Afternoon Session Abstracts

AGRICULTURE

THE STATE OF STANDARDBRED HORSE RACING IN ILLINOIS

Presenter(s):   Adam, Steven, Undergraduate, Agriculture

Mentor: Dr. Michelle Kibler

Authorship: Steven Adam, Michelle Kibler

At the peak of horse racing in Illinois, the state had five racecourses that supported Standardbred and Thoroughbred racing. By 2025, only two of the five facilities remain. In recent years the industry has faced challenges including declining attendance, competition from other forms of gambling, and aging infrastructure. This study aims to analyze the current state of Standardbred horse racing in Illinois compared to this industry in the past, exploring the impact of competition from casinos, the challenges of attracting and retaining younger audiences, the number of foals each year, and the state of existing racing facilities. Additionally, this study will compare Thoroughbred racing in Illinois over the same metrics with emphasis on differing actions taken in the Standardbred industry. Data on the number of annual races, foal registrations, and purse money will be collected through the US Trotting Association, the US Department of Agriculture, and the Illinois Department of Agriculture. Outcomes from this study will include potential strategies for revitalizing the Standardbred industry and expectations for the future of the industry. By addressing these challenges and exploring innovative solutions, Illinois can work towards supporting the Standardbred racing industry and ensuring its success for the future.

ECONOMIC IMPLICATIONS IN MANAGEMENT OF EQUINE LAMINITIS

Presenter(s):   Chaidez, Lizbeth, Undergraduate, Agriculture

Mentor: Dr. Michelle Kibler

Authorship: Lizbeth Chaidez

Laminitis is a musculoskeletal disease in horses that can be described by the separation of the hoof wall and atrophy of the laminar tissues due to inflammation which then results in the rotation or sinking of the coffin bone. The objective was to understand the financial implications of various therapies in guiding economic decisions in managing laminitis in horses. Due to the extensive causes of laminitis in horses, it is hypothesized that the cost of therapies varies depending on severity of lameness and veterinary diagnosis. Research will be conducted based on average costs collected regarding surgical procedures, therapeutic shoeing, analgesics, and nutritional diet formulation prices in the USA. Results were analyzed using descriptive statistical analysis. Chronic laminitis surgery through surgical tenotomy of the deep digital flexor tendon averaged $3,050 USD with a standard deviation of $35.35 among three US equine veterinarian hospitals. Analgesics such as phenylbutazone averaged $39.61 USD with a standard deviation of $7.30 for 100 tablets from two veterinary hospitals. Therapeutic boots averaged $167 USD with a standard deviation of $45.29 from two brands. Nutritional therapy included omega-3 fatty acid supplementation, limited grazing of pastures especially in spring and autumn, and vitamin and mineral supplementation. The fatty acid supplement average price for 1 gallon of product was $70 USD with a standard deviation of $42.79. The average cost for 50 lbs. of timothy hay was $64.50 USD with a standard deviation of $6.36. Vitamin and mineral blends averaged $34.88 USD with a standard deviation of $17.70 from three blends including selenium and vitamin E. The prices of therapies for laminitis management vary widely, with surgery being the most expensive therapeutic option compared to phenylbutazone and nutrition. Therefore, for acute laminitis, surgery may not be an economically preferred method of therapy compared to nutrition or medication. At the same time, one should consider the benefits of surgery in preventing progression of acute laminitis. The economic decisions on managing laminitis are dependent on consumer's willingness to spend and severity of symptoms. Further research is necessary to assess the effectiveness and long-term prevention of recurrence, particularly in relation to price.

UTILIZATION OF GOLDEN PENNYCRESS MEAL IN POULTRY DIETS

Presenter(s): Knowles, Marley, Graduate, Agriculture

Mentor: Dr. Nicholas Heller

The objective of this pilot study is to evaluate performance in broiler chickens fed diets containing golden pennycress (GPC) meal, with and without a flavor additive. Cornish Cross three-day-old chicks (n=12) were randomly assigned one of three diets. Golden pennycress (*Thlaspi arvense*) is a winter cover crop grown in the Midwest that is rising in popularity as a cash crop used for biofuel production. After oil is pressed out of the seeds, a meal remains that is usually discarded. Incorporation of this meal (23% protein, 15% fat) into feedstuffs for broilers would be an efficient way to make biofuel production more sustainable. Diet one served as the control with no flavor additive or GPC meal, diet two contained 10% GPC meal, and diet three contained 10% GPC meal with 3% dried molasses. Each diet was administered for five days, a washout period of three days consisted of the same diet offered pre-study, after which a different diet was administered for the same period. A washout between each diet change was to negate carryover effects. Applications of diets continued until all units had received all the treatments. Effectiveness of the diet and performance of the chickens was assessed through metrics like feed intake, water intake, body weight (BW), and feed conversion. A premeasured amount of feed and water was allotted each day and the amounts remaining were measured to assess feed and water intake. BW was recorded every day to track growth and to calculate feed conversion. Data were analyzed using the PROC MIXED procedure of SAS 9.4. No significant differences in weight gain were found between sequences of diets (P=0.8085). Carryover effects had no significant difference, meaning previous order of diet received did not impact the broiler's performance (P_{X1}= 0.5598, P_{X2}=0.0.2497). Period yielded significant results, which was to be expected as the broilers were at different ages whilst receiving treatments (P=<0.0001). However, all animals within a sequence were not different (P=0.6390) and contributed effectively zero variance. Results of this study indicate that GPC can be included in broiler diets as there was no difference in performance and growth compared to the control diet (P=0.8118). The successful integration of GPC into broiler diets promotes sustainable agricultural practices by utilizing a potentially unused product from a cover crop. Further studies could assess long term effects of GPC consumption on broiler carcass quality and performance at increased inclusion rates.

IMPACT OF WINTER COVER CROPS ON SOIL FERTILITY

Presenter(s):   Mackey, Keion, Graduate, Agriculture

Mentor: Dr. Rob Rhykerd

Winter cover crops coupled with best management practices may sequester atmospheric carbon dioxide in soil. However, traditional soil sampling techniques used to measure soil fertility that homogenize the top 15-20 cm of topsoil may not account for changes in fertility near the soil surface. This study evaluated the impact of selected winter cover crops on soil fertility when added to a corn-soybean rotation typical of the U.S. Midwest. A randomized complete block design was established at the Illinois State University Research Farm in Lexington, IL in the fall of 2020. Winter cover crop treatments included a fallow control, pennycress, cereal rye, and a pea, clover, radish, oat mix. The summer cash crop was soybean in 2021 and corn in 2022. Soil fertility was measured by a commercial laboratory from soil cores that were divided into segments of 0-2, 2-4, 4-6, 6-8, 8-10, 10-15, 15-20, 20-25, & 25-30 cm. Above ground cover crop biomass was measured at termination, just before planting the summer cash crop. Summer cash crop yields were determined using a yield monitor. Results showed concentrations of N and organic matter were greatest near the soil surface and decreased with soil depth. Cereal rye produced the most above ground biomass. The soybean yields following pennycress and the PCRO mix was similar to the fallow treatment. Corn yield was lower from treatments with cover crops. Although the cover crops may have decreased summer cash crop yields, in this initial transition to including cover crops in the rotation, their positive ecosystem services, long-term soil health benefits, and potential as a winter cash crop should be considered in an overall economic analysis. Additionally, longer-term studies are needed to evaluate the potential for cover crops to sequester carbon.

INFLUENCE OF PRIOR LIVESTOCK EXPERIENCE ON STUDENT STRESS IN AN INTRODUCTORY ANIMAL SCIENCE COURSE

Presenter(s:)   Tierney, Kathleen, Graduate, Agriculture

Mentor: Dr. Drew Lugar

The shifting student demographic in the animal science discipline has forced institutions to reevaluate the structure of their animal science courses. With an increase in students pursuing animal science degrees with no prior livestock experience, it can be expected that the experiential learning aspect of many of these courses will pose some level of stress on the students. Pilot data were collected on eight participants in an Introduction to Animal Science course during hands-on animal laboratories to determine the demographic effect on student stress. A respondent-reported survey was utilized to collect participant demographic data on prior livestock experience, age, discipline, and hometown classification. Physiological data were collected using heart rate monitors (Polar H9, Polar Electro, Kempele, Finland), and psychological data were collected using a modified perceived stress scale survey (PSS; Cohen et al., 1983). Students with no prior livestock experience had lower heart rates ($P \leq 0.007$) but greater respiration rates ($P \leq 0.048$) than students with prior livestock experience. There were no effects of demographic data on the perceived stress of students ($P \geq 0.249$). Further research or reproduction of this study are suggested to continue investigating student stress evoked by animal handling courses.

UN NUDO EN EL CORAZON

Presenter(s):   Brecheisen, Leah, Undergraduate, Art

Mentor: Dr. Melissa Johnson

Authorship: Leah Brecheisen

In 1973, Augusto Pinochet seized power of the Chilean government, with the help of the United States Central Intelligence Agency, overthrowing their democratic government and ending the life of their socialist president Salvador Allende. It was in that moment that Cecilia Vicuña, at the time a student at Slade School of Fine Art in London, became exiled from her country and positioned herself against the dictatorship. Vicuña is a multimedia artist who creates paintings, quipus, poetry, sculptures, installations, performances, and films. Her work heavily reflects on Latin American politics, starting with the five- thousand-year-old quipu, an ancient mnemonic device of knotted thread, and deep diving into the power of language. The invisible string tying her diverse oeuvre together is in fact not a string, but a knot. From the knot of her reviving quipu to the entanglement of objects in her assemblages or words in her poems, the connection between her historical and ecological passions is simply a knot. She critiques the neglect of the government and calls attention to the voices lost. In examining the tangible and nonliteral knots infused in her work, this research advances the discourse of Vicuña's intentionality and resistance in her interdisciplinary artistic practice.

KURT SCHWITTERS, MERZ, ABSTRACTION, AND THE PROCESS

Presenter(s:)   Latko, Morgan, Undergraduate, Art

Mentor: Dr. Melissa Johnson

The word "Merz" comes from "Kommerz Bank", and ultimately is a nonsense word. However, it defines the creative process of abstract artist Kurt Schwitters, and details how he created his works throughout three decades. Through Merz, Schwitters combines his previous knowledge of traditional artmaking with abstraction using a variety of mediums and materials, specifically in the form of collage. Schwitters' process had an emphasis on the unconventional, specifically with his use of materials, which would often comprise of labels and scraps he would find on the ground. His abstraction still includes formalities seen in fine art, with emphasis on composition and color. Through exploring his creative process and methods, as well as analyzing a variety of Merz works, I documented my findings and my own process creating my own Merz collage based upon my findings.

BEYOND THE QUEER UMBRELLA: MAPPING LESBIAN ARTISTS' EXHIBITIONS AND SCATTERED HISTORIES SINCE THE 1970S

Presenter(s): Murphy, Tess, Graduate, Art

Mentor: Dr. Melissa Johnson

Authorship: Tess Murphy

Lesbian artists in the mid-twentieth century did not participate in the Women's Art Revolution of the 1960s due to the anti-institutional values of radical lesbian ideology. However, lesbian art exhibitions emerged in New York and San Francisco during the 1970s, with documentation found in archives and feminist journals. Despite this, few art historical books include evaluations of lesbian sensibilities within art, and only one published anthology, written by Harmony Hammond in 2000, is solely dedicated to this subject. This research aims to uncover contemporary publications that explore lesbian aesthetics in art and address visibility issues arising from the reclaimed use of "Queer" as an umbrella term.

The research employs contextual and archival analysis to identify where and how lesbian artists have shared their works. Preliminary findings indicate a significant lack of access to information about works created by lesbian-identifying artists within the art historical context. This study highlights the necessity for dedicated scholarly attention to lesbian artists and their contributions, emphasizing the gaps in current art historical literature. This project proposes a quarterly periodical to address these gaps and expand the conversation. It would focus on conducting studio visits with lesbian-identifying artists, showcasing exhibition spaces that host lesbian-identifying artists, and collecting articles on the works written by art historians. These articles will employ art historical methods such as formal, contextual, iconographic, and technical analysis to examine lesbian artwork. This periodical could shed light on this history and provide contemporary artists in 2025 with influence and inspiration, fostering a more inclusive and comprehensive understanding of lesbian contributions to the art world.

THE ENLIGHTENMENT GALLERIES: 18TH CENTURY COLONIALISM ON DISPLAY IN THE 21ST CENTURY

Presenter(s):   Stanford, Kaili, Undergraduate, Art

Mentor: Dr. Katie Bruhn

The British Museum's Enlightenment Galleries serve as a striking example of how colonial-era narratives persist within contemporary museum spaces. Designed to replicate 18th-century display methods, the gallery organizes objects according to Enlightenment principles of classification, reinforcing a Eurocentric framework that continues to shape public understandings of non-European cultures. This paper and poster critically examine how the gallery perpetuates colonial ideology by privileging British perspectives of contemporary history over those of the peoples from whom these objects were taken. Rather than providing a nuanced, self-critical examination of Britain's imperial past, the gallery presents an uncritical celebration of Enlightenment knowledge production, obscuring the violent histories behind its collections.

This study interrogates the language used in museum signage, the layout of the exhibition, and the British Museum's institutional position on repatriation to reveal how colonial power dynamics are embedded within museum practices. Drawing on the writings of Edward Said and the more recent work of scholars such as Dan Hicks and Alice Procter, this paper argues that the continued display of looted artifacts under the guise of historical preservation sustains imperial narratives and silences Indigenous voices. The case of the Early Shield from New South Wales—an Aboriginal artifact contested by Indigenous activists— illustrates how the museum resists calls for restitution while making superficial acknowledgments of colonial harm.

Ultimately, this paper and poster contend that museums must move beyond mere recognition of their colonial pasts toward active decolonization which requires returning stolen artifacts. I advocate for the use of anti-colonial practices to restructure curatorial frameworks to prioritize Indigenous agency. Without such efforts, institutions like the British Museum will remain complicit in the perpetuation of colonial knowledge systems, reinforcing the same power hierarchies that fueled their collections.

CHARACTERIZATION OF SPREADING DEPRESSION SUSCEPTIBILITY UNDER HYPOXIA IN THE DROSOPHILA LARVAL BRAIN

Presenter(s):   Al Mokbil, Mohammad, Graduate, Biological Sciences

Mentor: Dr. Wolfgang Stein

Co-Mentor: Dr. Allison Harris

Authorship: Mohammad Al Mokbil, Wolfgang Stein, Allison Harris

Spreading depression (SD) is a pathophysiological phenomenon characterized by a slowly propagating wave of depolarization of neurons, followed by a transient near-complete suppression of electrical activity in large areas of the brain. SD events are associated with a massive ion redistribution, yet the primary trigger of SD initiation remains unknown. In humans, cortical SD is linked to migraine with aura as it travels across the visual cortex, which subsequently activates pain pathways and contributes to headache pathogenesis. In insects, SD can be triggered by different stressors, causing it to travel across the central nervous system, followed by a transient neural shutdown.

Despite the extensive research on stress-induced SD in the drosophila brain, there is still a gap in understanding if inter-animal variability plays a role in SD initiation, whether repeated-SD events influence the animal's resilience against SD, and if hypoxia affects the SD susceptibility. To address these questions, we developed a protocol using Drosophila larvae where SD was triggered by rapid cooling (22°C → −1°C). SD was imaged in larval fly brains with pan-neuronal GCaMP expression using fluorescent calcium imaging and was identified by a rapid and dramatic increase in the fluorescence that spreads across large sections of the nervous system. Preliminary data show that there is a wide range of SD-initiation temperatures among different animals with an average of (2±0.9°C, N=12) ranging from 0.5°C to 4.5°C, suggesting that there is a large inter-individual variation among larvae in SD susceptibility.

However, exposure to repeated coolings showed a significant downward trend (p=0.05, N=9) where 1st cooling had the highest SD initiation temperature (2.7±1.1°C) and the 5th cooling had the lowest SD initiation temperature (1.8±0.9°C). This suggests an increased resilience against cooling-induced SD events. Finally, to determine how oxygen availability influences SD susceptibility, SD initiation was investigated in condition 1, the animal's spiracles were in air while in condition 2, the spiracles were blocked by Vaseline. These experiments showed no substantial difference in SD initiation temperature between hypoxic larvae (4.7±3.7°C, N=15) and non-hypoxic larvae (5.4±3.3°C, N=14, p=0.57), suggesting that oxygen availability does not play a role in the SD initiation temperature. Currently, we are testing other environmental stressors in to see whether they influence SD temperature change.

QUERCETIN'S IMPACT ON CHICKEN EMBRYO DEVELOPMENT UNDER CORTICOSTERONE INFLUENCE: A COMPARATIVE STUDY WITH TROLOX

Presenter(s):   Ayorinde, Ayomi, Undergraduate, Biological Sciences

Mentor: Dr. Ryan Paitz

Authorship: Ayomi Ayorinde, Ryan Paitz

This study investigates quercetin, a natural antioxidant, for mitigating the negative effects of elevated cortisol levels on chicken embryo development compared to trolox, a vitamin E derivative known for its antioxidant properties. The hypothesis posited that quercetin would effectively modulate mitochondrial functions and lower plasma cortisol levels, thus promoting better embryo development under stress. This research serves a broader purpose by contributing to strategies that could counteract high cortisol levels during pregnancy and ultimately mitigate fetal mortality risks. The experimental design involved four treatment groups: trolox + oil, trolox + corticosterone (TroloxCort), quercetin + oil, and quercetin + corticosterone (QuercCort). An oil overlay was utilized to prevent evaporation and assess the isolated effects of the antioxidants. Corticosterone was introduced to simulate stress conditions and evaluate the protective capabilities of both antioxidants. Results revealed that quercetin did not surpass trolox in protecting embryos from the adverse effects of corticosterone. The QuercCort group had a survival rate of only 23%, and the surviving embryos were significantly smaller compared to those in other treatment groups. These findings indicate that while quercetin exerts some positive influence on embryo development in the presence of elevated cortisol levels, it does not provide superior protection compared to trolox. In conclusion, further research is essential to explore the underlying mechanisms through which these antioxidants operate and optimize their applications in alleviating the negative impacts of stress hormones on embryonic development. This study highlights the significance of strategically selecting antioxidants for therapeutic uses related to stress in embryogenesis while laying the groundwork for future studies in human pregnancy contexts.

UNDERSTANDING THE ROLE OF DYSTROPHIN ISOFORMS ON MUSCLE FUNCTION IN THE NEMATODE C. ELEGANS

Presenter(s):   Batchelor, Paige, Undergraduate, Biological Sciences
                Fazyl, Adina, Graduate, Biological Sciences

Mentor: Dr. Andrés Vidal-Gadea

Authorship: Paige Batchelor, Adina Fazyl, Andrés Vidal-Gadea

Duchenne Muscular Dystrophy (DMD) is a severe X-linked recessive disorder characterized by progressive muscle degeneration due to the absence of dystrophin (dys-1), a critical structural protein that protects muscle fibers from contraction-induced damage. This disease primarily affects boys and leads to progressive disabilities, often resulting in premature death. While multiple isoforms of the dystrophin gene have been identified, their specific contributions to muscle function remain an area of active investigation.

This study aims to characterize the different dystrophin isoforms in Caenorhabditis elegans a nematode worm able to recapitulate the hallmark pathologies of DMD. I am using molecular tools to assess the molecular identities and expression patterns of short dys-1 isoforms in C. elegans.

Understanding the differential expression of dystrophin isoforms in C. elegans will enhance our knowledge of dystrophin's role in muscle function and may provide insights into therapeutic approaches for DMD.

CHARACTERIZING THE EVOLUTION OF RESISTANCE TO REACTIVE OXYGEN AND CHLORINE SPECIES IN UROPATHOGENIC ESCHERICHIA COLI

Presenter(s):   Bhimwal, Tanisha, Graduate, Biological Sciences

Mentor: Prof. Jan-Ulrik Dahl

Authorship: Tanisha Bhimwal, Magdalena Urlaub, Sadia Sultana, Jan-Ulrik Dahl

Uropathogenic *E. coli* (UPEC) represents the major cause of urinary tract infections (UTIs), one of the most prevalent bacterial infections that occurs worldwide over 400 million times each year. UPEC ascend to the bladder, where they need to withstand phagocytosis by innate immune cells, exposing the pathogen to antimicrobial reactive oxygen and chlorine species (RO/CS) like hypochlorous acid (HOCl). HOCl, the active component of bleach, inflicts extensive damage to cellular macromolecules, causing significant protein aggregation and lipid peroxidation. However, the high number of often recurrent UTIs suggest that UPEC has adapted to the highly oxidizing environment of the inflamed urinary tract quite well. Microorganisms like yeast can display faster and more robust responses to severe stress if they or their progenitors experienced a prior mild stress, known as *priming*. Priming enhances resilience and survival in fluctuating or adverse environments by enabling organisms to better withstand subsequent challenges. RCS such as HOCl, exert selective pressure on bacteria, driving the evolution of mechanisms that mitigate its antimicrobial effects. However, whether "priming" with RCS will have similar protective effects on subsequent exposures of UPEC is still unknown. My preliminary data suggests that UPEC exposed to sublethal RCS stress exhibit enhanced resistance to subsequently applied lethal dose of RCS. Thus, my data suggest that priming through prior RCS exposure improves survival outcomes of oxidatively stressed cells, thereby stimulating bacterial growth under stress conditions. I also observed that priming gives fitness advantage regardless of nature of oxidant. Based on these findings, I hypothesize that priming with sub- lethal RO/CS improves survival to subsequent lethal stress. Another remarkable observation from my preliminary data is that RcrB, which we recently identified as an essential RCS defense component, also plays a role in CFT073's priming response as primed rcrB-deficient cells do not show improved survival response when compared to lethal RCS. The goal of this work is to uncover physiological mechanisms underlying UPEC's adaption to RCS, identifying genes responsible for eliciting this increased survival. This enables us to understand how UPEC thrives in chronic inflammatory environment of urinary tract and subsequently causes recurrent infection. This work proposes to answer potential hidden mechanistic insights on how UPEC interacts with host defenses during oxidative stress.

INVESTIGATING *SK-3* TYPE SPORE KILLING IN *NEUROSPORA CRASSA*

Presenter(s):   Damkoehler, Kole, Undergraduate, Biological Sciences
Davis, Alexander, Undergraduate, Biological Sciences

Mentor: Dr. Tom Hammond

Authorship: Kole Damkoehler, Alexander Davis, and Tom Hammond

Neurospora crassa is a genus of fungus that exhibits a phenomenon called *Sk-3* spore killing. *Sk-3* spore killing occurs when an *Sk-3* killer strain mates with an *Sk-3* sensitive strain, and it results in the death of half of the offspring (ascospores). A DNA interval called *i350*, located on *N. crassa* Chromosome III, has previously been identified as critical for spore killing. To obtain a more detailed understanding of this DNA interval, we are examining related DNA intervals *i386,* i*399* and *i408*. Our preliminary results indicate that deletion of *i386* disrupts spore killing, suggesting that this interval overlaps a gene required for the process. We are currently examining the effect of deleting intervals *i399* and *i408*. Our results will help precisely define the position of an *Sk-3* killer gene, which is a critical step toward elucidating the mechanism of spore killing.

LIVER X RECEPTOR (LXR) REGULATES 5β-REDUCTASE (AKR1D1) EXPRESSION IN AVIAN EMBRYOS: IMPLICATIONS FOR YOLK STEROID METABOLISM

Presenter(s):   Drew, Emily, Undergraduate, Biological Sciences
                Reynolds, Delaney, Undergraduate, Biological Sciences

Mentor: Dr. Ryan Paitz

During times of stress, humans and other vertebrates produce increased levels of glucocorticoids. Embryonic glucocorticoid exposure can have detrimental effects on both development and the long-term ability to respond to stressors. Steroid metabolism in the placenta can regulate exposure to these maternal glucocorticoids and potentially prevent negative effects. In birds, the extra-embryonic membranes contain an enzyme, 5β-reductase (AKR1D1), that converts corticosterone (an active glucocorticoid) to 5β- corticosterone (an inactive glucocorticoid). We have previously shown in chicken embryos that ligands for Liver X Receptor α (LXRα), such as 22R-hydroxycholesterol, can in induce AKR1D1 expression. The goal of this research was to investigate a range of doses of 22R-hydroxycholesterol that induce AKR1D1 expression and whether 22R-hydroxycholesterol can also induce the expression of other genes regulated by LXRα (ACOT13, SCD1, and FASN). To test this, fertilized eggs were injected with varying doses of 22R- hydroxycholesterol at the onset of development. After 48 hours, extraembryonic membranes were sampled, and gene expression was measured through qPCR. It was observed AKR1D1 expression was induced at higher dosages. We found that 22R-hydroxycholesterol induced AKR1D1 and ACOT13 at certain dosages but had no effects on the other two genes at any dose. This indicates that 22R-hydroxycholesterol is capable of regulating a number of LXRα related genes.

