonialism? Drawing from sociology, education policy, and legal history, this interdisciplinary thesis seeks to contribute to Asian American Studies through a triangulated analysis of Southern Black, Asian, and Indigenous schooling in the age of "separate but equal" policies. In this work, I weigh the tensions between education as, on the one hand, the hallmark of change and social mobility, and on the other hand, revealed by growing literature on Black and Indigenous schooling, as a tool of colonization and oppression. Ultimately, this thesis explores the role of racialization and public memory in shaping the facade of education as "the great equalizer."

Presentation Format: Oral
Time: 12:45pm-2:15pm
Room: Arch Room
Number: 965

Xie, Grace Faculty Advisor: David Uttal

Dissecting Mental Rotation Tests: How Stimuli Influence Children's Spatial Performance

Spatial cognition refers to our ability to think about and mentally represent spaces and objects. Mental rotation (MR) tests are widely used to assess spatial thinking in both adults and children, yet significant variation exists, with 103 different MR tests identified for children. Despite the widespread use of MR tests, the influence of test design on children's performance remains unclear. This study examines how different test stimuli-animate (e.g., humans, animals) versus inanimate (e.g., geometric shapes)-affect children's performance. As part of a broader meta-analysis, we systematically reviewed 575 studies on MR performance in children aged 3.0 to 8.0 years. Data about the type of test used, the stimuli of the test, children's performance, and sample age was extracted from each relevant article. To analyze effects of stimuli, we compared mean scores using a t-test and assessed developmental trends with a one-way ANCOVA, controlling for age. Our results indicate that the specific stimuli used within a test does affect performance. There is a significant difference between the Animate ($M = 0.58$) and Inanimate ($M = 0.95$) scores, $t(150) = -3.83$, $p < .001$. Additionally, there are significant effects of animacy, $F(1, 149) = 15.23$, $p < .001$, and age, $F(1, 149) = 6.71$, $p = .011$, on scores. These results, in the lens of the broader project, indicate that the design of mental rotation should be examined when interpreting mental rotation results. Identifying how stimuli influence performance contributes to more valid cognitive assessments in developmental research.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 028/032

Yang, Emily Faculty Advisor: Sandra Waxman

Order and Comprehension Effects in Death Penalty Jurors' Decision-Making

This study investigated whether participants demonstrated order effects and whether comprehension facilitated final sentencing decisions in a mock death penalty case. Previous research has confirmed order effects and demographics biases in the law, but the application of these issues to death penalty-specific contexts is largely understudied. Respondents (N = 342) viewed abbreviated facts and juror instructions for a felony murder case, and I randomly assigned participants to view either the defendant's mitigating or aggravating factors first. Other measures included participants' comprehension of intellectual disability, existing death penalty beliefs, comprehension of juror instructions, gender, age, race, education, and political affiliation. I conducted two logistic regressions: one with my full sample and another in a *voir dire* condition (n = 191), including only participants who stated that they agreed with capital punishment. In both regressions, I found that miscomprehension of juror instructions predicted harsher sentencing (i.e., death sentence). Additionally, women demonstrated a preference for more lenient sentencing (i.e., life in prison without parole) in both analyses. Certain variables, like death penalty beliefs and age, were significant or near-significant in one or both conditions. The order in which participants viewed the mock defendant's mitigating and aggravating factors was non-significant in both regressions. Race was also a non-significant predictor. These findings confirm what many other studies have concluded: jurors are flawed decision-makers, and their comprehension errors or immutable characteristics (e.g., gender, age) may have severe consequences for defendants' outcomes.

Presentation Format: Oral
Time: 12:45pm-2:15pm
Room: Armadillo Room
Number: 023

Yoo, Hye-won Faculty Advisor: Wendi Gardner

Friendship Jealousy: The Interplay of Attachment, Conflict, and Protective Behaviors