THE EFFECT OF STRESS ON FEMALE PREFERENCE AND PERCEPTION OF A SOCIALLY RELEVANT STIMULUS

Presenter(s):   Enevold, Alyssa, Graduate, Biological Sciences

Mentor: Dr. Fernanda Duque

Authorship: Alyssa Enevold, Fernanda Duque

Animals must respond adaptively to social cues for survival. Stress, often triggered by environmental factors, can alter how animals perceive and respond to social stimuli. A stress hormone, corticosterone (CORT), prepares the body to respond to a stressor; thus, it is used as a measure of stress levels. In the brain, different types of stress, such as acute and chronic, can cause shifts in the expression of neuropeptides that modulate social behaviors and changes in behavior. By assessing female preference for a socially relevant stimulus under different stress conditions, we can understand how stress impacts social behavior and the perception of social signals. In our study, female zebra finches (*Taeniopygia guttata*) will undergo different stress conditions (control, acute - AS, and chronic - CS). Then, using a three-chamber setup, females will be presented with a choice between a social stimulus consisting of a picture of a female zebra finch paired with contact calls or a control stimulus consisting of a scrambled zebra finch image and pink noise. Females will also have the option to remain in the neutral zone (no stimulus). We will assess social preference by comparing how long they spend near the control vs the social stimulus. We predict that there will be a negative correlation between preference for social stimulus and CORT levels so the control birds will have the lowest CORT levels and strongest preference, while the AS birds will have the highest CORT levels and weakest preference. This is consistent with research showing that chronic stress causes a dampened stress response while acute stress induces high CORT levels due to the novelty of the stressor. In the future, we will assess changes in the gene expression of social neuropeptides in sensory regions of the brain due to stress condition. This work will provide insights into how stress might change the perception of social signals, thus affecting future decision-making and social interactions.

ECOLOGICAL CONSEQUENCES OF BTI LARVICIDING ON AN AQUATIC MESOCOSM COMMUNITY

Presenter(s):   Everly, Jaclyn, Graduate, Biological Sciences

Mentor: Dr. Steven Juliano

Bti larviciding is a common method of mosquito control despite conflicting evidence from research regarding its unintended impacts. We conducted a semi-field experiment to evaluate the effectiveness of Bti larviciding using mesocosms stocked with simple invertebrate communities that simulated ephemeral ponds commonly treated with Bti. Shade cloth covering the mesocosms was temporarily removed twice at the start and middle of the experiment to allow oviposition and natural colonization by local mosquitos (primarily Culex spp). Four experimental treatments manipulated the addition of predatory odonate nymphs (families Aeshnidae, Libellulidae, and Ceonagrionidae) and a one-time application of Bti to the mesocosms, allowing us to test the immediate (24 hour) and short-term (1 month) effects of Bti on mosquito production in the presence and absence of predators that may contribute to biological control. Mosquito production was measured by collecting larvae and pupae with dip cup samples (~350 mL) and water column samples (~4,000 mL) and collecting adults from emergence traps in the initial and final mosquito cohorts. We found that larval abundance was significantly lower in Bti-treated mesocosms than in untreated mesocosms, and that larval abundance decreased significantly in the 24 hours following Bti application. Two weeks later, the presence of predators and residual Bti had no significant effects on mosquito oviposition; however, we did find that adult mosquito production in the final cohort was significantly lower in Bti-treated mesocosms compared to untreated mesocosms. Our results show that Bti larviciding is effective against mosquitoes irrespective of predator presence.

INVESTIGATING THE ROLE OF DYSTROPHIN IN SMOOTH AND STRIATED MUSCLES OF C. ELEGANS

Presenter(s):   Fransen, Hope, Undergraduate, Biological Sciences
                Niha, Shifat, Graduate, Biological Sciences
                Fazyl, Adina, Graduate, Biological Sciences

Mentor: Dr. Andrés Vidal-Gadea

Authorship: Hope Fransen, Adina Fazyl, Shifat Niha, Andrés Vidal-Gadea

The structural protein dystrophin is essential for maintaining muscle integrity by protecting against contraction-induced damage. While its role in striated muscle has been widely studied, its function in smooth muscle remains less understood. Caenorhabditis elegans provides a valuable model for studying dystrophin's role in both muscle types, as it possesses enteric smooth muscle involved in defecation and striated pharyngeal muscle required for feeding.

This study investigates whether dystrophin-deficient worms (dys-1 mutants) can be functionally "rescued" through plasmid-mediated dystrophin expression in specific muscle types. We analyzed four experimental groups: (1) wild-type controls with intact dystrophin, (2) dystrophic VG02 mutants lacking dystrophin, (3) dys-1 mutants with dystrophin restored using a small version (isoform) of the gene, and (4) dys-1 mutants with dystrophin restored using the intermediate isoform of dys-1 normally found in smooth muscles. To assess muscle functionality, we quantified enteric across groups.

Our findings provide insight into the muscle-type specific roles of dystrophin and the extent to which targeted gene expression can restore function. Understanding dystrophin's impact on smooth and striated muscle integrity in C. elegans contributes to broader efforts to develop therapeutic strategies for Duchenne Muscular Dystrophy.

URBAN HEAT AND FORAGING BEHAVIOR: INVESTIGATING THERMAL ADAPTATION IN HOUSE MICE

Presenter(s):   Fritz, Sylvia, Graduate, Biological Sciences

Mentor: Dr. Javier delBarco-Trillo

Different areas of the world are affected disproportionately with more urbanized areas averaging hotter daily temperatures compared to less urban areas due to a phenomenon known as the Heat Island Effect. Small mammals, such as mice, are especially vulnerable to these large and lasting changes in temperature. Adverse temperatures can affect the foraging behaviors of mice which can influence their availability as both consumers and prey in their respective ecosystems. This study aims to investigate the effects of heat stress on the effective foraging behavior of house mice (Mus musculus) and assess if mice from urban areas are more resistant to hotter temperatures than mice from less urban areas. The experiment will use two groups of mice: one from rural origin and one from urban origin. Behavioral assay tests in hotter temperatures will assess decision-making in food selection, risk-taking, and exploration patterns. It is hypothesized that urban mice which were theoretically exposed to hotter conditions will have a higher tolerance to foraging in increased temperatures. The results will provide us with a better understanding of how hotter temperatures and urbanization may affect survival and adaptability, which in turn could contribute to a broader understanding of behavioral adaptation in response to increasing temperatures and differences between areas of different levels or urbanization.

INTERROGATING DROUGHT RESILIENCE ON NATURAL ACCESSIONS AND CRISPR GENERATED MUTANTS IN PENNYCRESS (THLASPI ARVENSE L.)

Presenter(s):   Gautam, Liza, Graduate, Biological Sciences

Mentor: Dr. John Sedbrook

Authorship: Liza Gautam, Nikhil Jaikumar, Xinxin Ding, Carol Kiam Assato, Mary Phippen, Winthrop Phippen, Pubudu Handakumbura, John Sedbrook

Drought poses a serious threat to crops and food security. According to the National Integrated Drought Information System (NIDIS), 40% of the U.S. was under drought in 2020. It is predicted future droughts will become more common and severe due to global warming. Pennycress (*Thlaspi arvense L.*), a close relative of canola and Arabidopsis, is being developed as an oilseed-producing winter cover crop for the U.S. Midwest and other temperate farming regions. As part of our crop improvement efforts, we are focusing on further understanding how pennycress responds to drought and identifying genetic changes that can improve drought tolerance without negatively impacting seed yields. Our preliminary analyses indicate that pennycress naturally has drought tolerance superior to Arabidopsis, which may coincide with this species' know cold tolerance. Using CRISPR-Cas9 mutagenesis, we generated pennycress single, double, and triple mutants targeting ten genes shown in other species to negatively regulate drought responses. The genetic, biochemical, and metabolomic data presented here support our hypothesis that pennycress responds to drought differently from Arabidopsis.

GEOGRAPHIC VARIATION IN THE TIMING OF SONG IN THE GENUS *MICROCERCULUS*

Presenter(s):   Geyer, Tara, Undergraduate, Biological Sciences

Mentor: Dr. Carlos Rodriguez-Saltos

Authorship: Tara Geyer, Carlos Rodriguez-Saltos, Fernanda Duque

The evolution of song produces acoustic geographic variation across species. While geographic variation in song has been widely studied in songbirds, little is known about timing-based variations. We investigated variations in song timing across the genus *Microcerculus*. Using a crowd-sourced database, we obtained recordings across the entire geographic range of multiple *Microcerculus* species. By measuring inter-note interval durations, we classified songs into known timing variants or identified novel variants where necessary. We then tested whether these variants are separated across geographically distinct populations. This project will shed light on the evolution of timing in birdsong by studying a group of birds with wide variation in the timing of their songs.

CORTICOID STEROID EFFECT AND PATHWAYS IN C. ELEGANS

Presenter(s):   Gomez, Margarita, Graduate, Biological Sciences

Mentor: Dr. Andrés Vidal-Gadea

Authorship: Margarita Gomez, Andrés Vidal-Gadea

Duchenne muscular dystrophy (DMD) is an X-linked genetic disorder affecting approximately 1 in 5,000 male births in the United States. It is caused by mutations in the dystrophin gene, leading to a loss of dystrophin protein and subsequent muscle degeneration. Dystrophin plays a crucial role in stabilizing muscle cells by linking the cytoskeleton to the extracellular matrix. Without it, muscle fibers become susceptible to contraction-induced damage, resulting in membrane instability, calcium influx, mitochondrial dysfunction, and oxidative stress.

Currently, there is no cure for DMD. However, corticosteroid treatments, particularly prednisone and deflazacort, have been shown to slow disease progression. These glucocorticoids exhibit anti-inflammatory and immunosuppressive effects, delaying muscle deterioration and prolonging ambulation. Despite their benefits, long-term steroid use presents significant side effects, including weight gain, growth suppression, osteoporosis, and metabolic disturbances. Recent advancements have introduced vamorolone, a dissociative steroid with reduced side effects, which received regulatory approval in 2023.

C. elegans, a model organism widely used in biomedical research, has been instrumental in studying the effects of steroids on muscle degeneration. In the context of DMD research, C. elegans models have been utilized to examine the impact of glucocorticoids on muscle structure and function. Studies have shown that glucocorticoid treatment, including the administration of prednisone and deflazacort, can influence gene expression related to muscle maintenance and inflammation. Furthermore, the findings from C. elegans research contribute to understanding the mechanisms of steroid-induced side effects, such as metabolic alterations and oxidative stress, which can inform potential therapeutic strategies for DMD patients.

Ongoing research focuses on improving treatment efficacy and minimizing adverse effects while exploring novel therapeutic strategies to enhance dystrophin restoration and mitochondrial protection. This study aims to provide insight into the non-inflammatory pathways on which these steroids act on. Identifying pathways on which these drugs act contributes to the overall understanding of these treatments. Additionally, investigating the molecular pathways allows for the potential to create pathway-specific steroids, reducing unwanted adverse effects.

INVESTIGATING THE ROLE OF DYSTROPHIN IN MOTOR NEURON FUNCTION, A DEEPER DIVE INTO THE NEURONAL PATHOLOGY OF DUCHENNE MUSCULAR DYSTROPHY

Presenter(s):   Jones, Mackenzie, Graduate, Biological Sciences

Mentor: Dr. Andrés Vidal-Gadea

Authorship: Mackenzie Jones, Adina Fazyl, Shifat Niha, Tope Awe, Jack Fostiak, Andrés Vidal-Gadea

Duchenne muscular dystrophy (DMD) is a severe genetic disorder caused by a loss of function mutation in the *DMD* gene on the X chromosome. This mutation results in the absence of dystrophin, a key structural protein in muscles. When dystrophin is absent the primary pathology of DMD can be seen through progressive muscle degeneration. However, individuals who suffer from this disease also display neuropsychiatric disorders, such as anxiety and depression, alluding to the role of dystrophin within the nervous system. It has been suggested that dystrophin plays both a signaling and structural role in the nervous system, particularly at the neuromuscular junction (NMJ). Motor neurons located in the NMJ play a crucial role in receiving signals from the CNS and subsequently transmitting those signals to muscle fibers. However, the precise mechanistic function of dystrophin and its various isoforms within this context has not been discerned. This study aims to investigate the role of dystrophin within the neuromuscular junction, focusing on its contribution to the system both pre- and post-synaptically.

To examine dystrophin's various functions, we will utilize the well-studied model organism *Caenorhabditis elegans* (*C. elegans*). The nematode *C. elegans* presents a distinct advantage in this research endeavor, primarily due to its transparent body structure and its extensively well-mapped and understood nervous system. This facilitates an unparalleled opportunity for detailed and intricate observation of the complex synaptic processes occurring along the neuromotor pathway. This study's first aspect is to elucidate the expression and localization of dystrophin isoforms within the neuromuscular junction. Next, dystrophin rescue strains will be utilized and recorded to determine whether specific isoforms are required for proper synaptic transmission.

This study will enhance our knowledge of the role dystrophin has in motor neuron function and how its loss contributes to the neuronal pathology in Duchenne muscular dystrophy. Through this increased understanding the development of more holistic and effective treatment strategies can be developed, which tackle more than just muscle pathology. Future studies could focus on how dystrophin may be involved in other neuronal processes, such as circuit development.

OF MICE AND MUTATIONS: FREQUENCIES OF DELETERIOUS ALLELES IN SMALL, HIGHLY ISOLATED POPULATIONS

Presenter(s): Koeplin, Madeline (she/her), Graduate, Biological Sciences

Mentor: Dr. Pirmin Nietlisbach (he/him)

Authorship: Madeline Koeplin, Pirmin Nietlisbach

Genetic drift, or the alteration of allele (i.e. gene variant) frequencies due to chance, is strongest in small populations and also affects deleterious, or harmful, alleles. Weakly, moderately, and highly deleterious alleles may be impacted in different ways depending on the size of the affected population, due to the co-occurring forces of natural selection. However, this has rarely been researched in wild populations and it remains unclear how especially the frequency of highly deleterious alleles is affected by small population size. The deer mouse *(Peromyscus maniculatus)* populations on the Canadian Gulf Islands are a great system to study varying deleterious allele frequency. These populations differ in size from one island to another, and genomic studies in our lab have confirmed that these populations are strongly isolated from each other. The objective for my study is to determine how highly and moderately deleterious allele frequencies differ in differently sized populations. I will determine this by studying island populations of deer mice in Canada's Gulf Islands. I will use samples collected in 2021, 2022, 2023, and 2024 as well as from the upcoming field season in the summer of 2025.

To capture the mice, I bait and set 120 Sherman live traps, with two traps at each site and sites being eighteen meters apart. When a mouse is found in a trap, I weigh them, visually determine their sex and reproductive status, and collect a small outer-ear sample using a hole punch. If the mouse is an adult, I will also take tail, foot, and ear length measurements. After DNA extraction from the tissue samples, sequencing, and amplification, I then search for areas within the genome, which will show differences in genetic diversity in the different populations. This will determine how the frequency of mildly and highly deleterious alleles vary in the differently sized populations. By using the deer mouse populations on the Canadian Gulf Islands, I can address questions regarding how purging and genetic drift can impact the genetic makeup of very isolated and small populations. There have been very few empirical studies regarding how population size and isolation can impact deleterious allele frequencies in natural populations. My study broadens our knowledge in evolutionary and conservation genetics, and in the face of increasing habitat fragmentation, this knowledge is needed.

ENHANCEMENT OF GROWTH OF STAPHYLOCOCCUS AUREUS AT LOW TEMPERATURES BY ANTIMICROBIAL UNSATURATED FATTY ACIDS AND THEIR ESTERS

Presenter(s):   Paul, Sharanya, Graduate, Biological Sciences

Mentor: Dr. Jan Ulrik Dahl

Co-Mentor: Dr. Brian J. Wilkinson

Authorship: Sharanya Paul, Vineet K. Singh, Kelly M. Hines, Jan-Ulrik Dahl, and
                Brian J. Wilkinson

Staphylococcus aureus, a gram-positive bacterial pathogen recognized for its virulence, possesses the ability to invade an array of bodily organs and tissues, resulting in morbidity and mortality. It has been established that S. aureus incorporates exogenous straight-chain unsaturated fatty acids (SCUFAs) into membrane lipids from various sources, including supplemented culture media and during infections. Given the enhancement of membrane fluidity due to oleic acid (C18:1Δ9) incorporation into lipids and the growth stimulation as a result, we were prompted to examine the effect of medium supplementation with the other SCUFAs such as sapienic acid (C16:1Δ6), palmitoleic acid (C16:1Δ9), linoleic acid (C18:2Δ9,12), arachidonic acid (C20:4Δ5,8,11,14), the triglyceride (trilinolein), and cholesteryl esters (cholesteryl arachidonate and cholesteryl linoleate) on growth at low temperatures. All SCUFAs and trilinolein tested significantly enhanced the growth of S. aureus at low temperatures at low concentrations (<30μM), above which the growth was inhibited. These data suggest that SCUFAs incorporates into phospholipids and glycolipids and enhance membrane fluidity. Cholesteryl esters stimulated low temperature growth and were tolerated to considerably higher concentrations than free fatty acids or triglycerides suggesting a potentially protective role of cholesterol. There was a notable increase in the production of the golden pigment staphyloxanthin, at low temperatures. A carotenoid-deficient mutant strain showed less growth than the parent in response to the different compounds supporting a role for staphyloxanthin in cold adaptation. These findings shed light on the significance of exogenous SCUFAs in S. aureus's adaptation mechanisms to cold temperatures and their impact on bacterial growth and membrane fluidity that is relevant to growth in food environments. It also highlights a potential novel pathway involving a role for cholesterol in S. aureus membrane physiology, where cholesterol has a protective nature which may influence host-pathogen interactions and may affect the susceptibility to various antimicrobial molecules.

USING AN ACOUSTIC CAMERA TO DIFFERENTIATE INDIVIDUAL CONTRIBUTIONS IN DUETS OF NEOTROPICAL WRENS

Presenter(s):   Sander, Grant, Undergraduate, Biological Science

Mentor: Dr. Carlos Rodríguez-Saltos

Authorship: Grant Sander, Carlos Rodríguez-Saltos

Many species of neotropical wrens engage in complex duets in which individuals take turns alternating vocalizations with little to no overlap between phrases. The timing is so precise that it often sounds as if a single bird is singing. Both male and female wrens engage in duetting behavior, with duets serving multiple functions, including territory defense, social bonding, and mate acquisition. Given the rapid and seamless alternation of phrases, distinguishing individual contributions within a duet is challenging. To address this issue, we evaluated the efficacy of determining individual contributions to duets with an ACAM-120 acoustic camera. Acoustic cameras employ an array of microphones surrounding a central camera to spatially map sound sources. To test whether the ACAM-120 distinguishes individual contributions, we conducted a controlled experiment using modified recordings of Plain-tailed Wrens (Pheugopedius euophrys), played from two speakers to simulate natural vocal interactions. The acoustic camera was capable of distinguishing multiple audio sources and accurately determining the source of playback on a moment-to-moment basis. These findings suggest that acoustic cameras are an effective tool for analyzing duetting behavior in neotropical wrens. This approach has the potential for broader applications in bioacoustics and behavior research as a tool to isolate individual vocalizations in pair interactions.

USING COMPUTER VISION TO EXPLORE THE LINK BETWEEN BEAK MOVEMENTS AND BIRDSONG IN THE WILD

Presenter(s):   Scott, Jadyn, Graduate, Biological Sciences

Mentor: Dr. Carlos, Rodriguez-Saltos

Authorship: Jadyn Scott, Carlos Rodriguez-Saltos

Birdsong is a complex, multimodal behavior crucial for communication and fitness. Song production originates in the syrinx, the bird's vocal organ, then the final acoustic output is filtered through coordinated body movements—such as those of the beak and throat—that modify key song characteristics like frequency and tonality. Despite previous studies on specific species, the relationship between acoustics and body posture remains largely unexplored across taxa. Advances in machine learning and computer vision, particularly DeepLabCut, now enable high-throughput, precise tracking of this biomechanical filtering during song production. Using 159 field-recorded songs and crowd-sourced videos from the Macaulay Library, we applied DeepLabCut to quantify beak gape movements in White-crowned Sparrows. Our analysis revealed a positive correlation between beak gape angle and dominant frequency, mirroring patterns observed in manually-scored videos of related species, White-throated and Swamp Sparrows. These findings suggest a biomechanical constraint or adaptation influencing song filtering, such as beak size or maneuverability. By leveraging DeepLabCut's precise tracking capabilities, this approach will be expanded in future research to analyze a broader range of New World sparrows (Passerellidae), enabling a detailed, data-driven investigation of the evolutionary drivers of song filtering and their role in shaping species-specific vocal traits.

EXPLORING TEMPERATURE RESILIENCE IN CRUSTACEAN NEURAL CIRCUITS: DEVELOPING WESTERN BLOTTING AS A QUANTITATIVE APPROACH FOR NEUROMODULATOR RELEASE

Presenter(s):   Seymour, Mackenzie, Graduate, Biological Sciences

Mentor: Dr. Wolfgang Stein

Authorship: Mackenzie Seymour, Wolfgang Stein

Temperature perturbations challenge all levels of physiology, but they are particularly dangerous for the nervous system as neurons rely on temperature-sensitive biochemical and molecular processes to function. Temperature perturbations, and in particular rising temperatures, can cause an imbalance of inhibitory and excitatory conductances in neurons. Consequently, membrane leakage of the neuron increases, leading to abnormal or even cessation of neural activity, which disrupts behaviors important for survival. Possessing compensatory mechanisms is thus vital for animals to counterbalance negative temperature-induced effects on neuronal activity.

Recent research investigating the effects of temperature on the nervous system of poikilotherms (animals whose body temperature relies on the environment) have shown some neural circuits are endowed with an ability to continue functioning despite temperature perturbations, or temperature resilience. This temperature resilience is achieved in part through neuromodulation, where modulatory neurotransmitters released from temperature-sensitive neurons enable neuronal circuits to continue to function at rapidly rising temperatures. Previous research in my lab has shown that the neuromodulator CrustTRP (Crustacean tachykinin-related peptide) enables temperature resilience of a neural circuit in two crab species, the Jonah crab (Cancer borealis) and Dungeness crab (Cancer magister). We hypothesize that CrustTRP is released at a higher rate when temperature increases.

To test this hypothesis and better understand the role of CrustTRP in mediating temperature resilience, we aim to develop Western blotting as a quantitative method to measure its release in response to temperature perturbations. By optimizing Western blotting to specifically detect CrustTRP, we can quantitate its release across different temperature conditions. This will provide valuable insights into how CrustTRP modulates neural circuit function and temperature resilience. Ultimately, these findings contribute to a broader understanding of how neuromodulation can maintain neural stability under environmental stress.

HOW DO HEAT SHOCK PROTEIN GENES RESPOND TO HEATWAVES IN THE CRANIAL REGION OF T. SCRIPTA EMBRYOS?

Presenter(s):   Solache, Miranda, Undergraduate, Biological Sciences

Mentor: Dr. Rachel Bowden

Co-Mentor: Dr. Ryan Paitz

Authorship: Miranda Solache, Clinton Warren, Madison Wilken, Rachel Bowden, Ryan Paitz

The embryos of oviparous species such as turtles are vulnerable to various environmental conditions like extreme heat, which can influence embryonic development, hatchling survival, and even sex determination. Elevated temperatures can compromise cellular integrity by inducing protein denaturation, disrupting membrane fluidity, and impairing essential enzymatic activities. To counteract these detrimental effects, turtle embryos initiate protective responses to preserve cellular function under thermal stress. This process involves heat shock proteins (HSPs), a family of proteins that are produced in response to cellular stress such as transient heat. We utilized the red-eared slider turtle (Trachemys scripta) to understand how HSPs respond to heatwaves in the embryonic cranial region. We exposed T. scripta embryos to fluctuating cool temperatures (26 ± 3° C) with the control group remaining at cool temperatures and treatment groups experiencing three 3-day heatwaves (31 ± 3° C) early in development. We are investigating gene expression of 5 HSPs (HSPH1, HSP90B1, HSP70A5, HSP70A5, HSP70A8) in response to the heatwave treatments. Preliminary results show that HSPH1 expression increases during the 3-day heatwave events. We expect that the other HSPs will show similar patterns. These results so far indicate that HSPs in the cranial region may be rapidly induced in response to transient heat exposures, thus representing an adaptive acute heat response. This contributes to our understanding of embryonic resilience to environmental stress during development.

FACULTY PERSPECTIVES ON EQUITY, DIVERSITY, ACCESS, AND BELONGING IN STEM DISCIPLINES

Presenter(s):   Soyebi, Blessing, Graduate, Biological Sciences

Mentor: Dr. Rebekka Darner

Authorship: Blessing Soyebi

Despite the proliferation of initiatives on Equity, Diversity, Access, and Belonging (EDAB), STEM disciplines experience several inequities. Disparities continue to be evident in the underrepresentation of certain groups- Black, Indigenous, Latina, and women from historically marginalized and minoritized backgrounds in STEM fields. Additionally, low retention of students in STEM degree programs, especially for these minoritized students, is a national concern.

Notably, only a limited number of institutions of higher learning are addressing this concern by implementing initiatives that promote equity, diversity, access, and belonging (EDAB). This effort is evident in the professional developmental programs that these institutions design to equip faculty with strategies to foster inclusive classrooms. However, faculty perceptions and beliefs facilitate or hinder the implementation of these inclusive practices taught in these programs. Considering the critical position of faculty in shaping classroom climate and student experiences, it is safe to assume that faculty plays a vital role in contributing to students' success in STEM. Thus, faculty perceptions may be a factor that could influence retention rates in STEM fields. Despite this, research exploring faculty perspectives remains limited, potentially leading to disengagement and undermining long-term goals to foster equity, inclusion, and representation in STEM disciplines.

This qualitative study uses semi-structured interviews to investigate the perceptions of STEM faculty at a large Midwestern public institution. We seek to address three key research questions: (1) Does the current STEM climate at the institution align with the goals to foster equity, inclusion, and representation in STEM disciplines? (2) How effective do they perceive current STEM initiatives geared toward equity, inclusion, and representation in STEM disciplines at the institution? (3) What strategies do they employ to provide inclusive classroom instruction? This study has the potential to address these gaps and provide insight to institutional leaders, stakeholders, policymakers, and educators. The findings will be vital in formulating evidence-based strategies to enhance persistence in STEM, promote inclusion, and achieve representation within STEM disciplines.

Keywords: Faculty perspectives, STEM persistence, inclusive teaching, equity, inclusion, under-representation

DOES EXPOSURE TO FREE FATTY ACIDS AFFECT EMBRYONIC DEVELOPMENT

Presenter(s):   Wertz, Jessie, Undergraduate, Biological Sciences

Mentor: Dr. Ryan Paitz

When females experience stress during reproductive events, their offspring can be exposed to elevated corticosterone levels. In developing chicken embryos, embryonic exposure to corticosterone results in reduced growth and increased mortality. Corticosterone exposure also induces expression of ACOT13 (an enzyme that hydrolyzes fatty acyl-CoA to produce free fatty acids). The purpose of this study was to determine if embryonic exposure to free fatty acids will have an impact on embryonic development to potentially explain the consequences of high corticosterone levels. We tested the effect of free palmitic acid and free oleic acid on development. The eggs were injected with palmitic acid, oleic acid, or vegetable oil (control) and it was found that there was no significant effect on either fatty acid on development. This led to the conclusion that elevated free fatty acid content in the embryo is not what causes the negative effects of corticosterone levels.

DO YOLK ESTROGENS AFFECT PRIMORDIAL GERM CELL DIFFERENTIATION IN A SPECIES WITH TEMPERATURE-DEPENDENT SEX DETERMINATION?

Presenter(s):   Wilken, Madison, Graduate, Biological Sciences

Mentor: Dr. Rachel Bowden

Co-Mentor: Dr. Ryan Pait

Authorship: Madison Wilken, Clinton Warren, Rachel Bowden, Ryan Paitz

During early embryonic development, primordial germ cells (PGCs) originate in the yolk sac and migrate to the gonads where they differentiate into either oocytes (within ovaries) or spermatogonia (within testes). One key difference between spermatogonia and oocytes during embryonic development is that oocytes enter into meiosis, which is thought to be triggered by the local production of estrogens in the ovary that, in turn, initiates meiosis by inducing the expression of Dazl. However, there are other sources of estrogens during development, including maternally derived estrogens present in the yolk, that may also affect PGCs. We used Trachemys scripta, a turtle species with temperature-dependent sex determination (TSD) and known to be sensitive to estrogen exposure, to study how PGCs respond to maternal estrogens. In a previous study we found that Dazl expression was elevated in embryos that were treated with estrogens early in development, but sampling in this study occurred relatively late in development after ovary development had begun. Based on these previous findings, we designed an experiment to see how maternal estrogens affect Dazl expression levels early in development to characterize whether yolk estrogens can affect PGCs prior to any signals from a developed gonad. Preliminary results suggest that maternal estrogens do not induce Dazl expression early in development suggesting PGCs are not sensitive to estrogens until the later stages of development.

THE ROLE OF BODY SIZE IN VOCAL PRODUCTION OF ECUADORIAN HUMMINGBIRDS

Presenter(s):   Wolfersberger, Logan, Undergraduate, Biological Sciences

Mentor: Dr. Fernanda G. Duque

Authorship: Logan Wolfersberger, Baruah Padmanav, Fernanda Duque

A common trend seen throughout many taxonomic groups is an allometric relationship between an organism's body size and physical characteristics. Typically, species that are larger in size will develop larger vocal organs that produce lower-pitched vocalizations. Inversely, smaller species develop smaller vocal organs that produce higher-pitched sounds. In these cases, body size can become a reliable predictor of frequency of vocal production. Some species of hummingbirds produce vocalizations with a fundamental frequency greater than 8 kHz, which falls beyond the known hearing capabilities of most birds. Furthermore, our current knowledge of HF vocalizers shows that these species exhibit a wide range of body sizes. Therefore, we are interested in understanding whether hummingbirds, including those that produce HF vocalizations, follow this acoustic allometry. If hummingbirds followed standard allometric trends, then smaller hummingbirds would vocalize at higher frequencies and would be more likely to produce HF vocalizations. Using a publicly available repository, we conducted a detailed acoustic analysis of 621 recordings of 126 species of hummingbirds that occur in Ecuador. Our preliminary analysis using phylogenetic regression to compare body mass to fundamental frequency suggests that there was no correlation between body size and fundamental frequency of vocalizations in this group of birds. This means that factors other than body size influence the production of HF vocalizations in hummingbirds, raising questions about the mechanisms involved in determining their vocal frequencies and how hummingbirds recognize and use HF vocalizations in communication.

REDUCED AROMATIC CHARACTER IN NITRONAPHTHOPORPHYRINS

Presenter(s):   Bains, Gursewak, Undergraduate, Chemistry

Mentor: Dr. Timothy Lash

Porphyrins with nitro-substituents may exhibit modified spectroscopic properties and reduced aromatic characteristics. Nitronaphthoporphyrin **1a** was prepared previously and this showed an unusual UV-vis spectrum with two broad weakened Soret bands. This can be attributed to disruption of the pi-system due to resonance contributors such as **2**. Unfortunately, **1a** proved to have poor solubility in organic solvents and it was not possible to characterize the free-base form by NMR spectroscopy. In order to gain insights into the effect of nitro-substituents on the aromatic properties of **1**, two new examples of this system were prepared with n-butyl substituents. 1,3-Dinitronaphthalene was reacted with tert-butyl isocyanoacetate in the presence of the non-nucleophilic base DBU to give a mixture of two nitronaphthopyrroles **3** and **4**, together with a dipyrrolonaphthalene byproduct (structure not shown).

Montmorillonite clay catalyzed condensation of **3** with acetoxymethylpyrrole **5** afforded dipyrrylmethane **6** in excellent yields. The tert-butyl ester protective groups were cleaved with trifluoroacetic acid. Following extraction of the intermediate, the dipyrrole was further condensed with dipyrrylmethane dialdehydes **7a** and **7b** to give, following air oxidation in the presence of zinc acetate, the targeted nitronaphthoporphyrins **1b** and **1c**. The proton NMR spectra showed that the external protons were shifted upfield compared to a naphthoporphyrin lacking the nitro-substituent providing evidence for reduced global aromaticity in these structures. Nickel(II) and zinc(II) complexes **1Ni** and **1Zn** were also prepared and spectroscopically characterized.

SYNTHESIS AND REDUCTION OF 2-NAPHTHYL ISOCYANATE

Presenter(s):   Borchardt, Ryan, Undergraduate, Chemistry

Mentor: Dr. Steven Peters

Isocyanates (R-N=C=O) are molecules that are often used in industry to produce polymeric materials, such as polyurethanes. Aryl isocyanates have been found to undergo cyclotrimerizations forming triaryl isocyanurates upon reduction with alkali metals. Triaryl isocyanurates are known to enhance the properties of polyurethanes, making them more commercially effective due to their increased transparency and chemical resistivity. Previously, our research group has performed multielectron reductions of aryl isocyanates in aprotic, polar solvents and found these species form stable biaryl anion radicals. For example, when a solution containing 1-naphtyl isocyanate is reduced with potassium metal we find that 1,1'-binaphthyl anion radical is formed, which can be detected using spectroscopic techniques. We are interested in exploring this chemistry with other aryl isocyanates, such as 2-naphthyl isocyanate. The studies presented here will describe the synthesis of 2-naphthyl isocyanate as well as the results obtained from experiments involving the multielectron reduction of this compound.

SYNTHESIZING MATERIALS FOR RESEARCH ON (5+2) CYCLOADDITIONS

Presenter(s):   Brozenec, Rachel, Undergraduate, Chemistry

Mentor: Dr. Andy Mitchell

The purpose of this research was to create materials that can be further used to study (5+2) cycloadditions. The starting material, Maltol, was modified through sequential reactions such as the protection of Maltol, the bromination of the protected Maltol, and then the amination of the resulting bromide. As the reactions were run, the products were examined by Thin Layer Chromatography (TLC), purified by Flash Column Chromatography, and analyzed by ^{1}H and ^{13}C NMR spectroscopy. Overall, these reactions provided a learning experience of various reactions and lab techniques as well as a stock of materials that can be used for further research on (5+2) cycloadditions.

SYNTHESIS OF STRUCTURAL DIVERSITY FROM MALTOL-DRIVEN REARRANGEMENT REACTIONS

Presenter(s):   Eifert, Rex, Undergraduate, Chemistry

Mentor: Dr. Andy Mitchell

This study presents a synthetic approach utilizing maltol as a versatile scaffold for (5+2) cycloaddition reactions and complex rearrangements. The method uses sequential transformations, including protection, bromination, and amination, to generate a diverse array of starting materials. By optimizing the conditions for these rearrangements, the study aims to identify the most efficient route for obtaining the rearranged products and explore alternative molecules that could serve as viable precursors. The resulting compounds, with their structural diversity, hold significant potential for applications in the synthesis of complex molecular structures. This approach utilizes various chromatography and NMR techniques in order to ensure the purity and structural characterization of the products.

SINGLE CHAIN MANIPULATION OF SYNTHETIC POLYMERS

Presenter(s):   Gautam, Binod, Graduate, Chemistry
                Foster, Cayden, Undergraduate, Chemistry

Mentor: Dr. Susil Baral

Authorship: Binod Gautam, Cayden Foster, Susil Baral

Our approach to single-chain manipulation of synthetic polymers is based on Magnetic tweezers (MT) force microscopy. We grow surface-grafted synthetic polymers in situ via ring-opening metathesis polymerization (ROMP) of norbornene-based monomers and tether the other end of the polymer to a magnetic particle. A pair of permanent magnets generate magnetic force to pull the magnetic particle. The force exerted on the polymer is of the order of piconewton (pN), enough to stretch a semiflexible polymer but much smaller than the force required to break a covalent bond. The polymer extension under force is measured by tracking the axial position of the magnetic particle, which is determined by analyzing its optical diffraction patterns under transmission imaging. By changing the force applied to the magnetic particle and measuring the corresponding polymer extension, we generate the force-extension curve. Force-extension measurements are used to extract the single-chain mechanics and rigidity of a polymer using polymer physics models. Our study will provide fundamental knowledge on single-chain conformation and dynamics of various synthetic polymers, which is crucial for developing polymer materials with desired mechanical properties.

REGULATING SURFACE-ENHANCED RAMAN SCATTERING SIGNALS BY THERMO-RESPONSIVE GOLD-POLYMER NANOCOMPOSITES

Presenter(s):   Gonzalez, Grace, Undergraduate, Chemistry

Mentor: Dr. Jun-Hyun Kim

Authorship: Grace Gonzalez, Michaela Kirchoff, Garrett Milligan, Blessing Okereke, Jun-Hyun Kim

In this study, we describe a highly simple approach to prepare plasmonic gold nanoparticles (AuNPs) in the presence of a temperature-sensitive poly(N-isopropylacrylamide) particle solution for use as a surface enhanced Raman spectroscopy (SERS) substrate. The formation of the polymer particles is achieved by conventional radical polymerization, followed by the *in situ* integration of plasmonic AuNPs. After examining the structural and physical properties of these nanocomposites as a function of temperature, these materials are then tested as a SERS substrate to improve the detection of organic compounds and heavy metal ions in aqueous solutions. Studying these types of materials could lead to the development of highly sensitivity detection systems for toxic and hazardous species that can be directly applied to on-site and real time environmental analysis.

CONJUGATION AND ANALYSIS OF RANDOM AND SITE-SPECIFIC BIOTINYLATED ANTIBODIES ON STREPTAVIDIN-COATED SURFACES

Presenter(s): Kobulnicky, Trent, Undergraduate, Chemistry

Mentor: Dr. Jeremy D. Driskell

Authorship: Trent Kobulnicky, Emily Beitello, Jeremy D. Driskell

Immunoassays utilizing surface-bound antibodies are ubiquitous in biochemical diagnostics. Antibodies providing high affinity and specificity are central to achieving accurate results in diagnostic antigen tests. However, the effectiveness of surface-immobilized antibodies is diminished by limited stability and improper antibody orientation. With this research, we expound a novel mechanism for stable, oriented conjugation of the F_C antibody region to a target surface through biotin-streptavidin affinity. To accomplish this task, anti-horseradish peroxidase IgG1 antibody (anti-HRP) is biotinylated utilizing microbial transglutaminase (mTG) at one site-specific residue (Q295) on each heavy chain F_C region with the resulting structure being elucidated via SDS-PAGE, western blot, and trypsin digest LC-MS. These targeted, biotinylated antibodies (tBt-IgG) are then immobilized on a streptavidin-functionalized well plate. Surface saturation and antibody orientation is quantified using HRP antigen activity and compared to analogous results from antibodies biotinylated at random lysine residues (rBt-IgG). This procedure will be extended to different surfaces, culminating in tBt-IgG adsorption onto streptavidin-coated gold nanoparticles for versatile assay applications.

SYNTHESIS OF PORPHYRINS WITH TWO EXOCYCLIC RINGS USING THE '3+1' VERSION OF THE MACDONALD CONDENSATION

Presenter(s):   Marinucci, Nicole, Undergraduate, Chemistry

Mentor: Dr. Timothy D. Lash

Authorship: Nicole Marinucci, Maiya Forkin, Timothy Lash

Porphyrins are widely investigated due to their potential for applications in numerous areas, including as photosensitizers in photodynamic therapy. Modification of the porphyrin chromophore has been of great interest as this allowed the properties of the system to be altered. In this study, the synthesis of porphyrins with fused exocyclic rings is being investigated. Initially, tripyrrane **1** with two five-membered carbocyclic rings was condensed with a pyrrole dialdehyde, but this failed to produce the targeted diethanoporphyrin **2**. This may have been caused by the tripyrrolic intermediate taking on a conformation that was not conductive to macrocycle formation. An alternative structure **3** with two seven-membered exocyclic rings was targeted instead in an attempt to generate an intermediate that was better suited for porphyrin ring formation. Cyclohepta[b]pyrrole **4a** was prepared by reacting phenylhydrazone **5** with cycloheptanone in the presence of zinc dust in acetic acid. Selective oxidation with lead tetraacetate afforded the corresponding acetoxy derivative **4b** and this was condensed with 3.4-diethylpyrrole in a 2:1 ratio to generate tripyrrane **6a**. Deprotection of the terminal benzyl esters with hydrogen over 10% Pd/C gave the related dicarboxylic acid **6b** and further reaction with dialdehyde **7** afforded the novel porphyrin **3**. It is anticipated that this strategy can be applied to the preparation of a series of porphyrin analogues. Furthermore, it may be possible to synthesize related structures with extended conjugation pathways.
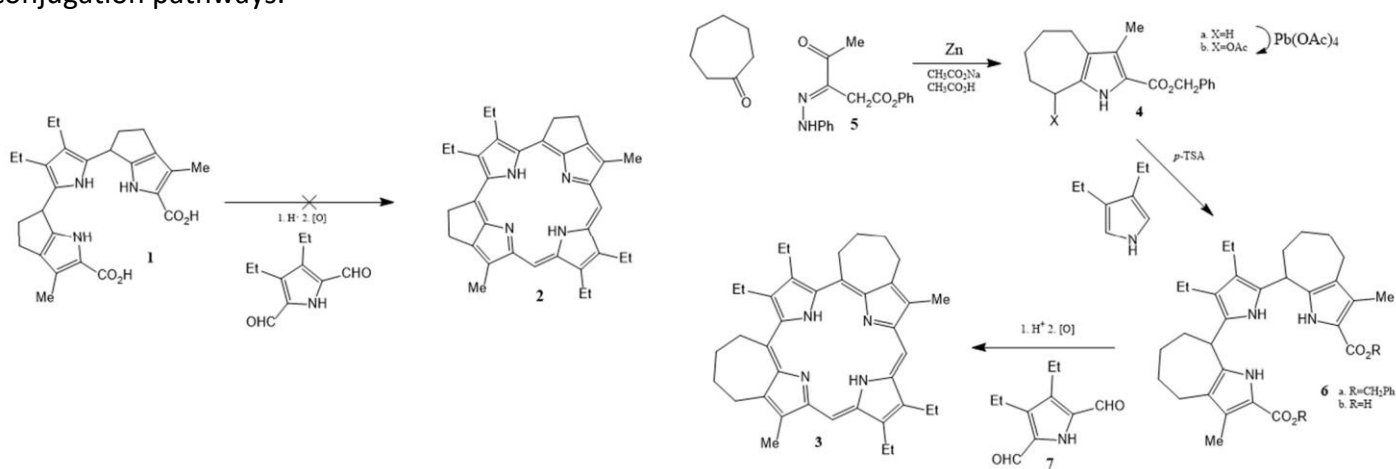
SYNTHESIS AND CHARACTERIZATION OF [Re6Se8(PBn3)4I2] and [Re6Se8(PBn3)5I]I

Presenter(s):   Melgoza, Briana, Undergraduate, Chemistry

Mentor: Dr. Lisa Szczepura

Authorship: Briana Melgoza, Lisa Szczepura, Taylor Coil

Transition metal cluster complexes exhibit unique electronic properties and have been found to be important for catalysis and for use in functional materials. This project included various experiments involving the synthesis and purification of *cis-* and *trans*-[$Re_6Se_8(PBn_3)_4I_2$], from $(Bu_4N)_4$ [$Re_6Se_8I_6$] and PBn_3 in chlorobenzene. The purified *cis-* or *trans*-[$Re_6Se_8(PBn_3)_4I_2$] metal cluster was then used for the synthesis of [$Re_6Se_8(PBn_3)_5I$]I in DMF. All new compounds were characterized using ^1H and $^{31}P\{^1H\}$ NMR spectroscopy, as well as mass spectrometry and combustion analysis. The next phase of this project involves scaling up on the synthesis of [$Re_6Se_8(PBn_3)_5I$]I for structural characterization, as well as determining if *cis-* or *trans-* [$Re_6Se_8(PBn_3)_4I_2$], can be used to prepare clusters with different types of spectator ligands.

OPTIMIZATION OF SYNTHETIC CONDITIONS TO MAXIMIZE THE FLUORESCENT PROPERTY OF GOLD NANOCLUSTERS

Presenter(s):   Milligan, Garrett, Undergraduate, Chemistry

Mentor: Dr. Jun-Hyun Kim

Authorship: Garrett Milligan, Blessing Okereke, Michaela Kirchoff, Grace Gonzalez, Jun-Hyun Kim

The properties of gold nanoclusters (AuNCs) are highly affected by many synthetic conditions, making the optimization process demanding. A variety of outcomes can result from a combination of reaction parameters, with the stabilizing ligand playing a major role as they can drastically change the electronic structure of AuNCs. The resulting electronic configuration strongly influences the intrinsic properties of AuNCs such as photoluminescence, magnetism, and catalytic activity. Thus, several synthetic parameters including reaction temperature, pH, illuminating conditions, and thiolate ligand to gold ratios were precisely regulated to determine the effects on the formation of AuNCs and their overall properties. The ability to accurately control these parameters can allow for the fabrication of nanoclusters with high stability and strong photoluminescence, expanding their practical applications such as fluorescent bioimaging and sensing.

APPLICATIONS OF [5+2] CYCLOADDITIONS TOWARDS CLEAVABLE TETHERS

Presenter(s): Nsabaah, Joseph, Graduate, Chemistry

Mentor: Dr. Andy Mitchell

Authorship: Joseph Nsabaah, Andy Mitchell

Cleavable tethers are essential components in various fields, including chemical biology and drug discovery. The [5+2] cycloaddition is a highly efficient and versatile process for forming seven-member rings, a structure in natural products and pharmaceuticals. This [5+2] cycloaddition involves the concerted union of a 5-atom π-system, typically a heterocyclic or a vinyl cyclopropane equivalent and a two-atom π system, resulting in the creation of new bonds and stereocenters. A series of transformations was performed on maltol to synthesize novel derivatives suitable for [5+2] cycloaddition reactions. Initially, maltol was protected with TBDPSCl (tert-butyldiphenylsilylchloride). The protected maltol subjected to bromination, introducing a reactive handle, which was then converted to an amine through substitution. Finally, acylation of the amine yielded a novel derivative bearing a functional group poised for participation in [5+2] cycloaddition reactions. These derivatives are expected to serve as valuable intermediates in the synthesis of complex molecules.

FABRICATION OF CARBON BLACK FOR THE DEVELOPMENTOF HIGHLY REACTIVE SUPPORTED CATALYSTS

Presenter(s):   Okereke, Blessing, Graduate, Chemistry

Mentor: Dr. Jun-Hyun Kim

Authorship: Blessing Okereke, Garrett Milligan, Michaela Kirchoff, Grace Gonzalez, Jun-Hyun Kim

This study explores the influence of carbon black (CB)-based support substrates on the catalytic properties of loaded palladium nanoparticles (PdNPs). We have demonstrated the possibility of utilizing recycled carbon black (rCB), derived from scrap tires, as a sustainable alternative to conventional carbon black (CB) in catalytic applications. Building on this finding, the present research aims to assess the catalytic performance of rCB against nitrogen doped carbon nitride (C3N4) as a support material for PdNPs. This graphitic C3N4 can be an easily obtained environmentally friendly materials such as urea and melamine. The resulting substrate is hypothesized to outperform rCB due to its structural and electronic configuration, including crystallinity and lone pair electrons, both of which can significantly influence on the loading efficiency of catalytically active PdNPs and electron-transfer catalytic reactions. Upon simply comparing the catalytic activity of PdNPs supported on rCB and C3N4 in several chemical transformations, this study can elucidate the reasons behind the higher reactivity of graphitic C3N4. This research not only aims to validate the prospective benefits of C3N4 but also seeks to promote the development of green and sustainable catalytic systems.