Friendship jealousy is the feeling that arises when an individual fears being replaced in a friendship by a third party. Although this phenomenon has been examined in children, minimal research has explored its occurrence in young adults, despite evidence that friendships significantly impact health throughout adulthood. To investigate the antecedents and reactions of friendship jealousy, 300 participants were recruited for this study. Participants were prompted to list a close friend's initials, which were then piped into either a neutral or friendship jealousy condition. Attachment style, self-esteem, life satisfaction, and emotional states were measured. Participants then responded to open-ended qualitative questions probing emotions and behaviors evoked by both friendship conflict and friendship jealousy. Results showed that a majority of participants had experienced friendship jealousy in adulthood. Furthermore, friendship jealousy situations evoked higher levels of negative affect than those involving friendship conflict. Participants in the jealousy condition reported decreased authenticity and closeness with their friend and were more likely to ignore texts and cancel plans. Those with anxious attachment were more likely to ruminate, while those with avoidant attachment were more likely to create distance in the friendship. These findings suggest that friendship jealousy and attachment style can independently predict specific protective behaviors. Additionally, the results indicate that friendship jealousy is a relatively common experience in emerging adulthood, challenging the assumption that friendships are superseded by romantic relationships. Future research should further explore protective behaviors and examine interactions between attachment style and friendship jealousy.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 145

Zhang, Jimmy Faculty Advisor: Adilson Motter

Understanding gene expression epistasis using complex networks and vector geometry

Interactions between components in a complex system allow local changes to drive large-scale behaviors of the system. In biological systems, this phenomenon explains how low-level changes in gene expression result in high-level phenotypic differences. Epistasis characterizes interactions by measuring how the outcome from a combination of changes differs from the sum of the individual changes. Prior work focuses on quantifying epistasis between gene deletions by measuring their impact on cell replication rate (a scalar). This project generalizes to consider epistasis between full transcriptional responses to gene perturbations (vectors) to develop a broader understanding of these interactions. We created networks mapping the experimental factors tested in *Escherichia coli* (gene perturbations, drug treatments, and cultivation shifts), using metadata from publications in the Sequencing Read Archive, and identified and characterized instances of epistasis within each network. For each set of altered experimental factors, we analyzed the geometric relationships between the corresponding transcriptional differences. Our results suggest the presence of nonadditive interactions across 210 measurements of epistasis in 39 projects. These interactions follow two patterns: the combined responses tend to attenuate one or both of the original responses, and the magnitude of the emergent responses, which lie outside the plane formed by the original responses, increases with this attenuation. We anticipate these results will generalize broadly even after accounting for systematic variations between different sequencing datasets. Because gene expression underlies all properties of cells, understanding gene expression epistasis can provide clues for analyzing whole-cell behavior that extends beyond the current models for individual traits.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 960

Zhong, Angela Faculty Advisor: Claudia Haase

Exploring Physiological Linkage and Empathic Accuracy in Caregiver-Youth Conflict Conversations: A Comparative Study between Healthy Individuals and Population with Clinical High Risk for Psychosis

Empathy, the capacity to resonate with others' emotions and offer compassion, is fundamental to fostering healthy familial relationship. Understanding empathy in caregiver-youth interactions is crucial for promoting emotional well-being and healthy development, particularly in families where youth are at clinical high risk (CHR) for psychosis. Building on theory suggesting that people empathize by mirroring others' physiological responses, this study examined whether physiological linkage—moment-to-moment synchrony in autonomic nervous system activity—predicts empathic accuracy in 34 caregiver-youth dyads (14 CHR, 20 hcontrol) during a laboratory-based conflict conversation. Physiological linkage was measured via cross-correlations between caregiver's interbeat interval (IBI, i.e., time interval between heartbeats) when re-watching the conversation video and youth's IBI during the conflict conversation, differentiating between in-phase (aligned changes) and anti-phase (opposing changes) linkage. Empathic accuracy was indexed by second-by-second cross-correlations between caregiver's ratings of youth's emotional experiences and youth's self-reports. Linear regression revealed that greater anti-phase linkage—specifically, when caregivers' heart rates slowed while their children's accelerated, and vice versa—was associated with lower empathic accuracy ($B = 0.01$, $p < .001$). This effect was specific to CHR caregivers, who also showed lower empathic accuracy overall compared to control caregivers ($B = -0.02$, $p < .001$). No significant associations were found in control dyads. These findings support theories that empathy has physiological roots and underscore the importance of differentiating between different forms of physiological linkage and accounting for clinical contexts. Overall, the results highlight the role of embodied psychophysiological processes in shaping empathic understanding in close relationships.

Presentation Format: Poster
Time: 10:00am-11:30am
Room: Louis Room
Number: 423