DETECTION AND LONG-TERM ASSESSMENT OF COVID-19 PHARMACEUTICALS IN SOIL AND THEIR DEGREDATION PATHWAYS

Presenter(s):   Piontek, Russell, Graduate, Chemistry

Mentor: Dr. Christopher Mulligan

Authorship: Russell Piontek

At the onset of the COVID-19 pandemic, an assortment of pharmaceutical drugs garnered mainstream prominence (e.g., hydroxychloroquine sulfate, dexamethasone, ribavirin, etc.). It is well documented that pharmaceuticals can end up in the environment by several different pathways, including manufacturing waste, improper disposal, and human excretion. Once in the environment, there are many potential areas they may impact, including: entering aquatic regions and contaminating aquatic organisms, infecting local plant and animal life via water to soil contamination, and reintroduction to humans by interaction with contaminated soil or consumption of infected wildlife.

Electrospray ionization mass spectrometry (ESI-MS) provides a rapid means of analysis for soil samples. Using ESI-MS, soil samples spiked with varying degrees of pharmaceutical drugs can be detected at very low concentrations, very quickly, and at a high resolution. ESI-MS is also very versatile as it is easily modifiable depending on the needs of the researcher. Here a three dimensionally printed cone using carbon nanotube-infused polymers are utilized for detection of COVID-19 pharmaceuticals under ambient conditions. Utilizing these cones, methods are then developed for the detection of each given pharmaceutical.

How these pharmaceuticals interact and breakdown in soil is also of interest. Spiking biologically active soil samples with these COVID-19 pharmaceuticals and then analyzing them over time lends insight into whether the drugs are detectable in soil, how long they stay in their native form, and with what rapidity they experience breakdown or fragmentation. Even if the drug is partially broken down in soil, this breakdown information is significant because the molecular fragments can be utilized to infer the presence of the drug in an environmental sample as the fragmented molecules are unique to theunfragmented molecule. Additionally, each drug is unique in that the fragmentation biproducts may be more or less undesirable in their fragmentated state versus their native state. Analysis of these degradation pathways will better inform us all about how long these drugs are expected to retain their native state in soil, how and if any breakdown occurs, and whether or not the fragmented molecules carry any toxic features of note.

THE ARG-N-DEGRON PATHWAY COUNTERACTS THE PRO-APOPTOTIC TRUNCATED BAX VIA PROTEIN DEGRADATION

Presenter(s):   Shahid, Michael, Undergraduate, Chemistry
                Homan, Grace, Undergraduate, Biological Sciences

Mentor: Dr. Mohamed Eldeeb

Authorship: Michael Shahid, Grace Homan, Mohamed Eldeebr

The Arg-N-degron pathway targets destabilizing N-terminal residue-containing protein substrates for Ubiquitin-dependent proteasomal degradation. It is shown that this pathway plays crucial roles in cardiovascular development, G-protein signaling apoptosis and genomic stability. In the course of Arg-N- degron-mediated protein degradation, Arg-N-degron- E3 ubiquitin ligases promotes protein degradation through the recognition of destabilizing N-terminal residues such as N-terminal arginine on target proteins. Upon apoptosis in various mammalian cell lines, Bax is cleaved by proteases to generate a pro- apoptotic Cleaved fragment of BAX that has a destabilizing N-terminal aspartate. While several studies demonstrated the potent pro-apoptotic activity of Bax, the biochemical regulation of the metabolic stability of this pro-apoptotic fragment has been elusive. Herein, we identify that the cleaved pro- apoptotic fragment of Bax is a novel substrate for Arg-N-degron degradation machinery. Tellingly, our data support the notion that Arg-N-degron degradation machinery may represent a potential therapeutic target to modulate apoptosis in cancer cells.

SURFACE INTERACTIONS BETWEEN HALOGENATED AROMATIC COMPOUNDS

Presenter(s): Sheehan, Casey, Undergraduate, Chemistry

Mentor: Dr. Bhaskar Chilukuri

Aromatic compounds and their halogenated analogs have unique interactions with surfaces. My research has been particularly focused on triphenylene (an aromatic compound) and its brominated and chlorinated analogs. Over the span of my research, I have utilized scanning tunneling microscopy to get images of these molecules adsorbed on a surface, usually one of highly ordered pyrolytic graphite (HOPG). Aside from imaging the molecules on the surfaces, I also used quantum mechanical models to predict the adsorption characteristics of these molecules with the surface. I also applied UV-visible spectroscopy to characterize each of these different molecules in solution to verify their identity and determine the properties dependent on concentrations.

FOSTER CARE TO PRISON PIPELINE

Presenter(s):   Bottom, Gianna, Graduate, Criminal Justice Sciences

Mentor: Prof. Ashley Farmer

The foster care to prison pipeline is the phenomenon where individuals who have experienced foster care are disproportionately put at risk for interacting with the criminal justice systems. Many factors such as instability, trauma, and lack of support systems are commonly faced by youth in foster care and increases the chances of behavioral and emotional challenges for these individuals. These different challenges are often also combined with systemic inequalities such as racial and socioeconomic disparities. This can lead to higher arrest rates, detention rates, and incarceration rates among foster youth. The foster care to prison pipeline is able to highlight the need for reform in both the foster care and criminal justice systems. Gaining insight from experienced individuals of foster care is essential in aiming to provide more adequate mental health services, education, and resources that prevent foster youth from becoming involved in the criminal justice system and perpetuating the foster care to prison pipeline phenomenon.

COMMUNICATION

CAN I COPE: LANGUAGE BARRIERS AND ACADEMIC STRESS EXPERIENCES AMONG INTERNATIONAL GRADUATE STUDENTS AT ILLINOIS STATE UNIVERSITY

Presenter(s):   Adeyemo, Grace, Graduate, Communication

Mentor: Dr. Andrew Ventimiglia

Authorship: Grace Adeyemo

Globalization and advancements in digital media technologies have encouraged international students to pursue academic opportunities abroad. Scholars recognize international students as valuable contributors to diversity on American campuses, as they often share experiences that promote cultural integration and appreciation during class discussions. However, they also face significant challenges, particularly language barriers, which can impact their academic experiences. While prior research has examined international students' challenges, limited attention has been given to how language barriers contribute to academic stress among international graduate students in the United States, particularly at Illinois State University (ISU), which hosts a significant number of international graduate students. This study fills this gap by examining the role of language barriers in shaping academic stress experiences among international graduate students at ISU. Communication Accommodation Theory (CAT) which explains why and how individuals adjust their speech patterns during social interaction, and what social consequences result from such adjustment serve as a framework. A qualitative approach that combines Focus Group Discussions (FGD), In-depth Interviews (IDI), and Key Informant Interviews (KII) was employed. Findings reveal that accent differences, speech rates, slang, and variations between British and American English are the primary language challenges faced by international graduate students at ISU. These barriers contribute to academic stress, as students struggle to keep up with and adapt to American classroom expectations. To cope, students modify their pronunciation and rely on peer networks for support. However, the study found that institutional support for language barriers is often underutilized. While ISU provides academic tutoring, peer mentoring, and faculty office hours, many students do not access these resources due to lack of awareness, cultural barriers, or intimidation in seeking help. Moreover, the study found that students and professors negotiate accommodation through convergence as they adjust their speech for clarity inside and outside the classroom. To create a more inclusive academic environment, universities should implement faculty training on language accommodation, promote awareness of academic support services, and establish structured classroom participation policies that support diversity.

THE ROLE OF MESSAGE FRAMING IN INFLUENCING HEALTH DECISIONS AMONG INTERNATIONAL GRADUATE STUDENTS AT A MIDWEST UNIVERSITY IN THE UNITED STATES OF AMERICA

Presenter(s):   Amissah, Beatrice, Graduate, Communication

Mentor: Dr. John R. Baldwin

International graduate students in US universities face numerous challenges in the quest to attain higher education while navigating an environment far from home. While significant research has addressed the mental and physical health needs of these students, little attention has been given to how they respond to health messages based on framing, especially within the context of cultural differences. As the United States continues to serve as a prominent destination for international students, it has become increasingly important to address health message framing to meet their unique needs and influence their health-related decisions effectively. This qualitative study explores the impact of message framing on the health decisions of international graduate students at a Midwest university in the United States. Using semi-structured, in-depth interviews with ten participants, the study reveals that the framing of health messages plays a crucial role in how international students perceive and process such messages. Participants expressed a preference for health messages emphasizing potential benefits (gain-framed) over those highlighting potential losses (loss- framed). Additionally, the study found that certain health messages were perceived as irrelevant due to cultural differences between the United States and the participants' home countries.

Key terms: Message framing, international graduate students, health decisions.

EFFECTS OF MULTITASKING DURING INTERPERSONAL VIDEO CHATS

Presenter(s):   Edema, Clementina, Graduate, Communication
                Merkling, Matt, Graduate, Communication
                Niftulaeva, Alina, Graduate, Communication

Mentor: Dr. Caleb Carr

Co-Mentor: Dr. Aimee Miller-Ott

Authorship: Clementina Edema, Matthew Merkling, Gabriela Gomes, Alina Niftulaeva,
                Caleb Carr, Aimee Miller-Ott

Even when engaged in synchronous dyadic video chats, individuals can be distracted from their communication partner. Drawing on the concept of crosstalk in face-to-face interactions, two studies explored the impact of a video chat partner's distraction on perceptions of that partner's social attractiveness, electronic propinquity, conversational immediacy, and social presence. The first study (N = 40) used a survey to have respondents recall and describe three specific prior social dyadic video chats (i.e., dyadic, dual front mediated crosstalk, collective mediated crosstalk), and then provide metrics of study variables for each episode and partner. The second study (N = 87) used an online experiment to expose participants to one of three video chat vignettes in which one partner engaged in one of three forms of crosstalk. Results extend the concept of crosstalk into fully-mediated interactions, evidencing lower perceptions of conversational characteristics (i.e., electronic propinquity, conversational immediacy, social presence) as dyad partners were more distracted away from the video chat, though relational perceptions of the partner (i.e., social attractiveness) remained generally stable.

FAMILIAL POLITICAL DISCOURSE: A LOOK INTO MANAGING POLITICAL DIFFERENCES WITHIN THE FAMILY

Presenter(s):   Mueller, Kate, Graduate, Communication

Mentor: Dr. Lindsey Thomas

This study examines how Reddit users discuss how their family communication patterns, and relationship closeness was affected by political discourse surrounding the 2024 election with their assumed close family members. Using a thematic analysis to look at a Reddit thread three major themes were found: conflict escalation and relationship strain, perceived betrayal and value misalignment, and avoidance as a communication strategy. Findings revealed that political disagreements frequently led to heightened arguments, emotional exhaustion, and sometimes estrangement within families. Many individuals expressed using avoidance to preserve emotional well-being, challenging established communication patterns and harming relationship closeness. Taking a closer look at this topic provides insight into navigating family relationships in a time of high political polarization.

THE IMPACT OF INTRODUCTORY PUBLIC SPEAKING COURSES ON STUDENT RETENTION IN HIGHER EDUCATION

Presenter(s):   Murray, Taylor, Graduate, Communication

Mentor: Dr. Cheri Simonds

Co-Mentor: Dr. Stephen Hunt

This study examines how Reddit users discuss how their family communication patterns, and relationship closeness was affected by political discourse surrounding the 2024 election with their assumed close family members. Using a thematic analysis to look at a Reddit thread three major themes were found: conflict escalation and relationship strain, perceived betrayal and value misalignment, and avoidance as a communication strategy. Findings revealed that political disagreements frequently led to heightened arguments, emotional exhaustion, and sometimes estrangement within families. Many individuals expressed using avoidance to preserve emotional well-being, challenging established communication patterns and harming relationship closeness. Taking a closer look at this topic provides insight into navigating family relationships in a time of high political polarization.

PREDICTIVE POLICING AND AI BIAS: CAN MACHINE LEARNING MODELS BE MADE FAIR?

Presenter(s):   Nguyen, Han, Undergraduate, Information Technology

Mentor: Prof. Shanna Carlson

Authorship: Han Nguyen, Shanna Carlson

Artificial intelligence is increasingly used in law enforcement, with predictive policing models claiming to enhance crime prevention. However, these systems often inherit and amplify biases from historical data, disproportionately impacting marginalized communities. This research examines whether machine learning algorithms can be trained to mitigate bias while preserving predictive accuracy. Using real-world crime datasets, we develop a PyTorch-based predictive policing model, applying fairness-aware training techniques such as adversarial debiasing, reweighting, and bias-regularized loss functions and measure their impact. This study highlights the technical and ethical limitations of debiasing methods and raises critical questions about the role of AI in criminal justice.

NAVIGATING CRISIS COMMUNICATION: HOW UNDERGRADUATE STUDENTS PERCEIVE UNIVERSITY RESPONSE DURING CAMPUS EMERGENCIES

Presenter(s):   Obiri, Alfred Kwabena, Graduate, Communication

Mentor: Dr. John Baldwin

This study looks at how undergraduate students perceive and respond to university crisis communication during campus emergencies. The study takes a qualitative approach and investigates participants' experiences with institutional messaging, focusing on their preferences, problems, and the emotional impact of communication strategies. Semi-structured interviews with seven students showed themes such as the value of transparency, peer-driven safety measures, and the effect of location-specific clarity on message efficacy. The findings emphasize the dual nature of digital communication, in which rapid updates can both comfort and increase worry, as well as the importance of addressing equity and access disparities in digital platforms. Based on Situational Crisis Communication Theory (SCCT), the study emphasizes the need of adapting crisis communication to meet stakeholder demands and perceptions. These insights contribute to understanding effective strategies for fostering trust and engagement during campus emergencies.

Keywords: crisis communication, higher education, student perceptions, situational crisis communication theory (SCCT)

STUDENTS' PERCEPTIONS OF TEACHER-STUDENT RELATIONSHIPS AND HOW THESE RELATIONSHIPS MOTIVATE STUDENTS

Presenter(s):   Pappoe, Deborah, Graduate, Communication

Mentor: Dr. John Baldwin

This study investigated students' perceptions of teacher-student relationships and how these relationships motivate students in the classroom. Bowlby's (1979) attachment theory was used to explain how teacher- student relationships are developed and the form they take (positive or negative). The study uses in-depth interviews from a purposive sample of ten college students exploring how teacher-student relationships affect student motivation, particularly emphasizing communication styles, classroom environment, and the influence of positive and negative interactions. Thematic analysis of the interviews resulted in three themes: positive and negative teaching methods, the impact of teacher-student relationships on academic motivation, and out-of-class communication. The study offers insights into the nuances of teacher-student relationships and their impact on academic motivation in college classrooms.

PUBLIC RELATIONS CAMPAIGNS: STATE OF THE FIELD

Presenter(s): Quick, Alexis, Graduate, Communication

Mentor: Dr. Rebecca Hayes

Authorship: Alexis Quick, Rebecca Hayes, Maddie Wilson, Kate Mueller, Taylor Murray, Miriam Wolff

The public relations (PR) industry has evolved significantly in the past 10 years, but the instructional model for the capstone "campaigns course" has not. The same models and methods of campaign development have been emphasized for at least the past 25 years, with the RACE and ROPE models dominant. It is unknown whether those models actually map to current PR practice. This study, through in-depth practitioner interviews (N = 19) seeks to update understanding of how campaigns are developed across various PR settings. This knowledge informs recommendations for improving campaigns classes and strengthens academic-industry relationships.

Method

In-depth, semi-structured interviews were conducted with PR practitioners from different sectors (agency, corporate, non-profit, institutional), and transcripts were analyzed for emerging themes.

Results and Discussion

Key themes emerged, showing that while no universal framework exists, common approaches were identified. The themes identified are as follows:

Theory vs. Practice in Campaign Models: Professionals are aware of PR models (e.g., RACE, ROPE) but rarely use them explicitly. These frameworks serve as general guides for campaign stages but are adapted informally in practice.

Client-Centric Adaptations: Practitioners often adjust their approaches based on client needs, which may not align with textbook strategies. For instance, communicating complex models to clients is seen as impractical, prompting professionals to simplify ideas to fit client perspectives.

Collaborative and Iterative Development: Campaign development is a collaborative, iterative process with ongoing feedback from stakeholders, and does not follow the step-by-step approach of models.

Importance of Foundational Planning: Setting clear goals, identifying key audiences, and conducting preliminary research were emphasized as foundational steps in PR campaign planning. Professionals prioritized understanding the target audience, assessing what has worked in the past, and defining clear, measurable goals to ensure strategic direction.

Practical Use of Business Frameworks: Concepts such as the SMART approach (specific, measurable, achievable, realistic, and time-bound) were often cited as practical tools for campaign planning, offering a concrete method for setting and measuring goals. Though PR-specific models may not be followed explicitly, these tools provide a foundation for effective strategy formulation, and one better understood by non-PR clients and partners.

Implications for the campaigns course are varied. As the discipline of PR is further integrated with other promotional functions, the value of standalone PR campaigns models may be lessened and focus should be instead given to more general business models, such as SMART, to facilitate cross-area collaboration.

CHOOSING BOOKS: PERCEPTIONS OF AVID READERS

Presenter(s):   Reimers, Mackenzie, Graduate, Communication

Mentor: Dr. John Baldwin

Authorship: Mackenzie Reimers

Books are still a popular form of entertainment young people pursue even after they are required to for school. BookTok is a rising platform where readers are getting their recommendations and having conversations about books. The rise in book bans and need for diverse representation in media informs this study. To understand the reasons people read and what informs their reading decisions, Uses and Gratifications Theory is used as a theoretical framework. Eight avid readers participated in semi-structured interviews that were examined using thematic analysis. The findings were grouped into three main categories: reading habits, reading choices, and reading motivations.

FOLLOWING THE RULES? CASE STUDIES IN TECH INDUSTRY LAYOFFS

Presenter(s):   Roiland, Haley, Graduate, Communication

Mentor: Dr. Pete Smudde

Co-Mentor: Dr. Rebecca Hayes

This study examines the handling of recent layoffs at Twitter, now X.com, and Meta. It analyzes how the layoffs and the reasoning for them are framed when announced to internal publics and the media. The study utilizes thematic analysis of media coverage, company documents, and publicly available employee and public reaction in traditional and social media. A model for communicating layoffs based on the nature of the layoffs and organizational dynamics developed by Smeltzer and Zener (1994) is the basis for the analysis. Expected key findings should address the commonality in the framing of layoffs within the industry and showcase how the Twitter layoffs lacked many elements of the model and will compare and contrast the recent Meta layoffs. The differences in resulting controversy among employees and external publics and may be an outcome Twitter not following recommended models and communication processes for layoffs. Improper handling of organizational change can negatively impact an organization and its employees, so it is important to analyze and learn from past events that may have been mishandled.

THE WEAPONIZATION OF REALITY: A RHETORICAL ANALYSIS OF AN AI-GENERATED TRUMP DEEPFAKE

Presenter(s):   Wolff, Miriam, Graduate, Communication

Mentor: Dr. Joseph Zompetti

Authorship: Miriam Wolff

This rhetorical analysis examines an AI-generated political deepfake featuring Donald Trump with Black supporters, posted on Facebook by a conservative talk show host. Using Critical Discourse Analysis (CDA), this study interrogates the interplay of visual and textual elements within the synthetic image and its accompanying Facebook post to explore how AI-generated content can be weaponized exploit racial tensions, political divisions, and traditional family values. This analysis reveals how confirmation bias, motivated reasoning, and persuasive appeals—including pathos, ethos, and kairos—contribute to the deepfake's persuasive power. Additionally, this study considers the broader implications of AI-driven disinformation, particularly its potential to erode public trust in media, manipulate electoral discourse, and amplify polarization. This study underscores the evolving role of deepfakes in digital persuasion, emphasizing the need for ethical considerations in the age of AI-generated disinformation.

COMMUNICATION SCIENCES AND DISORDERS

EXECUTIVE FUNCTIONS AND MEMORY PROCESSES IN OLDER ADULTS WITH MILD HEARING LOSS

Presenter(s):   Beilstein, Kathryn, Undergraduate, Communication Sciences and Disorders
Turner, Juliana, Undergraduate, Communication Sciences and Disorders
Kirkham, Camryn, Graduate, Communication Sciences and Disorders
Cavanagh, Grace, Graduate, Communication Sciences and Disorders

Mentor: Dr. Shraddha Shende

Authorship: Kathryn Beilstein, Juliana Turner, Camryn Kirkham, Grace Cavanagh, Shraddha Shende

Current research has identified age-related hearing loss (ARHL) as a modifiable risk factor for dementia. Consequentially, the relationship between hearing loss and cognition warrants further investigation. To date, studies have thoroughly examined a few cognitive functions, including attention and speed of processing. However, a comprehensive examination of various cognitive functions, including executive function and memory, has not been explored in older adults with mild to moderate ARHL. To address this gap, the current study examined executive functions and memory processes, specifically working memory and semantic memory in 20 older adults. Specifically, 10 older adults with mild hearing loss (OAMHL) and 10 older adults with normal hearing (OANH), all aged >55 years, were included in the study. We also determined participants' perceived Listening Effort, using an Effort Assessment scale. To assess executive function performance, the National Alzheimer's Coordinating Center Trail Making Test (TMT) Parts A and B and the Delis-Kaplan Executive Function System (D-KEFS) Stroop Task were administered. Additionally, the National Alzheimer's Coordinating Center Forward and Backward Digit Span tests were administered to assess working memory performance. To assess semantic memory, the D-KEFS verbal fluency tests were administered to evaluate the ability of participants to recall words within a given category. Analyses of the data are ongoing. Results will be presented at the time of the symposium.

DEMOGRAPHICS OF PEDIATRIC DYSPHAGIA IN A TERTIARY HOSPITAL IN SOUTH KOREA

Presenter(s):   Churchey, Jenna, Undergraduate, Communication Sciences and Disorders

Mentor: Dr. Taeok Park

Authorship: Jenna Churchey, Taeok Park

Dysphagia is a medical diagnosis meaning swallowing difficulty. A compromised swallowing process greatly impacts feeding and nutritional intake, which inhibits pediatric growth and development. Since the prevalence of dysphagia diagnoses within the pediatric population has been increasing, research is critical to understanding pediatric dysphagia. The purpose of this study was to examine the demographic characteristics of pediatric patients with dysphagia including etiologies and management through tube feeding. Moreover, the study investigated the presence of oropharyngeal dysphagia and aspiration through videofluoroscopic swallow studies (VFSS). The cross-sectional study was conducted between January 2011 and December 2018 at Seoul National University Hospital. The medical records of 200 patients who were referred to the VFSS, aged from 0 to 5-years-7-months, were utilized to analyze demographic characteristics, frequent etiologies, rates of dysphagia diagnoses, presence of aspiration, and prevalence of tube feeding as the method of nutritional intake. In the results, the most frequent etiologies were neurological disorders (37%.0%), genetic conditions (24.5%), and a mix of etiologies (18.0%). Other etiologies were anatomical abnormalities related to swallowing (5.5%) and cardiorespiratory disorders (8.0%). Further, 7.0% of patients were diagnosed with dysphagia without a medical diagnosis. From the VFSS data, dysphagia diagnoses predominated (81.5%), and the majority of the patients did not aspirate (61.0%). Further, a significant amount of the population was reliant on tube feeding for nutritional intake (45.5%), and another portion of the population was partially by mouth and tube feeding (14.0%). The cases of pediatric dysphagia are intricate due to complicated etiologies, comorbidities, and challenges as well as the high prevalence of tube feeding as the method for nutritional intake. Their etiology is often accompanied by other difficulties such as poor motor skills and cognition. Interdisciplinary team approaches are vital for gaining a well-rounded understanding of diagnoses and intervention strategies.

SWALLOWING DISORDERS IN CHILDREN

Presenter(s): Dyrby, Ellenie, Undergraduate, Communication Sciences and Disorders

Smith, Chloe, Undergraduate, Communication Sciences and Disorders

Campbell, Carene, Undergraduate, Communication Sciences and Disorders

Mentor: Dr. Taeok Park

This study aimed to investigate swallowing disorders in the pediatric population. A review of the literature and a case study were performed. Swallowing disorders (dysphagia) are swallowing difficulty or discomfort while transferring food or liquid from the mouth to the stomach. Common signs and symptoms of dysphagia can occur in the oral, pharyngeal, or esophageal stage. For example, poor sucking, delayed swallowing initiation, oral motor delays, aspiration, and laryngeal penetration are observed. For the evaluation, the clinical bedside exam is performed to determine further evaluation. The two types of instrumental evaluations commonly used are the Fiberoptic Evaluation of Swallowing (FEES) and a Videofluoroscopic Swallow Study (VFSS). The speech-language pathologist (SLP) plans the intervention based on the results of the swallowing evaluation.

For the case study, the patient included a 9 year, 6-month-old male who has a diagnosis of cerebral palsy. He experienced an onset of dysphagia at birth and currently uses a gastrostomy tube for feeding. Our patient participated in a videofluoroscopic swallow study. A 2 ml thin liquid and a 5 ml thin liquid were presented to the patient by the SLP. In the results, after the 2 ml thin liquid was swallowed, there was residue in the pharynx, vestibule, esophagus, oral cavity, and back of the tongue. Aspiration and penetration were present and there was no sign of a cough. After the patient swallowed the 5 ml thin liquid, there was residue in the valleculae, vestibule, epiglottis, upper esophageal sphincter, and the back of the tongue. Aspiration was present but there were not any signs of coughing.

Speech Language Pathologists play an important role in assessing and treating swallowing disorders. Additionally, SL provides support for the child's nutrition and development. It is important to be aware of the signs of dysphagia in children so the clinician and families can help support the needs of the child.

Early detection of dysphagia can lead to early intervention strategies to help improve feeding safely and enhance their quality of life. When working with a pediatric population with a complex medical condition, it is common for an interdisciplinary team made of SLPs, occupational therapists, physical therapists, and physicians all work together with children who are more at risk of having complications.

EXPLORING THE INTERSECTION OF ART, TECHNOLOGY, AND NATURE: THE WORK OF HAYK ZAKOYAN

Presenter(s):   Akter, Tonmoy, Graduate, Creative Technologies

Mentor: Kristin Carlson

Authorship: Tonmoy Akter

The multifarious artistic path of eminent Yerevan, Armenia artist Hayk Zakoyan is investigated in this paper. Deeply attached in his Armenian background and motivated by the natural environment, Hayk's work is known for its creative mix of art, technology, and music. Hayk deftly combines sound, images, and emotions as a Media Artist, Visual Artist, NFT Artist, Lighting Designer, and Music Composer to provide immersive and provocative events. The paper explores Hayk's early inspirations, his change from visualizing soundscapes to creating dynamic visual representations, and his use of cutting-edge technology including Python, GLSL, and proprietary sound analysis tools. It also looks at his unique grayscale palette and lighting design experience, which turns live events into mesmerizing visual extravaganz. By conducting a comparison examination with other modern artists such as Mikael Alafriz, the paper emphasizes the special features of Hayk's work and his contributions to the modern art scene. Hayk asks viewers to interact personally with his artwork by reinterpreting natural events via an abstract lens, therefore providing a fresh viewpoint on the beauty and complexity of nature.

THE LIFE OF A ENGINEER (GERALD LAWSON)

Presenter(s):   Cousin, Jaden, Undergraduate, Creative Technologies

Mentor: Dr. Jody Decremer

Gerald Lawson is the developer of Channel F, the very first console ever created. Along with being the first console that changed the video game world completely. The Fairchild was the very first console to ever use a cartridge and because of this creation such systems we know today like the Xbox and PlayStation were developed. His creation gifted inspiration onto those who inspire to make games a blessed those who always had to travel to play games the gift of just staying home and playing it on their TV or Mini system in their hands.

A BOARD GAME APPROACH TO CLIMATE CHANGE EDUCATION AND ADVOCACY

Presenter(s):   Islam, Jubair, Graduate, Creative Technologies

Mentor: Kristin Carlson

Climate change is a critical global challenge that demands urgent and collective action. Despite widespread awareness, a significant gap persists between understanding the issue and taking meaningful steps toward mitigation. "EcoQuest," a purposefully designed board game, addresses this gap by leveraging gamification to educate and inspire players about climate change. Through immersive gameplay, players engage with real-world scenarios, explore interconnected environmental challenges, and develop an action-oriented mindset. This research investigates EcoQuest's effectiveness as an educational tool, analyzing its components, mechanics, and impact on players' awareness and motivation. Using qualitative methods— including pre- and post-gameplay questionnaires and ethnographic observations—the study assesses changes in participants' knowledge, engagement, and attitudes. Preliminary findings reveal that EcoQuest not only introduces essential climate change terminology and concepts but also fosters deeper understanding and empathy. Players reported heightened motivation to adopt sustainable practices and advocate for systemic change. These results underscore the potential of gamified approaches like EcoQuest to bridge the perception-action gap and catalyze broader participation in climate advocacy. This study contributes to the growing discourse on gamification in education, offering innovative pathways to address one of the most urgent issues of our time.

ENHANCING CLIMATE CHANGE AWARENESS IN CHILDREN THROUGH AUGMENTED REALITY: A STUDY ON EDUCATIONAL ENGAGEMENT

Presenter(s):   Islam, Jubair, Graduate, Creative Technologies

Mentor: Kristin Carlson

Co-Mentor: Annie Sungkajun

As the need to address climate change becomes more urgent, introducing children to environmental conservation has become increasingly important. This thesis explores how augmented reality (AR) technology can turn traditional storytelling into an exciting and educational experience to help children learn about climate change. *Sam and Mia's Earth-Saving Adventure*, a 10-page graphic storybook enhanced with AR, allows children aged 3-10 to interact with the story through animations, sound effects, and quizzes that respond to their choices. Developed using Adobe Aero, the book creates an immersive and fun way for children to engage with environmental topics.

The study will employ a combination of methods: ethnographic observations will capture children's engagement during AR interactions, and their performance in a quiz will be quantitatively analyzed to measure comprehension and retention. While the research is still in progress, the study aims to explore how AR-infused storytelling can captivate young learners and enhance their understanding of climate concepts. The goal is to assess whether children demonstrate excitement, curiosity, and an improved ability to recall and apply environmental lessons from the story.

By combining immersive technology with playful education, this study seeks to provide insights into innovative approaches for early childhood learning, emphasizing the potential of AR to inspire a generation of environmentally conscious individuals.

ADVANCING GENDER EQUALITY AND EMPOWERING WOMEN IN STEM IN LATIN AMERICA

Presenter(s):   Olaya Karen, Graduate, Creative Technologies

Mentor: Dr. Kristin Carlson

Authorship: Karen Olaya

Women across Latin America are making significant strides in STEM fields, yet structural and cultural challenges continue to limit their full participation. Gender stereotypes, unequal access to education, and limited mentorship opportunities create barriers that affect women's advancement in science, technology, engineering, and mathematics. This research explores these challenges and highlights successful initiatives across the region that are fostering inclusion and empowerment. By examining education reforms, mentorship programs, and policy interventions, this study identifies effective strategies to increase female participation in STEM. Strengthening professional networks, promoting equitable hiring practices, and addressing societal biases will help create a more inclusive and innovative STEM workforce. This research contributes to the ongoing efforts to advance gender equality and offers practical recommendations for educational institutions and policymakers seeking to support women in STEM across Latin America.

MOVEMENT FREEDOM EXPLORATION EXPERIENCE

Presenter(s):   Villalobos, Samuel, Undergraduate, Creative Technologies
                Tunberg, Michael, Undergraduate, Creative Technologies
                Sears, Nicholas, Undergraduate, Creative Technologies
                Wanda, Devin, Undergraduate, Creative Technologies

Mentor: Dr. Greg Corness

The Movement Freedom Exploration Experience (MFEE) looks at the building of a customizable low-cost full body movement controller for application in games, simulations, and other digital environments. The focus of this project lies in two aspects of the concept of freedom. First, we are interested in the idea of using free full body motion to control movement in a virtual environment. This has been developed as a commercial product; however, we are interested in the ability to customize such controllers to reflect our own game designs.

Second, we are interested in working to develop a template for others to create this type of controller. We want to show that no matter the project, if a small group of people can start a project together then anything, even a wide scale custom controller on a budget, is possible. The project shows the possibility for small development teams to explore the relationship between the mechanics of the game and the design of custom controllers. We are exploring this area to show that anyone with the right motivation can accomplish this goal of making a custom controller.

SEEKING EMPATHY, SELF-AGENCY, AND WELL-BEING IN COLLEGE: A LITERATURE REVIEW

Presenter(s):   Schaack, Nick, Graduate, Educational Administration

Mentor: Dr. Marci Rockey

College is a remarkably unique educational experience that exposes students to new challenges, perspectives, and ideas: learning how to live with a roommate, appreciating the importance of communication and transparency, making self-guided choices as a student and as an adult, remaining sensitive to individuals with different life-style preferences, learning how to approach difficult conversations centered on social issues both in and outside the college classroom, and learning how to integrate a sense of "self-care" into everyday life. As students
navigate their college journey, a plethora of thoughts, realizations, and emotions surface, which affect how certain actions are taken in different spaces across a college campus. Affecting not only college students individually, but others, too. In this moment, college campuses across the United States—especially four-year public universities—are responding to an on-going pattern of mental health concern, student behavioral concern, and changes in student engagement. In this extensive review of literature published between 2010 and the present, findings centered on how increasingly racially and ethnically diverse populations of undergraduate students acquire empathy, self-agency, and well-being is shared. In addition, implications for professional practice in specific college student affairs functional areas— including residential life, student activities, student conduct, and sorority & fraternity life—at four-year public universities in the United States are highlighted. This work is carefully and intentionally approached with college student development in mind, which represents scholarship grounded in theories asserting how college students transition, grow, reflect, develop, and acquire necessary skills and knowledge to persist and succeed.

BRIDGING VOCABULARY INSTRUCTION AND ASSESSMENT IN GHANA'S WASSCE

Presenter(s):   Neequaye, Ishmael, Graduate, English

Mentor: Prof. Kristina Lewis

The West African Senior Secondary Certificate Examination (WASSCE) is a high-stakes exam administered across five English-speaking West African countries: Ghana, Nigeria, Gambia, Sierra Leone, and Liberia. In Ghana, the WASSCE English paper, written by Senior High School (SHS) students, serves as a crucial gatekeeper for higher education.

For over a decade now, students' performance in the English paper has been described as "not good enough" or "below expectation" by Chief Examiners' Reports (2013, 2020, 2021), with multiple reports suggesting that students' limited vocabulary knowledge may be a causal factor (Chief Examiner's Report, 2011–2021). Despite this claim, there is a dearth of scholarship on vocabulary acquisition in Ghana or on factors influencing students' performance in the WASSCE. As a former WASSCE candidate and English Language Teacher, I am motivated to conduct research that delves into these issues, bridging the gap between assessment practices and teaching methodologies, with implications that extend beyond Ghana to other multilingual and exam-centric contexts.

Thus, in my ongoing MA thesis, I use qualitative methods to examine how Ghanaian SHS English Language Teachers prepare students to meet the vocabulary demands of the WASSCE and how the exams inform their instructional practices. To investigate the interplay between exam-driven teaching and the broader goals of language education in a globalized, multilingual context, I utilized two theoretical frameworks: Communicative Competence and Multiliteracies. In addition to grammatical, sociolinguistic, discourse, and strategic competencies, the Multiliteracies Framework provides an expanded perspective, emphasizing cultural, linguistic, and multimodal diversity in literacy practices.

My preliminary findings suggest that the exam emphasizes traditional vocabulary breadth (e.g., synonyms, antonyms, and contextual word use), with limited integration of multimodal or culturally diverse literacy practices. The teachers I have interviewed report focusing on test-taking strategies and surface-level vocabulary knowledge, often at the expense of deeper and more comprehensive literacy development. This disconnect between multiliteracy principles and the impact and focus of the WASSCE raises important questions about how pedagogical practices can better prepare students for both high-stakes exams and real-world communication.

In this presentation, I will share my preliminary findings. Symposium attendees will: (1) gain insight into the specific vocabulary demands of the WASSCE; (2) explore challenges teachers face in aligning instruction with assessment demands; and (3) discuss strategies for integrating multiliteracies into

vocabulary instruction to balance exam preparation with holistic language development. This research seeks to provide practical recommendations for improving equitable and effective language teaching in high-stakes settings.

SIZE MATTERS: AN ANALYSIS OF SIZING OF WOMEN'S JEANS ACROSS 96 BRANDS

Presenter(s):   Schunke, Ellie, Undergraduate, Family and Consumer Sciences

Mentor: Dr. Yoon Jin Ma

This study explores the sizing of denim jeans across popular women's fashion brands, focusing on how these brands are addressing body diversity, inclusivity, and accessibility in their jean offerings. The fashion industry, particularly the denim category, has seen a rising demand for more inclusive sizing options in recent years. It is critical to assess how brands are catering to the needs of women of various body types. Traditional sizing systems have overlooked the diversity of women's shapes and sizes. Although brands are starting to respond to this demand, many still struggle to provide a wide range of sizes that fully accommodate diverse body types. With limited sizing systems failing to represent all body types, challenges are created for women who do not fit into the narrow categories of "regular" sizes. This can lead to dissatisfaction and exclusion, and even cause body image issues. With inclusivity becoming a key concern, it is important to understand whether brands' sizing practices reflect the diversity of their consumer base. Therefore, this study aims to provide insights into how brands are responding to sizing needs by evaluating size ranges, body type offerings (petite/plus), and inseam lengths (short/tall). The data was drawn from YouGov's "Most Popular Clothing & Footwear Brands," which ranks clothing and footwear brands based on consumer popularity in Q4 2024. From their initial pool of 196 brands, the focus was narrowed to 96 brands that offer women's jeans, and their size charts were thoroughly analyzed. The findings will shed valuable insights into how brands can improve inclusivity, providing a guideline for making denim more accessible and empowering for women of all shapes and sizes.

CONTENT ANALYSIS OF THE PORTRAYAL OF GENDER ROLE THROUGH DRESS AND ACTIVITIES IN CHILDREN'S LITERATURE ACROSS DECADES

Presenter(s):   Schunke, Ellie, Undergraduate, Family and Consumer Sciences

Mentor: Dr. Yoon Jin Ma

More recent children's books show a shift toward diverse gender expressions, with characters of all genders wearing a wider range of clothes and engaging in various activities. This study explored how gender stereotypes are depicted in children's picture books from the 1930s to the 2020s, focusing on the relationship between clothing, activities, and gender roles. By analyzing the visual representation of boys and girls in popular children's books, how clothing choices and behaviors align with traditional gender norms was examined. Specifically, the following questions were addressed: (1) How are children's clothing choices linked to their activities and behaviors in images? Are girls often shown participating in more passive or nurturing activities, while boys are depicted in more active or adventurous roles? (2) Do the clothing choices of young boys in children's books reflect traditional masculinity? (3) Do the clothing choices of young girls in children's books reflect traditional gender stereotypes? A content analysis of 50 images from books spanning multiple decades revealed that earlier publications reinforced rigid gender roles. Girls were typically portrayed in passive, nurturing roles, while boys were depicted as active and adventurous. Girls often appeared in pink, neat clothing, while boys wore blue and engaged in rough play. Literature has increasingly begun to feature characters with diverse clothing choices and illustrations that blur traditional gender lines, challenging traditional gender stereotypes. This shift reflects broader societal changes, including evolving views on gender roles. The findings suggest that while traditional gender roles still appear, there is more diversity in children's books today, which can help shape children's social development and how educators approach gender in the classroom.

GUADALUPE MOUNTAINS EROSION: TRACING THE ORIGIN AND EVOLUTION OF STREAM CHANNEL SEDIMENTS

Presenter(s):   Jacob, Aaron, Undergraduate, Geography, Geology, and the Environment

Mentor: Dr. Lisa Tranel

Authorship: Aaron Jacob, Lisa Tranel, and Ella Xu

Spatial patterns of erosion are influenced by factors including rock type, rock strength, climate, tectonics, and surface processes. Tracing erosion patterns and identifying erosion controls help to answer a few questions on landscape evolution. The purpose of this research is to trace apatite mineral origins along stream channels and determine tectonic controls on rock type and hardness. This work also evaluates how stream sediments change over time from weathering, in both active channels and related terraces. We propose three hypotheses. First, we predicted that most apatite grains are from easily eroded bedrock. Second, we expect coarse-grained sandstones to yield larger apatite grains. Third, we hypothesize that gravels in active channels will be smoother from abrasion compared to semi-stationary coarser grains found in terraces influenced by chemical weathering. First, we determined quantity and quality of apatite minerals in different rock units for dating with (U-Th)/He methods, in which cooling age is affected by inclusions, zonation, and mineral sizes. The research also assessed gravel size and roughness of active and past deposits based on dimensional measurements and contour gage variability. Most recovered apatite minerals (95%) were anhedral, coarse or rounded. The mean diameter of apatite grains across six samples so far was 96.64 microns, above the optimal threshold of 70. We conducted a preliminary assessment of gravel smoothness using the Krumbein roundness scale. Sandstones in an active channel were more rounded (mean roundness of 0.6) than limestones (mean roundness of 0.4). Limestone gravels in the active stream channel were more rounded than limestone gravels in terraces (mean roundness of 0.2 and 0.3). Ongoing research will provide better understanding of spatial patterns of erosion throughout the uplift history of the Guadalupe Mountains. Understanding past erosion in historic conditions is the key to understanding potential future change.

ASSESSING GLACIAL MASS CHANGE AND ITS IMPACT ON WATER RESOURCES IN PARTS OF THE HIMALAYAS USING SATELLITE REMOTE SENSING

Presenter(s):   Panta, Kriti, Graduate, Geography, Geology, and the Environment

Mentor: Dr. Wondwosen Seyoum

Climate change is accelerating glacier depletion in the Himalayas, significantly affecting water availability and balance in Nepal. Rising temperatures and shifting precipitation patterns contribute to rapid glacier retreat, altering the seasonal flow of glacier-fed rivers and increasing the risk of glacial lake outburst floods (GLOFs). This study investigates the long-term changes in Nepal's glaciers, focusing on their impact on hydrological systems. Using remote sensing data, including GRACE satellite observations, and climate records, the research analyzes trends in glacier mass loss and surface water variations. The study highlights the critical role of glaciers in sustaining water resources for drinking, agriculture, and hydropower, especially during dry seasons. Findings will provide insights into the long-term implications of glacier retreat on water security, informing climate adaptation strategies and regional water management policies.

MAPPING LATE ANTIQUE VILLAS

Presenter(s):   Cordray, Brooke, Undergraduate, History

Mentor: Dr. Kathryn Jasper

Historical and archaeological research on Late Antique Villas is minimal but can be telling of European life during and after the Roman Empire. Often, these villas have multiple lives, transitioning into sites of production, religion, or centers for villages. Recent excavations at the Valle Gianni archaeological site suggest a rural villa but have not revealed any signs of a post-life transition. Instead, deposits of expensive marble and tesserae indicate abandonment and possible squatter activity. If similar sites throughout Italy present evidence of abandonment and squatting, they may suggest a much more rapid fall of the Roman Empire than currently believed. By mapping late antique villas with no sign of transformation, we can look for patterns which may give insight to when, where, and why some luxury buildings throughout modern-day Italy were abandoned while others flourished.

USING DATA TO ANALYZE MARBLE TRENDS IN THE ROMANO-BRITISH FRONTIER

Presenter(s):   Fried, Amalie Undergraduate, History

Mentor: Dr. Kathryn Jasper

Emperor Diocletian formed a fixed-rate economy in the year 301 CE. Using the Edict of Maximum Prices, which tells general prices around the year 300 CE, I have mapped the Roman marble quarry sites. Mapping these dig sites and knowing the estimated price value associated with different marbles raises a question of cultural significance and the use of marble. To navigate this, we are studying the significance of different marbles in the British frontier of the Roman Empire by focusing on the use and reuse of marble in villas.

APPLYING MACHINE LEARNING MODELS TO PREDICT BRIDGE CONDITIONS

Presenter(s):   Achammer, Ben, Undergraduate, Mathematics

Mentor: Dr. Mangolika Bhattacharya

Co-Mentor: Dr. Sally Xie

Authorship: Ben Achammer, Mangolika Bhattacharya, Sally Xie

Ensuring the safety of highway bridges requires continuous monitoring and updating. The current method used by the U.S. Department of Transportation simplifies bridge attributes into a few categories, averages them, and classifies bridges as "good," "fair," or "poor." This method fails to capture the complexity and interconnectivity of these attributes. By applying machine learning, we can better understand influential factors and patterns, leading to more accurate and efficient predictions.

In the first part of this project, we developed a Graphical User Interface (GUI) to visualize the extensive National Bridge Inventory (NBI) dataset, using dot plots to represent each bridge as a discrete entity. Tooltips provide identifying information for each bridge. The second part visualizes the results of various machine learning models used to predict bridge conditions, each with its own accuracy. Additionally, a separate heatmap of traffic, climate, and temporal attributes was constructed to visualize correlations between these bridge attributes.

The second part of the project experimented with applying machine learning models to the data, with the goal of creating a model that can reliably predict a bridge's condition based on only a subset of the attributes documented. Such models included logistical regression, decision tree, random forest, xgboost, and artificial neural networks using the scikit-learn library. Illinois bridges from the NBI dataset were explored first, and this process would later be repeated on New York bridges. From these Illinois bridges, a subset of traffic, climate, and temporal attributes were selected. The data subset was then cleaned, addressing any missing data. The majority of entries in this data subset were used in training these models, while the remaining were reserved for testing purposes. The bridge condition predictions of these models were then compared to the test data to judge each model's effectiveness.

IOT WEATHER REPORTING SYSTEM

Presenter(s): Bello, Ahmed, Graduate, Information Technology

Mentor: Dr. Elahe Javadi

Authorship: Ahmed Bello

This study synthesizes generative AI models and Internet of Things (IoT) tools to improve the accessibility of smart home applications for people with varying levels of visual abilities. Specifically, I use a DHT11 sensor to collect temperature and humidity data and transfer the data over serial communication to the computer, where that information is read to the user, removing the need for any additional screen-reading tools. I use a generative model named Edge Text-to-Speech that enhances my thermostat's versatility for users with different spoken languages across the world. This project has the option to record the data and make it accessible via a web interface, allowing real-time monitoring and data visualization. I investigate and report on the performance of the model using regular processors only. I also outline pathways through which my peers at Illinois State University can innovate with generative AI and IoT pipelines using open- sources models and platforms.

AI MUSICAL DEVELOPMENT

Presenter(s):   Beltran Sanchez, Bridgette, Undergraduate, Information Technology

Mentor: Prof. Elahe Javadi

Authorship: Bridgette Beltran Sanchez

Creating music can involve various challenges. One of those challenges can be players' instrumental ability, or in other words, their varying skill levels on different instruments. While a user may be able to come up with melodies and music ideas, there may be a limitation in this creative process, where the user can only generate their music with their voice or a limited set of instruments. This project utilizes generative AI to remove the obstacles caused by a lack of instrumental experiences by optimizing general vocal input and finding suitable instrumentation to complement the track. The player can provide a general mood for the song, such as "energetic" or "melancholy," to define their vision for the creative process, which AI will utilize as an initial point to suggest matching instrumentation. Additionally, audio emotion detection models such as HuggingFace's Wav2Vec2 will be used to further identify tone, pitch, and emotional elements and suggest instruments that align with the specific mood. For example, if the input is recognized to be soft and melancholic, the model will supplement the track with matching instruments such as piano and orchestral arrangements. The player using the system can indicate desired sound effects or instruments, such as "include synth" or "include rain effects" to define preferences. Lastly, the user may select a different song as a reference to incorporate similar patterns into the generated song with models such as MusicGen on HuggingFace. This research project also assesses and reports on the generative AI capabilities that allow a vocal track to be further developed with instrumentation.

LEVERAGING THE POWER OF ARTIFICIAL INTELLIGENCE IN PHYSICAL APPLICATIONS

Presenter(s):   Benard, Charlie, Undergraduate, Information Technology
                Perhay, Alex, Undergraduate, Technology

Mentor: Dr. Elahe Javadi

Co-Mentor: Dr. Jeritt Williams

As the power of artificial intelligence (AI) tools increases, applications in which intelligence manifests itself in the physical world will thrive. The research of Physical AI (Li et al., 2021), sometimes called embodied AI (Liu et al., 2024), focuses on the models that enable such applications. Physical AI refers to the integration of artificial intelligence into physical systems, enabling these systems to perceive and intelligently interact with the physical world (Li et al., 2021; Xu et al., 2023). Physical AI leverages advanced AI algorithms and computational systems to enable physical agents to sense their environments, learn from interactions, adapt to dynamic contexts, and take action.

This research proposal aims to evaluate the behaviors of Koch v1.1 when using an open-source pre-trained Diffusion Policy. Diffusion Policy is an application of Diffusion Probabilistic Models (DPMs) (Ho et al. 2020) in the Reinforcement Learning (RL) context. Reinforcement learning (RL) is the type of learning achieved in an environment through feedback. Diffusion Policy in the Koch v1.1. robotics arm will generate feasible action sequences by modeling temporal dependencies between the actions. Training of such models has been accomplished using datasets of expert demonstrations or trajectories available in the AI literature. We use Hugging Face's open-source robotics framework, LeRobot. LeRobot provides state-of-the-art models, datasets, and tools for real-world robotics applications. The primary objective is to evaluate and enhance the Koch v1.1 arm's capabilities to execute tasks such as object manipulation and sorting, and we will share insights into potential pathways for our peers to engage in AI and Physical AI training, evaluation, and applications.

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DUNGEN CRAWLER

Presenter(s):   Davis, Jordan, Undergraduate, Information Technology

Mentor: Dr. Elahe Javadi

Authorship: Jordan Davis

As generative AI becomes more well-established, the landscapes of both technology and creative mediums shift, and new paradigms are created every day. The intersection between these two bubbles, video gaming, benefits the most from these developments and has a plethora of untapped ideas left to explore. With this project, I aim to bridge the gap between old gaming and new technology by developing a game styled like old text-based RPGs powered by generative AI.

This project involves using GradioDungeon developed by Hugging Face user VamooseBambel, and fine- tuning it to work within a new, fully developed world that users can interact with in deep, thoughtful ways that could not be accomplished with the technology of decades past. Players will be able to shape their world line by line, with each interaction changing their reputation, interactions, and abilities. I will investigate and report the efficacy of this model in this context.

NLTEXT2SQL

Presenter(s):   DeGeare, Nolan, Undergraduate, Information Technology

Mentor: Prof. Elahe Javadi

Authorship: Nolan DeGeare, Elahe Javadi

Interacting with databases often requires knowledge of SQL, which can be a barrier for users unfamiliar with query languages. This project addresses this challenge by translating Natural Language (NL) into Structured Query Language (SQL). This project aims to allow users with no SQL knowledge to query a database and find specific information with just normal English sentences.

This project creates and investigates the performance of a generative AI application that uses open-source pre-trained models (e.g., gaussalgo/T5-LM-Large-text2sql-spider) available on Hugging Face. The currently available models can process a user statement and generate the SQL query to it, along with logging the request and what is returned. The dataset used for testing contains NBA player statistics from 1980-2022 and is stored in an SQLite database. Users can input requests such as "Select the college that the most players went to" or "Select the player with the highest point average" and receive a properly formatted SQL query to retrieve the relevant data.

This project involves prototyping the application and examining the methods for improving efficiency. Furthermore, the research will explore and report on enhancing the usability of the application by enabling users' requests to be closer to plain English than using keywords and standards of the Structured Query Language.

SO-100 WITH LEROBOT

Presenter(s):   Jain, Neer, Undergraduate, Information Technology

Mentor: Dr. Elahe Javadi

Co-Mentor: Dr. Jeritt Williams

This research explores the application of artificial intelligence in robotics, specifically through the use of the LeRobot framework. LeRobot offers cutting-edge AI models, datasets, and tools that facilitate the integration of imitation learning and reinforcement learning into real-world robotic systems. In this project, we focus on using these AI techniques to develop a robotic arm, leveraging pretrained models and human-collected demonstration datasets. The goal is to showcase how AI can enhance robotic performance, enabling more intuitive and adaptable behavior in real-world settings. By utilizing simulation environments and minimizing the need for physical robots, we demonstrate the power of AI in streamlining robotic development and lowering the barrier to entry for AI-driven robotics. This project emphasizes the potential of AI to revolutionize the field of robotics, enabling scalable and efficient solutions across various domains.

ARDUINO AS A DMX FIXTURE

Presenter(s):   Johanson, Hunter, Undergraduate, Information Technology

Mentor: Dr. Elahe Javadi

Currently, the Digital Multiplex 512 (DMX512) protocol is primarily used for stage and architectural lighting systems because of its ability to transfer multiple lighting parameters over a long distance. This project aims to repurpose and integrate this widely adopted protocol to control non-lighting hardware such as motors. Using an Arduino microcontroller integrated with a DMX transceiver enables precise, low-latency control over motor speed, position, and coordination in real-time environments. The system's flexible design allows for easy adaptation to many different applications, ranging from automation to industrial control and interactive installations. Depending on the design, such a system will be capable of executing complex motion sequences and synchronizing multiple actuators simultaneously, making it an excellent candidate for designing dexterous robotics arms.

This project investigates and showcases platform supports for the seamless integration of multiple DMX- based systems for novel automation use cases. By reimagining the traditional role of the DMX protocol, this project lays the foundation for future hardware interfacing solutions that increase both functionality and efficiency in modern, already-installed control environments.

AI AGENTS FOR STUDENT TIME MANAGEMENT

Presenter(s): Lucer, Szymon, Undergraduate, Information Technology

Mentor: Dr. Elahe Javadi

Authorship: Szymon Lucer

Juggling various responsibilities can prove to be challenging for many students. This project investigates open-source generative AI models to optimize a student's time management by creating unique schedules tailored to their needs. Students provide their background information about their weekly responsibilities, including classes, homework, extracurricular activities, job duties, and habits. Using this information, the program creates a personalized schedule that covers the days of the week on which to focus on specific tasks. Using AI agents and Google Calendar's API, students have the schedule updated to their Google account's Calendar service, allowing for interaction on multiple devices. The project compares and reports the performance of the tool using two open-source models. The research provides insights into the application of current AI models for enhancing students' time-management capabilities.

AI IN HEALTHCARE ROBOTICS

Presenter(s):   Malagoni, Meghana, Graduate, Information Technology
                Uppunuthula, Sankeerthan, Graduate, Information Technology
                Rayan, South, Graduate, Information Technology
                Sribuaai, Suphasit, Graduate, Information Technology

Mentor: Dr. Will Lewis

In microsurgery, artificial intelligence (AI) robotics can safely perform small tasks or assist doctors in more complex tasks, providing an invaluable tool for medical professionals. However, while small advancements, such as improved precision and flexibility, have been achieved, the larger goal is to develop AI-controlled machines that can perform full surgeries independent of human interaction.

Fully independent robotic surgery would open a gamut of possibilities for consistent healthcare worldwide. The state of these robots is still experimental, but tests are being conducted for complex tasks such as suturing, hair implantations, total knee replacement, and cochlear implants. Once achieved, fully autonomous robotic surgery could have substantial impacts on the medical field. The robot could be used for surgeries in rural areas where hospitals are few and far between. They could also be used in war zones to help in areas where it would be dangerous for humans to reach.

One challenge to this goal, in the form of real-time analysis of complications during surgery. Human bodies are incredibly complex and complications can arise in surgery at a moment's notice. The issue is that AI is systematic and follows procedures step by step. The purpose of this descriptive study is to identify and explore the areas where AI will have to be developed and improved in order to achieve fully autonomous robotic surgery.

AUDIO FILE TO GUITAR TAB AI

Presenter(s):   Mccaslen, Aiden, Undergraduate, Information Technology

Mentor: Dr. Elahe Javadi

This project's goal is to use generative AI models to transform audio or video files into a playable guitar tab, which is basically a simplified guitar music sheet. The project prototype will accomplish this by using an open-source model available on Hugging Face to extract the audio file into a spectrogram, which can then be analyzed. Throughout this project, I will investigate separating the audio files first so that the AI model analyzes only the guitar part of a song as opposed to getting the frequencies from the whole song to avoid confusing the AI. Specifically, the AI can look at the frequencies shown in the spectrogram and use the data collected to translate them into notes that should be played for that respective frequency. Once the AI model has the notes, the pipeline becomes a simple translation into the guitar tab itself. I have identified candidate models and datasets of about 1.11k songs with descriptions to feed to the model so that it learns a variety of songs, which will lead to the ability to request a certain genre of song to find/ create and then generate the tab off of that as well. I will investigate and report on the performance of the model. This research project will showcase possible applications of and challenges related to the use of generative AI for audio classification.

TIME UTILIZATION OPTIMIZER

Presenter(s):   McCue, Brady, Undergraduate, Information Technology

Mentor: Dr. Elahe Javadi

The Schedule Optimization/Time Utilization Optimizer project seeks to lighten the tedious task of scheduling for busy individuals, primarily students. I want to provide students with the help they require to optimize their current schedule or give guidance to determine their plan of action for their future semesters. However, it will be able to create restrictions depending on any given set of events, so it can be useful to any individual who is required to keep an organized and timely schedule. By utilizing user- provided inputs such as class schedules, professor office hours, and required events, this tool will optimize daily schedules to maximize time efficiency. Using open-source large language models such as Mistral-7B- v0.1 model, fine-tuned with LoRa for efficiency, the tool will create .csv files containing relevant data, which will be processed using Pandas to generate required time slots. The system will allow adjustments and non-repeating events, ensuring it is adaptable to new events and changing schedules. This project aims to provide an assistant tool that enhances time management by organizing and optimizing the user's routine. Although I only began with students in mind, it's easy to use this tool for any rigorous schedule. It will also be able to provide schedules for multiple individuals or could be potentially used to schedule a company's workload effectively so all workers have optimized recurring events that don't interfere with their coworkers/management.

UNMASKING PHISHING: A DATA-DRIVEN ANALYSIS OF TRENDS AND TACTICS IN CYBER DECEPTION

Presenter(s):   Nguyen, Han, Undergraduate, Information Technology

Mentor: Dr. Yousra Javed

Authorship: Han Nguyen, Yousra Javed

Phishing attacks continue to pose a significant threat to individuals and organizations, leveraging deception to steal sensitive information. This research aims to analyze phishing websites by examining patterns and trends within a dataset of known phishing URLs. Using publicly available datasets from sources like PhishTank and OpenPhish, the study identifies common characteristics of phishing websites, such as domain name trends, SSL certificate usage, and the countries where these sites are hosted. Additionally, content analysis reveals the methods used by attackers to mimic legitimate websites, including URL spoofing and the use of fake login forms. By analyzing these patterns, the research provides insights into the evolving tactics of phishing attacks and offers recommendations for improving phishing detection and prevention strategies. This research contributes to a deeper understanding of phishing threats, which can be used to inform better security practices and more effective anti-phishing measures.

BREAKING THE SILENCE: AI'S UNTAPPED POTENTIAL IN BANKING

Presenter(s):   Patel, Darshita, Graduate, Information Technology
                Kolukula, Carmel Pavithra, Graduate, Information Technology
                Vallepalli, Sai Lakshmi, Graduate, Information Technology

Mentor: Dr. Will Lewis

Imagine a world where banks anticipate your needs before you even ask, where employees make smarter decisions with the help of cutting-edge technology, and where your financial security is protected by an invisible, yet incredibly powerful force. This is not science fiction—it's the hidden power of Artificial Intelligence (AI) in banking.

While AI has already made waves in industries like education and healthcare, its application in banking remains relatively untold. We often hear about how AI is revolutionizing classrooms and improving patient care, but how is it transforming the way banks operate, serve customers, and empower employees? This research delves into the hidden role of AI in the banking sector, exploring how it enhances customer experiences through chatbots, fraud prevention, and personalized financial services. However, how much of this is merely automated, and how much is actually accurate?

As AI examines customer spending patterns and forecasts their needs, the question arises:
How can AI carve out a more prominent place in the banking sector, gaining the same recognition and visibility as it has in healthcare and education? This research explores the strategies that banks can use to enhance AI's adoption, increase its transparency, and build trust with both the industry and the public.

On the flip side, we will investigate how AI is reshaping the banking workforce by automating processes, improving decision-making, and boosting productivity.

Through this exploration, we aim to shed light on how AI is already making an impact in banking today and uncover the limitless potential it holds for the future, benefiting both customers and employees. The future of finance is here—but are we ready for it.

OPTIMIZING LOW LATENCY AI FOR ROBOTICS: DEPLOYING VISION AND SOUND MODELS ON AN ESP32-S3-EYE

Presenter(s):   Witkowski, Daniel, Undergraduate, Information Technology

Mentor: Dr. Elahe Javadi

This project explores the deployment of low-latency computer vision and voice recognition models on the ESP32-S3-EYE module to control an AI-powered robot car. Using Google's Teachable Machine, the system trains and tests models for recognizing visual and auditory inputs. The ESP32-S3-EYE, a microcontroller with an onboard camera and microphone, supports machine learning inference while operating under strict memory and processing constraints. To optimize performance, this project utilizes Lite Runtime (LiteRT), a framework which allows machine learning to be deployed on edge devices with small memory and processing power. The research examines inference speed, memory efficiency, floating-point precision, and serial communication between the ESP32-S3-EYE and the robot's control system. The project prototype involves training, testing, and evaluation of vision and sound models using TensorFlow. It is hypothesized that LiteRT will reduce inference latency and improve responsiveness, demonstrating the feasibility of deploying AI on resource-constrained devices for robotics and smart home applications.

KINESIOLOGY AND RECREATION

BODY COMPOSITION PROFILE OF NCAA DIVISION I WOMEN'S VOLLEYBALL PLAYERS

Presenter(s):   Jordan, Cassandra, Graduate, Kinesiology and Recreation

Mentor: Dr. David Thomas

Co-Mentor: Dr. Kristen Lagally

Authorship: Cassandra Jordan, David Thomas, Kristen Lagally, Diego Soto

Body composition plays a major role in overall health. In athletics, it can also be a determinant of performance. Guidelines exist for body fat percentage (%BF) and bone mineral density (BMD) for the general population. Sport-specific body composition in female athletes is understudied, and guidelines for female athletes are lacking. Those that do exist group multiple sports together. PURPOSE: To profile the body composition, specifically %BF, lean mass (LM), fat mass (FM), bone mineral content (BMC), and BMD, of a NCAA Division I women's volleyball team and compare results to existing research and guidelines. METHODS: Nine female volunteers (age 19.78 $\pm$ 0.97 years) had height (Ht) and mass measured, and underwent a dual x-ray absorptiometry (DEXA) scan to measure body composition. Body mass index (BMI) was calculated by mass (kg) divided by height (m) squared and classified using CDC categories. Means and standard deviations were calculated for body composition variables, and Pearson correlation coefficients were calculated between certain variables. RESULTS: Means and standard deviations were: Ht 177.72 $\pm$ 6.95 cm; Mass 73.71 $\pm$ 7.27 kg; BMI 23.38 $\pm$ 2.31 kg/m^2; %BF 31.99 $\pm$ 4.02%; FM 23.21 $\pm$ 3.68 kg; LM 46.50 $\pm$ 5.36 kg; BMC 2,677.67 $\pm$ 223.35 g; BMD 1.20 $\pm$ 0.08 g/cm^2. The correlation between BMI and % BF was r = 0.78, R^2 = 0.61. The correlation between %BF and BMD was r = 0.40, R^2 = 0.16. The correlation between LM and BMD was r = -0.34, R^2 = 0.12. CONCLUSIONS: According to ASCM's Fitness Categories for Body Composition (%BF) for Women by Age, the average %BF of the participants is categorized as 'very poor'. The correlation between %BF and BMI was positive and strong, indicating that BMI may be a good predictor of %BF in NCAA Division I women's volleyball players. The correlation between %BF and BMD was positive and moderate to low, meaning that greater %BF may indicate stronger bones. These results were expected. The correlation between LM and BMD was negative and moderate to low, meaning that more LM may indicate weaker bones in this population. Compared to existing research, this result was unexpected. Further research is needed to understand why this result occurred; however, a low subject number could account for it. Assessing body composition in female athletes is beneficial for understanding health, may account for certain factors of performance, and can be useful in understanding the effectiveness of their training regimens.

TRACKING BODY COMPOSITION PROFILES IN NCAA DIVISION I COLLEGIATE BASEBALL PLAYERS

Presenter(s):   Pettys, Blake, Graduate, Kinesiology and Recreation

Mentor: Dr. Samantha McDonald

Authorship: Blake Pettys, Evan R. Semonis, Brett Scott, Jadon Konkel, Chris Carter, Kelly R. Laurson, Marcel L. Dos Santos, Michael Torry, Dale Brown

Shifts in athletes' body composition (BC) may significantly impact sport performance. Thus, accurately tracking these profiles may improve performance and prevent major injuries. However, changes in athlete BC profiles using state-of-the-art technology are unquantified. PURPOSE: To evaluate BC profiles in a sample of male, collegiate baseball players during the 2023-2024 season. METHODS: Data from 34 athletes with three, BC assessments were analyzed. The participants were 18.6 ± 1.4 years old, 79.4% non-Hispanic white, and 52.9% pitchers. Bone mineral content (BMC, g), non-bone lean mass (NB-LM, g), fat mass (FM, g) and % body fat (%BF) were quantified via dual-energy x-ray absorptiometry (DEXA) in the off-season (December), pre-season (February) and late season (April). Participants followed all pre-testing guidelines and were tested in the morning. Changes in BMC, NB-LM, FM and %BF were evaluated via repeated- measures ANOVA, adjusted for familywise error. RESULTS: BMC significantly increased (+0.04 ± 0.01 kg, 95%CI: 0.05, 0.2) between the off-season through pre-season. No significant differences in BMC were observed between pre-season and late season (+0.007 ± 0.01 kg, 95%CI: -0.03, 0.04). For NB-LM, a non- significant decrease was observed between the off-season and pre-season (-0.1 ± 0.2 kg, 95%CI: -0.5, 7.9). However, between pre-season and late season, significant decrements in NB-LM (-4.4 ± 0.2 kg, 95%CI: -4.9, -3.7) were found. Increases in FM did not significantly change between the off- and pre-season (+0.26 ± 0.2 kg, 95%CI: -0.29, 0.83), however, significantly increased during pre- and late season (+3.1 ±0.3 kg, 95%CI: 2.5, 3.8). %BF also exhibited a non-significant increase between the off- and pre-season (+0.3 ± 0.2%, 95% CI: -0.25, 0.75), however, significantly increased during pre- and late season (+3.8 ±0.3%, 95%CI: 3.2, 4.4). CONCLUSION: Through the off- and pre-seasons, only BMC showed a statistically significant increase. But, from pre-season through late season, significant decreases in NB-LM and increases FM and %BF were observed. These changes were consistent across all positions.

THE EFFECTS OF ANKLE BRACING ON LOWER LIMB BIOMECHANICS DURING A MAXIMAL VERTICAL JUMP

Presenter(s):   Rekart, Dylan, Undergraduate, Kinesiology and Recreation

Mentor: Dr. Michael Torry

Authorship: Dylan Rekart, Jadon Konkel, Michael Torry

Introduction:
Ankle braces are used to prevent injuries and provide joint stability, but their effects on jump performance and biomechanics remain debated. Ankle injuries are common musculoskeletal injuries in sports. Athletes frequently wear ankle braces as a preventive measure to reduce the risk of sprains and enhance joint stability. Understanding how ankle bracing affects jump performance is essential for athletes, coaches and professionals to make informed decisions about brace use and performance deficits.

Purpose:
This study examines how ankle bracing influences the lower limb biomechanics of a maximal vertical jump.

Methods:
A healthy 21-year-old female (160cm, 57 kg) completed three trials of a maximal vertical jump in braced and unbraced conditions. The vertical jump is performed by standing in the starting position with feet shoulder width apart, then squatting down into the eccentric phase lowering to a 90 degree angle, then accelerating up into the concentric phase and landing back down. For the braced conditions, both ankles were tested and reported, but only the right ankle (dominant limb) was braced (McDavid Inc, lace-up). Kinematic (250 Hz, 10-cameras, Vicon, Inc) data were collected by adhering 41 retroreflective markers on boney landmarks of the subject. These markers defined a 23-segment rigid linked body. Force plate (1000 Hz, AMTI, Inc) data were simultaneously collected. Dependent variables included peak vertical jump height, peak ground reaction forces, peak hip, knee, ankle joint torques, and hip. knee, ankle ranges of motion.

Results:
A 14% reduction in maximal jump height was noted with the ankle braced condition, suggesting a performance deficit. Peak vertical GRF increased by 3.42%. Joint torque analysis revealed a 12.4% decrease in peak ankle torque, accompanied by a 27.42% increase in peak hip torque, highlighting compensatory adjustments in the kinetic chain away from the ankle to the hip. These findings suggest that while ankle bracing enhances stability and reduces mechanical load on the ankle, it shifts the biomechanical demands to the hip and knee. Athletes in sports requiring explosive lower-body movements may experience decreased jump performance when using ankle braces.

COMPARING ESTIMATES OF ADIPOSE AND SKELETAL MUSCLE MASS BETWEEN BOD POD AND DEXA IN COLLEGIATE ATHLETES

Presenter(s):   Semonis, Evan, Graduate, Kinesiology and Recreation

Mentor: Dr. Samantha McDonald

Authorship: Evan R. Semonis, Diego A. Soto, Jadon Konkel, Samantha M. McDonald, Kelly R. Laurson, Marcel L. Dos Santos, Michael Torry, Chris Carter, Dale Brown

Accurately estimating skeletal muscle (SKM) and fat masses (FM) in athletes is crucial for effectively designing sport training programs. Recently, air displacement plethysmography (ADP) gained popularity in sport programs for measuring body composition (BC). A significant limitation of ADP is the reliance on a two-compartment model, measuring only FM and fat-free mass (FFM), potentially leading to misestimations in BC most concerningly, SKM. Dual-energy x-ray absorptiometry (DEXA) remains the gold- standard for quantifying BC, however, is underutilized in athletes. PURPOSE: To compare estimations in FFM and FM between ADP and DEXA methods in a sample of male and female collegiate athletes. METHODS: In total, 67 (males = 49, females = 18) athletes aged 17 to 22 years playing baseball, basketball, American football or soccer participated in the study. All athletes, in their respective off-seasons, underwent two sequential BC tests, BodPod (ADP) and DEXA. Athletes followed all pre-testing guidelines and were tested in the morning. The BodPod quantified FFM and FM using sex-, age- and sport-specific predictive equations while the DEXA directly estimated FFM (∑bone mineral content and SKM) and FM. Differences in the estimates of FFM and FM masses between DEXA and BodPod were compared via studentized paired samples t-test. RESULTS: Statistically significant differences in FFM and FM between DEXA and BodPod assessments were observed. Specifically, the BodPod significantly overestimated FFM (-6.2 ± 2.2 kg, 95%CI: -6.8, -5.7, p<0.001) and underestimated FM (+5.1 ± 2.1 kg, 95%CI: 4.5, 5.6, p<0.01) compared to the DEXA (FFM: 7.3 kg vs 6.7 kg and FM: 14.5 kg vs 19.6 kg, respectively). Similarly, the BodPod significantly underestimated %FM (+6.3 ± 2.7%, 95%CI: 5.6, 6.9, p<0.001) relative to the DEXA (16.6% vs 22.9%). The observed misestimations were consistent for male and female athletes. CONCLUSION: ADP significantly overestimated FFM and underestimated FM and %FM in our sample of collegiate athletes.SIGNIFICANCE/NOVELTY: Misestimating BC poses significant challenges in enhancing sport performance. Coaches heavily rely on body composition data for evaluating effectiveness of training programs and player performance, emphasizing the importance of utilizing gold-standard methodologies, like DEXA.

EFFECTS OF ANKLE BRACING ON LOWER EXTREMITY BIOMECHANICS DURING A SINGLE- LEG VERTICAL DROP LANDING

Presenter(s):   Solomon, McKenna, Undergraduate, Kinesiology and Recreation

Mentor: Dr. Michael Torry

Co-Mentor: Jadon Konkel, Graduate Student

Authorship: McKenna Solomon

Introduction: Ankle injuries are common injuries in sports, leading to the use of ankle braces for support and injury prevention. However, ankle bracing may alter lower extremity biomechanics by modifying ground reaction forces, joint angles, and joint torques, potentially increasing stress on other joints. Landing mechanics play a significant role in the distribution of forces across the joints ultimately impacting injury risk. Purpose: The purpose of this study was to investigate the effects of ankle bracing on ground reaction forces, kinematics, and joint torques at the ankle, knee, and hip during a single-leg vertical drop landing performed during both soft and stiff landing techniques. Methods: A 22-year-old female (54.43kg, 164cm) with no history of lower extremity injuries volunteered as subject. The subject performed soft and stiff landings from a 30cm height in both braced (McDavid, lace-up brace) and unbraced conditions. A soft landing was explained as bending the knee to absorb the impact. A stiff landing was explained as trying to keep her leg as straight as possible with minimal joint flexion. Twenty trials were completed with the subject completing five trials for both landing techniques and braced versus unbraced conditions. Kinematic (250 Hz, 10-cameras, Vicon, Inc) data was collected by adhering 41 retroreflective markers on the boney landmarks of the subject. These markers defined a 23-segment rigid linked body. Force plate (1000 Hz, AMTI, Inc) data was simultaneously collected. Dependent variables included peak vertical ground reaction forces, ankle and knee ranges of motion, and peak joint torques at the ankle, knee, and hip. Results: Peak vertical ground reaction forces were higher in the braced condition compared to the unbraced condition for both landing techniques, with increases of 11.77% and 13.3% for soft and stiff landings, respectively. Ankle range of motion decreased by 27.7% in the soft landing and 44.2% in the stiff landing in the braced condition. Peak knee torque was slightly reduced in the braced stiff landing, while peak hip torque increased in the braced condition. Conclusion: Ankle bracing increased vertical ground reaction forces, decreased ankle range of motion, and altered peak joint torques which ultimately shifted mechanical stress to the knee and hip. While ankle bracing provides support to the ankle, it may increase the risk of injury at other joints. These findings suggest that there are implications of ankle bracing on landing mechanics and should be considered when suggesting use of an ankle brace to athletes.

CHANGES IN APPENDICULAR SKELETAL MUSCLE MASS IN DIVISION I COLLEGIATE BASEBALL PITCHERS

Presenter(s): Soto, Diego, Graduate, Kinesiology and Recreation

Mentors: Dr. Samantha McDonald and Dr. Kelly Laurson

Authorship: Diego Soto, Evan Semonis, Cassandra Jordan, Nathan Durr, Brett Scott, Blake Pettys, Jadon Konkel, Samantha McDonald, Kelly Laurson

Skeletal muscle mass (SKM) plays a critical role in sports performance and injury risk. For baseball players, maintaining SKM throughout the in-season is challenging given the large number of games played (50 to 56), shortened recovery time and travel. Of concern, pitchers rely heavily on the repeated use of their dominant arm followed by between-game resting periods. Quantifying changes in SKM from pre- through in-season is understudied, especially using gold standard methodology. PURPOSE: To quantify the changes in SKM from pre- through in-season in Division I collegiate baseball pitchers and evaluate differences between dominant and non-dominant upper and lower body limbs METHODS: Seventeen, male baseball players aged 20.9 ± 1.3 yrs with an average height and weight of 186.3 ± 3.8 cm and 92.7 ± 6.5 kg, respectively, participated in the study. Appendicular SKM mass, the summed SKM masses of the upper and lower limbs, was quantified via DEXA scans at two, time points, pre- (February 2024) and late, in-season (April 2024). Participants followed the established pre-testing guidelines and were eligible for DEXA scans (e.g., fasted, hydrated). All scans were completed in the morning. Changes in SKM mass were quantified for the dominant and non-dominant limbs and compared via studentized paired t-tests. RESULTS: In pitchers, appendicular SKM significantly declined (1.9 ± 0.7 kg; 95% CI: 1.5, 2.3 kg; p<0.001) from pre through late, in-season. Similarly, significant reductions in the dominant (0.5 ± 0.5 kg; 95% CI: 0.3, 0.8 kg; p<0.001) and non-dominant upper limbs (0.3 ± 0.4 kg; 95% CI: 0.08, 0.4 kg; p=0.004) and dominant (0.5 ± 0.4 kg; 95% CI: 0.3, 0.7 kg; p<0.001) and non-dominant (0.6 ± 0.4 kg; 95% CI: 0.3, 0.8 kg; p<0.001) lower limbs. The SKM mass of the dominant arm decreased 11.2% compared to 5.8% in the non-dominant arm, this difference, however, did not reach statistical significance. CONCLUSIONS: Significant decrements in total appendicular SKM mass in collegiate baseball pitchers were observed. Pitchers also exhibited a nearly 2-fold non-statistically significant decrease in SKM mass in their dominant relative to their non-dominant arm. Tracking changes in SKM mass throughout pre- and in-seasons of collegiate baseball may provide coaches information critical to their pitchers' performance and risk of injury.

IMPACT OF STRESS MANANGEMENT, PHYSCIAL ACTIVITY, AND VACCINE STATUS ON HEART RATE VARIABILITY

Presenter(s): Wisdom, Lauren, Undergraduate, Biological Sciences
Solomon, Mckenna, Undergraduate, Kinesiology & Recreation
Vondriska, Matthew, Graduate, Kinesiology & Recreation

Mentor: Dr. Karen Dennis

Authorship: Lauren Wisdom, McKenna Solomon, Matthew Vondriska, Karen Dennis

Introduction: There is conflicting research in whether the COVID-19 vaccine impacts the autonomic nervous system, more specifically heart rate variability (HRV) (Hajduczok et al, 2021). HRV is the time interval between heart beats used to measure autonomic nervous system (ANS) function and is an indicator of overall health and wellness (Kerkutluoglu et al, 2023). Stress can alter the sympathetic nervous system and a reduced HRV can be linked to health issues due to the body being unable to recover from stress. A higher HRV may indicate better stress resilience due to an increase in activity of the parasympathetic nervous system that helps manage stress. **Purpose:** The purpose of this study was to investigate the effects of physical activity and stress levels on heart rate variability (HRV) in vaccinated and non-vaccinated individuals. **Methods:** The participants in this study were students enrolled in a 16-week health/wellness course. The 67 individuals reported their vaccination status. Variables such as R-R interval, HRV, coherence, stress index, and VO2max were all assessed both at pre- and post-test. HRV and related variables, including R-R interval, coherence, and stress index, were assessed using the HeartMath emWave Pro software with a pulse plethysmograph ear sensor. Physical fitness measures, including VO_2 max, were recorded, and stress levels were evaluated using the State-Trait Anxiety Inventory for Adults. Mixed-Design Multivariate ANOVA was used to examine associations. **Results:** The non-vaccinated group showed a significant increase in HRV scores over time (Pre: 109.3 ± 44.4 ms, Post: 138.7 ± 51.0 ms, $p = .005$, $F(1,49)= 8.79$, $\eta^2 = .154$), suggesting improved autonomic function. In contrast, the vaccinated group exhibited a slight decrease in HRV scores (Pre: 113.1 ± 43.5 ms, Post: 104.2 ± 38.0 ms). R-R interval indicated no significant differences between group and time ($p = .109$, $F(1,49)=2.673$, $\eta^2 = .053$), but overall results in time (pre-test to post-test) suggested improvements. Coherence and stress index scores did not yield statistically significant results.

Conclusion: Our results show that non-vaccination status could be linked to improved autonomic Function when paired with education on stress management and physical activity, when compared with vaccination status. Although, the changes we observed could have been caused by other, unobserved factors. Further research is required to examine this relationship more conclusively.

KINESIO TAPE ON THE GASTROCNEMIUS AND ITS EFFECT ON VERTICAL JUMP PERFORMANCE

Presenter(s):   Young, Colin, Undergraduate, Kinesiology and Recreation

Mentor: Dr. Michael Torry

Introduction. Kinesio tape (KT tape) is used as a therapeutic and injury prevention tool for individuals and elite athletes. Due to its elastic properties, KT tape could assist in athletic movements like jumping. Previous research found KT tape provides no significant difference in jump height with double leg take-offs; yet a 2.4 cm increase in jump height with single leg take- offs has been reported. An increase in peak isometric torque at the knee has also been reported. Thus, there are limited studies reporting mixed results regarding KT tape and jump performance. There have been no studies conducted regarding the effect KT tape has on the speed of the jump.

Purpose. This study investigated the effects KT tape would have on vertical jump performance of an athlete, specifically on the maximal height and velocity of the jump. Methods. The subject was a 21-year-old female {1.524m, 0.454kg} former collegiate cheerleader who volunteered to participate. Kinesio tape was applied to the gastrocnemius from insertion to origin. A 10-camera Vicon Nexus System (250 Hz) was used with two force plates (AMTI, Inc) which collected ground reaction force data. A 54 retro-reflective marker set was applied to the subject in a standard plug- in gait model. Electromyography (EMG) was captured for the medial gastrocnemius which was compared to a MVC collected via three trials of a single leg calf raise. Four maximal effort jumps were recorded under single and double leg conditions. The depth was controlled by touching a chair behind them, before performing the maximal vertical jump. The variables measured were maximal height and speed of the jump, ground reaction force, peak ankle torque, and average % MVC of the gastrocnemius. An unpaired t-test (alpha ≤ 0.05) was employed to detect significant differences. Results. There was no effect on double leg performance with KT tape. However, single leg jump performance was increased. Total time to reach maximal height was decreased by 0.2128 seconds (p = 0.003); suggesting KT tape to have a positive effect on the speed of a single leg countermovement jump. The peak ankle torque was decreased by 283.122 N.mm/Kg (p = 0.0464). Conclusion. While the results do not suggest the application of KT tape on the gastrocnemius as an alternative to increasing jump performance, it could supply a placebo effect to increase performance.

THE PERCEPTION OF STUDENTS AND INSTRUCTORS ON THE USE OF TECHNOLOGY IN TEACHING AND LEARNING OF FOREIGN LANGUAGES: THE CASE OF UNIVERSITY OF GHANA

Presenter(s):   Apaflo, Dorcas, Graduate, Languages, Literatures, and Cultures

Mentor: Dr. Rachel Shively

Authorship: Dorcas Apaflo, Rachel Shively

The widespread use of technology tools for language learning has resulted in changes to the traditional learning classroom in countries around the world, including African countries like Ghana. The general perception about the importance of technology is that it has made language learning more enjoyable in the school setting. To understand perception on the use of technology in teaching and learning of foreign languages among students, questionnaires were administered to 14 foreign language students and 5 instructors at the University of Ghana. The results were analyzed using Qualtrics. The findings suggest that both instructors and students had a positive perception on the use of technology in teaching and learning foreign languages. On one hand, teachers indicated that the use of technology in language classes increased participation and productivity, enhanced communication, and improved linguistic skills of students. On another hand, students indicated that the use of technology in language learning increased collaboration and interaction in the target language. They explained that technology could be used as a teaser before the main lesson to enhance general learning experience, ease the stress of both teachers and instructors and help strengthen language acquisition in Africa. However, instructors encountered challenges such as lack of knowledge on the use of technological tools, interruption in internet connection, inadequate teaching time, and high cost of some technological tools. Students also experienced poor connectivity challenges, lack of knowledge of the use of tech tools, distraction, inaccuracy and limited explanations of some technology tools.

MOTS NON POLIS: A FRENCH LINGUISTICS BOARD GAME

Presenter(s):   Dalbey, Nikki, Undergraduate, Languages, Literatures, and Cultures

Mentor: Dr. Sandra Keller

Authorship: Nikki Dalbey

I created this project to allow students of the French language to engage with sociolinguistic concepts and explore how language and language use are a form of social currency. My board game, submitted for my end-of-semester project in French 340, "Introduction to Applied French Linguistics," reimagines the Hasbro game "Monopoly" from a language rights perspective. I designed the game to encourage players to critically examine, first, how all varieties of French and other languages spoken in the Francophone world are linguistically rich and creative; second, how various social forces work to stigmatize that creativity; and third how our own choices can further or resist this dynamic.

The game's title, "Mots Non Polis," contains three layers of meaning. Firstly, when spoken with a standard French accent, it sounds like the title of the Hasbro game "Monopoly." Secondly, one translation of the phrase "mots non polis" is "unpolished words" which represents the French speakers who, by way of regional accents or dialects, do not conform to standard French as determined by l'Académie Française, the governing body of the French language. Lastly, a second translation of the phrase is "impolite words," which represents the criticisms made by the prescriptivist French who seek to invalidate others' "Frenchness" through attacks on their manner of speaking. The game then utilizes the words of the "unpolished" and "impolite" French speakers themselves as the means through which players are rewarded and/or punished. The linguistic facts I researched and present in the form of "property" descriptions are meant to show players that these "unpolished" varieties of French are creative, systematic, and nuanced.

This game also engages with the concepts of language creation (creoles and neologisms), language diffusion, language loss, and loanwords. It uses words as currency while it embraces a descriptivist approach that encourages players to recognize the unjustness of using narrow views of language and language use to determine a person's value. By creating this game that implicates players emotionally and cognitively in the fate of linguistic diversity, I hope to spark new conversations about language and empathy, in the French-speaking world and here at home.

THE RELATIONSHIP BETWEEN EMPLOYEE PERSONALITY TRAITS AND PREFERRED LEADERSHIP STYLES

Presenter(s):   Carlson, Colby, Undergraduate, Management

Mentor: Dr. Yongmei Bally

Authorship: Colby Carlson

Personality traits have been widely recognized as key factors influencing leadership effectiveness, but limited research has explored how personality traits influence preferred leadership styles from the follower's perspective. This study aims to fill the gap in research by examining the role of the Big Five personality traits (i.e., openness, conscientiousness, extraversion, agreeableness, and neuroticism), in employee leadership style preferences for autocratic, democratic, and delegative leadership. This study reveals that neuroticism had a significant positive association with democratic leadership, and openness to experience had a significant negative association with autocratic leadership. Age was found to influence leadership preferences, with older individuals showing a stronger preference for democratic leadership and a rejection of autocratic leadership, while younger individuals preferred autocratic leadership. The analysis finds no significant correlates of delegative leadership preferences. These findings suggest that both personality traits and age shape leadership style preferences, providing valuable insights for leadership development programs. Practical implications for organizational leadership and directions for future research are discussed.

MUSIC

RECENT DEVELOPMENTS WITH THE HAMMERED DULCIMER, 1975-PRESENT

Presenter(s):   Prado, Ethan, Graduate, Music

Mentor: Dr. Allison Alcorn

Authorship: Ethan Prado

A commission for a hammered dulcimer piece from a friend led me down quite the rabbit hole of information in researching the instrument. Many of the articles I read kept pointing towards the same set of sources, and these publications had a general lack of information past 1975, despite being published after that year. Even though academic publications from then until the present are sparse, there is concrete evidence that the hammered dulcimer is a small but thriving community with new works being written for the instrument as well as very active organizations which bring together enthusiasts both new and old. First, a very brief overview of the hammered dulcimer's origins, spread, and downfalls are given. Next, I have examined three works written within the last 25 years by living musicians - new repertoire is in fact being written for the instrument beyond its folk associations. Then, we go back in time and contextualize the importance of major organizations founded around the cutoff year, which includes The Original Dulcimer Players Club and Dulcimer Players News, before looping back to the present. There have been several recent external developments that have greatly affected the dulcimer community and tie in with the origins of some composers. These developments include the COVID-19 pandemic, Hurricane Helene, and the attacks against the Internet Archive. Despite all odds, the hammered dulcimer has never fallen into complete obscurity due to the fortitude of its community.

THE IMPACT OF EXERCISE ON PERCEIVED DEPRESSION AMOUNG INDIVIDUALS DIAGNOSED WITH HEART FAILURE WITH PRESERVED EJECTION FRACTION

Presenter(s):   Krebs, Harrison, Graduate, Nursing

Mentor: Dr. Marilyn Prasun

Authorship: Harrison Krebs, Marilyn Prasun, Annette Hubbell, John Blakeman, Matthew Hesson-McInnis

Introduction

Heart failure (HF) is the common final pathway for many cardiovascular diseases. Approximately half of those individuals have HF with a preserved ejection fraction (HFpEF). Many individuals with HFpEF also report experiencing depression. Depression, combined with HFpEF, can place individuals at risk for increased mortality and hospital admissions. Exercise is recommended for individuals with HFpEF. However, exercise to manage depressive symptoms among individuals with HFpEF has yet to be fully explored.

Objectives

This systematic literature review aimed to examine the effects of exercise therapy on depression reported by individuals diagnosed with HFpEF.

Method

A systematic literature search was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) methodology in five databases: SPORTDiscus, PubMed, Cumulative Index to Nursing and Allied Health Literature, Academic Search Complete, and the Joanna Briggs Institute Evidence-Based Practice Database. Inclusion criteria consisted of studies published in English that were original human subjects' peer-reviewed research, that enrolled adults diagnosed with HFpEF, used exercise as a form of treatment and measured depression as an outcome. Exclusion criteria consisted of nonhuman subjects research, gray literature and non-peer-reviewed published studies, or studies of individuals with HFpEF younger than 18 years of age.

Results

A total of sixty-six studies were identified, but only five (totaling 306 participants) met the inclusion criteria. Exercise therapy consisted of strength, endurance training, and Tai Chi. Exercise capacity significantly improved when measured via the 6-minute walk test but had varied results when measured via peak VO2. Depression was measured using various validated instruments which included, the Patient Health Questionnaire (PHQ-9), Geriatric Depression Scale-15, Profile of Mood States, and the Hare-Davis Cardiac Depression Scale. All five studies showed improved depression scores following exercise therapy, with four studies reporting statistically significant improvements. Specifically, depression was reduced by 0.8 points (measured with the Geriatric Depression Scale-15), 2 points (measured with the PHQ-9 tool), 1.7 points (measured with the subscale of Depression in Profile of Mood State), and 3.95 points

(measured with the PHQ-9) in these 4 studies. The fifth study demonstrated a 7-point improvement in depression (measured with the Hare-Davis Cardiac Depression Scale), though this change was not statistically significant.

Conclusion

The data from this systematic review suggests that exercise can be a practical approach to improving reported depressive symptoms among individuals with HFpEF. However, more robust research is warranted to confirm these findings and long-term benefits.

THE POWER OF TRANSFORMATIVE LOVE

Presenter(s): Mayback, Clo, Undergraduate, Philosophy

Mentor: Dr. Daniel Breyer

Authorship: Clo Mayback, Daniel Breyer

If you could drink a love potion that guarantees you would fall deeply in love but fundamentally changes your desires, values, and sense of self in unpredictable ways, would you take it—and what does this say about the nature of your freedom and agency? Is love truly free?

In the free will debate, some argue that our choices are determined, while others believe we have full control over them. Love challenges this divide—it feels beyond our control, yet deeply personal. This research introduces noncompatibilism, a theoretical framework that transcends the compatibilist-incompatibilist divide through a transformational account of free will. Instead of seeing love as either fully determined or completely free, noncompatibilism understands love as a transformational force that changes agency itself.

Building upon Harry Frankfurt's theory of volitional necessity, L.A. Paul's work on transformative experience, and theories of emergence, this research demonstrates how agency emerges through transformative experiences that fundamentally reshape human decision-making and self-understanding. Through Frankfurt's idea that love both binds and expands our will, I explore how love shapes our choices in ways that feel both necessary and freeing. L.A. Paul's concept of transformative experience, illustrated by her vampire thought experiment, shows how love, like radical transformation, reshapes our desires in ways we cannot predict. The theory of emergence further explains how love creates new possibilities for choice, rather than fitting into a fixed framework of free will or determinism.

Through noncompatibilism, I present a case for understanding the connection between love and freedom—not as a choice we make, nor as a force that controls us, but as something that transforms who we are and what we can will.

FREE WILL, GRACE, AND GOD'S OMNIPOTENCE

Presenter(s):   Reckamp, Robert, Undergraduate, Philosophy

Mentor: Dr. Daniel Breyer

Many struggle to reconcile our free will with God's providence over everything. Understanding sufficient and efficacious grace lets us accept both a meaningful sense of free will and God's omnipotence and omniscience. In this presentation, I will lay out the Thomistic principles of grace and compare two different interpretations of them, the first by Fr. Reginald Garrigou- Lagrange and the second by Fr. Francisco Marin-Sola. Grace is defined by the Catechism of the Catholic Church as "favor, the free and undeserved help that God gives us to respond to his call to become children of God, adoptive sons, partakers of the divine nature and of eternal life" (CCC 1996). Garrigou-Lagrange and Marin-Sola disagree on what sufficient grace is and what we can do by the aid of sufficient grace. Lagrange thinks that sufficient grace gives us the real power to do a good act, but that we cannot actually do any good act without the aid of efficacious grace. On the other hand, Marin-Sola thinks that sufficient grace really gives us an act, but an imperfect one. Sufficient grace begins the good action in us, but we may resist it of our own free will and so prevent the good action. Sola also thinks we can do some easy good works with sufficient grace only, such as a quick prayer. To Marin-Sola, efficacious grace differs from sufficient grace in that it is irresistible and infallible, necessary for completing difficult good works, while sufficient grace is still efficacious for the beginning of the action, but not for the perfection of the work, which requires efficacious grace that will be provided by God if the sufficient grace is not resisted. I argue that Marin-Sola's view better protects a strong sense of free will while remaining consonant with the Thomistic principles. I first lay out the relevant principles that are accepted by all Thomists. I next outline Garrigou-Lagrange's view on sufficient grace, then Marin-Sola's. Finally, I argue why Marin-Sola's view better protects free will and the real sufficiency of sufficient grace.

PHYSICS

COMPUTATIONAL MODEL FOR C. ELEGANS' THERMOTAXIS

Presenter(s):   Gomez, Lylia, Undergraduate, Physics

Mentor: Dr. Epaminondas Rosa Jr.

Authorship: Lylia Gomez, Zach Mobile, Rosangela Follmann, Epaminondas Rosa Jr.

Caenorhabditis elegans is a free-living transparent worm, about 1 mm in length, inhabiting temperate regions across the Earth. This worm is a widely used research model for studying biological phenomena. Its connectome consists of 302 neurons, including 68 sensory neurons that detect chemicals, touch, and temperature. Most studies involving these worms are experimental, rather than computational, particularly concerning temperature effects. This research builds upon an existing model by including temperature features in the differential equations representing the worm's thermotaxis behavior. The equations allow for a methodology to predict the calcium response of a single C. elegans amphid finger-like neuron (AFD) at varied temperatures by employing a dynamical mechanism and without requiring intricate physiological parameters. This work indicates that calcium responses in AFD neurons may be conceptualized as a biochemical process in which activation and inactivation are modulated by Arrhenius factors. Additionally, we model two coupled AFD neurons to study directional locomotion and movement along a temperature gradient. These neurons, located on the left and right sides near the worm's nose, sense temperatures on each side. Based on sensed temperatures and the cultivation temperature, they produce motor outputs that direct movement left or right, refining the previous model which predicted movement toward hot or cold.

DIAGRAM GENERATION FOR SPINOR AMPLITUDE SUBROUTINES

Presenter(s):   Minney, Gabriel, Undergraduate, Physics

Mentor: Prof. Neil Christensen

Authorship: Gabriel Minney, Neil Christensen

Fundamental particles are the building blocks of the physical world. Physicists have studied the interactions between fundamental particles using experiments such as those conducted at the Large Hadron Collider (LHC) and by using Feynman Diagrams alongside numerical techniques to predict the outcomes of these experiments. However, Feynman Diagrams introduce unphysical degrees of freedom into calculations, an aspect that greatly hinders the efficiency of numerical calculations of scattering amplitudes. Using constructive diagrams instead of Feynman diagrams offers the prospect of removing these unphysical degrees of freedom, which could greatly increase the scope of scattering amplitude numerical calculations. The algorithmic generation and preparation of expressions for numerical calculations using constructive diagrams poses many unique problems, such as the recursive generation of interaction topologies and the algebraic manipulation of expressions to remove singularities. Raptor is a program-in-development that aims to solve these problems.

ISOLATING DIFFUSION COEFFICIENTS OF LATTICE DEFECTS IN COULOMB CRYSTALS

Presenter(s):   Webb, Levi, Graduate, Physics

Mentor: Dr. Matt Caplan

Authorship: Levi Webb, Dany Yaacoub, Matt Caplan

The diffusion coefficients of Coulomb crystals, as applicable to stellar astrophysics, have seldom been studied to a satisfactory level. Molecular dynamics (MD) studies such as this inform our understanding of the macroscopic properties of stellar remnants, such as white dwarfs and neutron stars. We use the MD code LAMMPS to simulate small Coulomb crystal lattices of varying temperature and screening length, then introduce defects by either inserting (interstitials) or removing (vacancies) particles. By tracking the propagation of these defects and their interactions with the surrounding lattice, we determine their diffusion coefficients. This research enhances current understandings of defect-driven diffusion in strongly coupled plasmas, thereby influencing knowledge of the thermal and mechanical evolution of the dense matter within white dwarfs and neutron star crusts.

PSYCHOLOGY

SCHOOL DIFFICULTIES RELATED TO RECIDIVISM RATES WITH JUVENILE YOUTHS

Presenter(s):   Aclibon, Shari Nicole, Graduate, Psychology

Mentor: Dr. Adena Meyers

The association between school difficulties and delinquency is fundamentally complex. Early aggressive behavior can lead to classroom challenges, negative evaluations, and potential delinquency (McCord, 2000). Verbal and reading deficits are also linked to victimization (both inside and outside school), drug use, aggression, and delinquent behavior when students fall behind in reading become marginalized as "failures" (McCord, 2000). School failure can hinder academic interest and commitment, and feelings of isolation and lack of emotional support may contribute to delinquent behaviors (McCord, 2000). The school-to-prison pipeline refers to the set of policies and practices that increase the likelihood of students facing criminal involvement rather than educational support (Mallet, 2016). This phenomenon implicates punitive approaches in schools, or the "criminalization of school discipline" (Hirschfield, 2018), which can lead to academic setbacks and juvenile justice involvement (Villalobos & Bohannan, 2017). Once youths are involved with the juvenile court, there is a higher probability of recidivism, or reoffending (NIJ, 2008). Suspensions and expulsions from school are recognized as potent indicators of the school-to-prison pipeline. (Novak, 2022). This current study explores the association between a range of school difficulties and recidivism among youths involved with the juvenile justice system. A series of logistic regressions were conducted to examine the association with a range of school difficulties and recidivism. Because youths who spent more time in the juvenile justice system had more opportunities to reoffend and to experience school problems, the number of days of juvenile court services was used as a control variable. The results of the study showed that failed courses significantly predicted recidivism [B= 1.984, Exp(B)= 7.269 and p= .026]. Additionally, expulsions marginally predicted recidivism (B= 2.167, Exp(B)= 8.736, and p= .095)., while other school difficulties did not yield significant results. The finding that academic failures are a stronger predictor of recidivism than exclusionary discipline suggests that academic achievement may play a critical role in the school-to-prison pipeline.

RIPPLE LAB ESPORTS PROJECT

Presenter(s): Berger, Matthew, Undergraduate, Psychology

Wright, Payton, Undergraduate, Psychology

Mentor: Dr. Burak Ozkum

With how influential personality is, we aspire to determine the effects of personality on team composition. Particularly, we will focus on team composition in the professional video game scene, eSports. eSports is a competitive environment where players work in teams or on their own to play video games at a high skill level. For our study, we will be focusing on team eSports gaming and conducting research to determine the effects of personality on these teams.

To determine and define 'personality,' we referred to foundational personality concepts like the Big Five (Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism) and The Dark Triad (Machiavellianism, Narcissism, and Psychopathy) to form a list of trait definitions to help conceptualize our work. With common personality traits defined, we used a general job analysis structure to create an interview. This interview sheet was used to discuss with Illinois State University eSports teams (players and coaches) to understand what eSports players find valuable in their teams.

We interviewed ISU eSports teams, including teams for the video games League of Legends, Overwatch 2, Counter-Strike 2, Rocket League, and Valorant. Our respondents were players ranging from leadership to supportive roles. We also interviewed the coach of the League of Legends team. Participants described personality traits they found valuable or unimportant to the structure of their teams. Certain traits might rank differently depending on the eSport game or the player's role in-game or on the team. Participants gave ideas of team structure for different eSport games. Having these conceptualizations of how a player of Overwatch 2 might play, for example, helps determine valuable personality traits in that setting, as opposed to different eSport games. Two raters on our research team analyzed the interview responses to understand emerging themes, like the value of team communication or working together to accomplish in- game goals.

We will survey eSports players based on interview responses to get a quantitative outlook on the effects of personality on eSports teams. This survey will refer to responses found in our interview results. Questions regarding the value of personality traits or actions in the respondent's eSports game, the importance of general or specific knowledge, skills, abilities, and other characteristics (KSAOs), the importance of different performance criteria, team processes, and essential functions will be found in the survey. Once completed, the survey will be given to eSports collegiate teams beyond ISU to understand personality's influence in eSports better.

EFFECTS OF FOOD ALLERGIES AND INTOLERANCES ON COLLEGE STUDENTS: USING THE CONCEALABLE STIGMATIZED IDENTITIES FRAMEWORK

Presenter(s): Carlos, Nicole, Undergraduate, Psychology

Mentor: Dr. Caitlin Mercier

Authorship: Nicole Carlos, Caitlin Mercier

Sparse research observes the effects of food allergies and intolerances (FA/FI) on college students. Using the Concealable stigmatized identity frame, I qualitatively explore how college students navigate stigmatization, social interactions, disclosure of the food allergies/intolerances. Additionally, I investigate the intersectioning identities shape the experiences of college students. Implications comprise of spreading awareness about the impacts and dangers these college students must navigate, addressing the lack of research on this population, providing resources for these college students to better navigate college life, alongside providing resources to colleges to better support their students, and protocols that ensure the safety of college students with food allergies and intolerances (FA/FI).

CONFIDENCE AND SUCCESS: INVESTIGATING SELF-ESTEEM'S ROLE IN ACADEMIC PERFORMANCE

Presenter(s):   Charles, Michael, Undergraduate, Psychology

Mentor: Dr. Dawn McBride

Self-esteem is widely recognized as an influential factor in academic performance, yet existing literature presents conflicting findings regarding the strength and nature of this relationship. Thus, this study aims to broaden our understanding of the effects of self-esteem on college students' academic performance and clarify the contradictions in the literature. Using a sample of students enrolled in a Research Methods in Psychology course, the Rosenberg Self-Esteem Scale will be employed to measure self- esteem. Additionally, academic performance will be assessed through students' scores on their first exam and first major writing assignment. A regression analysis will be conducted to examine the extent to which self-esteem predicts academic performance. It is hypothesized that these two variables will be positively correlated, suggesting higher self-esteem is associated with better academic performance, while lower self-esteem corresponds with worse academic performance. These findings are expected to strengthen our understanding of the impact of self-esteem on academic performance while clarifying contradictions in the literature.

ADOLESCENTS' FAMILY RELATIONSHIP TRAJECTORY CLASSES AND LATER ADJUSTMENT OUTCOMES

Presenter(s):   Donnelly, Caitlyn, Graduate, Psychology

McDaniel, Sean, Graduate, Psychology

Mentor: Dr. Laura Finan

Authorship: Sean McDaniel[1], Caitlyn Donnelly[1], Laura Finan[1], Nicole K. Watkins[2]

1) Illinois State University, (2) The Pennsylvania State University, Scranton

*These authors contributed equally to this project.

Background and objectives: Adolescents family relationship experiences are associated with diverse adjustment outcomes, including internalizing symptoms and problems behavior (Buehler, 2020; Cummings et al., 2015; Finan et al., 2018). However, extant research examining these associations has been generally limited by cross-sectional examination of these dynamic family processes, siloed exploration of family interactions and relationship experiences, and omission of heterogeneous subgroups of adolescents. Therefore, in this study, we investigated the heterogenous latent growth class trajectories of family relationships during adolescence and explored differences across these classes with adjustment outcomes.

Methods and Analysis Plan: Data were drawn from the Predictors of Anxiety and Depression during Adolescence (PANDA) Project (Ohannessian & Vannucci, 2018), a large 7-wave study which surveyed demographically diverse 7th and 8th graders every six months from fall 2016 (W1; N=1,347) through fall 2019 (W7). Adolescent-mother (AM) and adolescent-father (AF) reports of open and problem communication, family cohesion, family conflict, family support, and sibling support from W1-W6 and W7 internalizing (depression and anxiety) and conduct problems measures were use in the current study. Parallel process latent class growth models were specified for two- through seven-classes. Intercept and slope means were freely estimated, but variance estimates for the intercept and slope were constrained to zero within each class, so that all participants within each class followed the same trajectory. Associations between growth parameters also were constrained to zero within class. Regression analyses were used to explore associations between class membership and internalizing symptoms (OLS linear) and any conduct problems (logistic), controlling for demographic characteristics and previous W1 outcomes.

Results and Discussion: A four-class solution best fit the data. Class 1 (11.9%) reflected high stable problem AF communication; Class 2 (46.9%) was increasing AF and AM problem communication; Class 3 (13.2%) was stable high AM problem communication; and Class 4 (27.9%) was high family cohesion and open communication. Results from regression analyses indicated that compared to adolescents in Class 4, (a) those in Class 2 and Class 3 reported greater depressive symptoms, those in Class 3 reported greater anxiety symptoms, and (c) those in Class 1, Class 2, and Class 3 reported greater likelihood of conduct problems. These results stress the importance of examining variations in different family dynamics throughout adolescence, and how these different family relationships have implications for adverse adjustment outcomes.

DO YOU KNOW AS MUCH AS AN EXPERT?

Presenter(s):   Ervin, Will, Graduate, Psychology

                Mao, Charlisa, Undergraduate, Psychology

Mentor: Dr. Alison Nguyen

When people communicate, they aim to produce a mutual understanding between each other, called *common ground* (Clark & Brennan, 1991), and reach an agreement on words and their meaning, as well as other aspects of the conversation, such as authority and certainty.

Gradable adjectives are adjectives that are reliant on the context of the conversation and are words like *straight* and *dangerous*, and thus, vary in meaning depending on the established common ground (Kennedy & McNally, 2005). *Cognitive verbs* notify the listener about the credibility of the statement, and are words like *think*, *know*, and *believe*. Additionally, statements from authority figures seem more credible because of their influence. (Wei, 2024; Schommer- Aikins, 2012). In this study we hypothesis that authority figures and cognitive verbs will alter the meaning of gradable adjectives via certainty, which alters the context. Please compare the statements below.

A) The engineer thinks the material is strong.
B) The engineer knows the material is strong.
C) A person thinks the material is strong.
D) A person knows the material is strong.

Each of the sentences should indicate to the reader different degrees of certainty. Each sentence varies in the cognitive verbs (*believe, think,* and *know)* used and via the presence of an authority figure. Examples (a) and (b) are the *authority* sentences. Engineers are authority figures for subjects regarding engineering, such as materials. However, the usage of *know* or *thinks* should result in varying degrees of certainty, as one is a *booster* (implies certainty) and the other is a *hedge* (implies uncertainty). Therefore, people should be more certain of example
(a) than example (b). The same thing occurs with (c) and (d), however, the status of the person's material expertise is unknown. In (a) and (c), these sentences vary in their credibility depending on if the statement is making reference to the authority figure or not.

Preliminary data suggest that cognitive verbs influenced people's certainty $F (1, 11) = 57.259$, $p = <.001$. Cognitive verbs classified as boosters resulted in higher levels of certainty, while cognitive verbs classified as hedges resulted in less certainty. Who produced the utterance also had an effect on people's certainty $F (4, 11) = 2.982$, $p =.044$. Preliminary data suggest that statements made by authority figure resulted in higher levels of certainty than when non- authority figures expressed statements.

PERCEPTIONS OF TRUST IN I.D.E.A. MESSAGING ON CAMPUS

Presenter(s):   Etheridge, Emma, Undergraduate, Psychology

Mentor: Dr. Jordan Arellanes

Authorship: Jordan Arellanes, Mike Hendricks, Chang Su-Russell

IDEA initiatives in universities have increased in recent decades across the country. These IDEA initiatives include messages that promote inclusion, diversity, equity, and access. However, the specific strategies for enhancing the authenticity and trust in these messages are unclear. To address this issue, this study was developed to evaluate students' trust in Illinois State University's IDEA initiatives utilizing Rotenberg's (2010) BDT framework of interpersonal trust. There were 70 participants through 16 focus groups in 12 classes through in-class SoTL academic intervention. Three themes of the data were established through inductive/deductive coding. These themes included honesty of IDEA intentions, emotional associations of trust, and reliability of IDEA messaging. Students questioned genuine desires for IDEA on campus, and it was found that the university needs to provide consistent messaging to support honest messaging. Classes that allow for open discussion are very important for students' learning and participation. In addition, follow through and closure after discriminatory events are crucial to fostering trust in the IDEA messaging. A final takeaway of this study was that although universities cannot be expected to prevent all distances of discrimination on campus, they should mitigate the response afterward to ensure trust and confidence in the students that they will not tolerate such actions.

READING COMPREHENSION AS A RESULT OF SYNTACTIC STRUCTURES

Presenter(s): Fletcher, Kelly (she/they), Undergraduate, Psychology
Hernandez, Alexandria (she/her), Undergraduate, Psychology

Mentor: Dr. Allison Nguyen (she/they)

Authorship: Kelly Fletcher, Allison Nguyen

Reading comprehension functions as a reflection of one's ongoing cognitive processes while encoding new information through a text. When the brain is unable to correctly encode information, the effectiveness of one's ability to successfully retrieve it later is impacted, which is shown through reading comprehension scores (Zhang et al., 2018). Comprehension levels can be affected through different factors, such as media multitasking and busy environments, since the brain engages in semantic integration, known as the process of combining cues and information from multiple senses, and this can affect retrieval (Du et al., 2020; Zhang et al., 2018).

This study aims to investigate the relationship between syntactic structures and its' effect on reading comprehension concerning individuals familiar with the English language. Our goal is to analyze how expectations of syntactic structures can affect the accuracy and quantity of informational text encoded into the brain, along with the processing speed of recalling information accurately. We predict that when communicating in English, specific sentence structures, such as the subject-verb-object, are preferred as they convey information in a condensed manner, compared to object-verb-subject sentences. For example, the phrase, "The cat chased the mouse" may be perceived as easier to encode than the phrase "The mouse was chased by the cat," as the first phrase follows a more predictable pattern familiarized to English speakers when introduced to the language (Poulsen & Gravgaard, 2016). When reading content that follows predictable language patterns, participants can absorb greater quantities of information accurately compared to those who encode sentences about the same topic but follow more complicated sentence structures (Brimo et al., 2015). This process is reflected upon within reading comprehension exams, as participants are forced to recognize and recall information previously learned to accurately answer questions related to the text.

This study emphasizes the importance of syntactic structure, especially for those who are not fluent within the English language, as the complex formation of sentences can conflict with one's expectations of the language and the way their brain is able to encode and process new information. This study can be used as a tool in the consideration of developing AI chat bots that are able to communicate with users, as the system often struggles with predictable language patterns and complex syntactic structures, while failing to retain information previously presented.

Keywords: Reading comprehension, encode, syntactic structure, predictable, information

NAVIGATING NON-INTUITIVE DOORS: OBSERVATIONAL INSIGHTS AND IMPLICATIONS FOR BUILDING SAFETY

Presenter(s):   Guthrie, Alison V., Graduate, Psychology

Mentor: Dr. Jeffrey Wagman

Building safety relies on the intuitive use of doors, yet many architectural designs incorporate non-intuitive doors that hinder efficient egress. This study examines how people interact with such doors in public buildings, using observational data collected across multiple locations. Where users first contact a door, how they attempt to open that door, whether they are successful in doing so, and how long it takes them to do so were recorded and analyzed. We expect findings to indicate that certain design features will contribute to how quickly and easily doors are operated, potentially contributing to delays, increased cognitive load, and safety hazards during emergencies. Such results will highlight the need for improved architectural design guided by affordance and human factors principles. Enhancing door usability can improve everyday efficiency and, crucially, ensure safer and more effective evacuation in high-stakes situations.

EMPLOYEES' PERCEPTIONS OF WORKPLACE CHANGE AND REDESIGN

Presenter(s):   Hindman Katie, Undergraduate, Psychology
Williams, Sarah, Undergraduate, Psychology
Lomelino, Tori, Graduate, Psychology
Hubbard, Emily, Graduate, Psychology

Mentor: Dr. Kimberly Schneider

Authorship: Katie Hindman, Sarah Williams, Tori Lomelino, Emily Hubbard

Purpose: In preparation for a workspace redesign, we collaborated with an architectural group to conduct interviews and focus groups with employees from a social service agency regarding their perceptions of a need for change in their physical workspaces. With an increase in hybrid and remote work options, there is demand for more flexible workspaces. The agency was interested in exploring options for converting office space into more flexible 'touchdown' spaces where employees are not assigned individualized space but could share offices and arrive on flexible schedules, moving between spaces and locations as needed. Focus groups and interviews were conducted to collect employee feedback on workspace needs and perceptions of change.

Project Methodology: We describe themes from employee feedback from focus groups and interviews with 25 employees using questions regarding need for change in their physical workspace, ideal preferences for spaces, and preferences for interacting with coworkers. Most employees described the desire for personalized workspaces, improved storage systems, and a more centralized layout to reduce inefficiencies. In addition, we are currently collecting data from all employees using a standardized survey. Survey assessment is focused on the need for belongingness at work, current workspace and ideal workspace preferences, and employee satisfaction.

Results: Based on interviews and focus group data, we determined from independent observers that 7 themes were discussed regarding concerns with current workspace. These include a lack of personal space, insufficient layout, minimal storage, excessive travel time between locations, accessibility difficulties, and concerns regarding the confidentiality of conversations. We will report preliminary analysis of survey data currently being collected. We expect to find that perceptions of a need for change will predict openness to change as well as higher levels of organizational commitment. We will also examine differences in openness to change and perceived need for change based on age, years with the organization, and job type.

Implications: Our study can inform the social service agency we are collaborating with regarding how to best communicate upcoming changes to employees, as well as how to prioritize the types of changes that are necessary.

INVESTIGATING THE INFLUENCE OF MOOD ON SHORT-TERM FALSE MEMORY FORMATION

Presenter(s):   Jodlowski, Vanessa, Graduate, Psychology

Arquilla, Isabelle, Undergraduate, Psychology

Mentor: Dr. Dawn McBride

False memories occur when associative correlates of information are activated upon their presentation, such as semantic or phonological properties of word lists. False memory formation in short-term memory (STM) has shown a dependency on list type, with phonological lists producing more false memories than semantic lists. Research has also shown that mood has the potential to influence the formation of false memories. The present study is looking to examine the effect of list type (semantic vs. phonological) and mood (positive vs. negative) on false memory at a short-term delay between study and test. Participants will complete a baseline mood survey before watching either a positive or negative film clip, followed by another mood survey and a word-list memory task. Finally, a third mood assessment will be given, followed by an amusing film clip to reestablish a positive mood. It is hypothesized that participants in the positive condition will produce higher levels of false recognition rates and that phonologically related word lists will produce higher levels of false recognition. However, this effect is expected to differ depending on the type of list studied. Understanding the relationship between mood and false memory in STM is crucial when considering student learning outcomes and eyewitness statement credibility during interviews or crime investigations.

POLITICAL ORIENTATIONS AND OSTRACISM

Presenter(s):   Marcikic, Aidan (he/him), Undergraduate, Psychology
                Owens, Angelina (she/they), Undergraduate, Psychology
                Hernandez, Alexandria (she/her/hers), Undergraduate, Psychology
Mentor: Dr. Allison Nguyen (she/they)

Authorship: Aidan Marcikic (he/him), Charlisa Mao, Ari O'Connell, Madi Sapp, Kelly
                Fletcher, Alexandria Hernandez (she/her/hers), Dante Caruso, Allison
                Nguyen (she/they)

College students are an increasingly large percentage of the voting population, with 66% of college students across 1000 institutions in the United States voting in the 2020 election (Thomas, et al., 2021). Consequently, how college students understand the messaging political parties use to promote their platforms is of utmost importance to understand how they understand political viewpoints and learn to self-identify. Another factor for understanding the relation to politics is ostracism, or how excluded people might feel, as people who feel ostracized are vulnerable to more extreme viewpoints, including political viewpoints and conspiracy theories (Poon et al., 2020; Robertson et al., 2022). We hypothesize that college students who are not reminded of political parties' stances will have a harder time distinguishing between them than those who are reminded.

To examine this, we will conduct an experiment looking at knowledge of political issues and political parties, as well as whether participants feel ostracized based on their political beliefs. Participants will be randomly assigned to one of four conditions where they will be asked to assign political parties to different political stances ("Marijuana should be legal"). For two of the conditions, they will read descriptions of the political parties before responding, with the question about political orientation varying in location (please see Table 1 for details on the four conditions). Each condition will contain a qualitative question regarding participants' level of ostracization given their assigned political orientation. We will have an IRB filed by early November and will finish data collection by December.

We will analyze this data by using a coding scheme to determine the accuracy of participants responses in comparison to political party positions. Then, we will conduct a 2 x 2 ANOVA to compare the four conditions. We predict that giving participants the descriptions of political parties will increase the accuracy of assigning viewpoints to parties and we predict that there will be an interaction between participants' political beliefs and accuracy, such that participants who read the descriptions and provide their viewpoints at the beginning of the study will be more accurate at identifying statements, because the differences between the parties will be the most salient.

Understanding whether college students can correctly identify political stances with parties has implications for how accurately policy statements are being communicated by political parties and can provide insight into one of the fastest-growing groups of voters in the United States.

THE RELATIONSHIP AMONG BODY SATISFACTION, SELF-EFFICACY IN PERFORMANCE AND WEIGHT CONTROL BEHAVIORS IN COLLEGE AGED STUDENTS IN PERFORMANCE ARTS

Presenter(s):   McElmury, Kailey, Undergraduate, Psychology

Mentor: Dr. Suejung Han

The purpose of this research is to examine the relationship between body satisfaction and self-efficacy in performance among collegiate students in performing arts. McAuley, Bane, and Mihalko (1995) showed that among a community sample of middle-aged adults, anxiety about body image was negatively associated with physical self-efficacy in exercise tasks, which was improved by increased level of exercise. However, previous research has found that those in performance arts, specifically dancers, experience more negative self-perceptions about their bodies, placing them at higher risk for body dissatisfaction (Gearhart et al., 2018). This same study revealed that approximately half of the participants believed their performance was affected by their weight. These results suggest that body dissatisfaction, particularly based on their weight, may undermine self-efficacy in performance among dancers. The Gearhart et al. (2018) study only focused on dancers; this speculation may also be applicable to those in a variety of performance arts, such as gymnasts, aerialists, and acrobats, because certain body types (i.e., slim with low weight) are deemed more desirable in performance arts and they tend to use form fitting attires. Therefore, I hypothesize that for those who participate in performance arts, body dissatisfaction will be negatively associated with self-efficacy within performance and weight control behaviors. Participants will be college students in a performance based Registered Student Organization at a Midwestern university. Data collection will start in January 2025 upon the IRB approval, with data analysis occurring in March 2025 to be ready to present in April 2025. After giving informed consent, participants will complete a survey through the online platform, Qualtrics. The survey will consist of items from the Body-Esteem Scale for Adolescents and Adults (BESAA) (Mendelson, White, & Mendelson, 1997), modified items from the Athlete Self-Efficacy Scale (ASES) (Kocak, 2020), and the Oxford Food and Activity Behaviors 20-item questionnaire (OxFAB20) (Hartmann-Boyce et. al., 2022). A Pearson Correlation analysis will be conducted for hypothesis testing. This study's results can inform athletes in performing arts and their coaches that addressing body image concerns may be instrumental for enhancing self-efficacy in performance and preventing unhealthy weight control behaviors among these athletes.

OPTIMIZING AAC BOARD LAYOUTS: THE IMPACT OF ORGANIZATION ON COMMUNICATION EFFICIENCY

Presenter(s):   O'Connell, Ari, Undergraduate, Psychology
                Hernandez, Alexandria, Undergraduate, Psychology

Mentor: Prof. Allison Nguyen

Authorship: Ari O'Connell (she/her), Alexandria Hernandez (she/her), Allison Nguyen (she/they)

Augmentative and Alternative Communication (AAC) is used by 2 million individuals in the United States alone to return communication to those with both temporary and life-long impairments (U.S. Department of Health and Human Services). These AAC boards can be static physical objects where the user must point or otherwise indicate an object, or alternatively, can make use of technology to create an interface between the user and the board (Elshar et al., 2019). Many of these individuals use AAC boards that contain words and pictograms to communicate with conversational partners. The layout of these boards is oftentimes pre-set, and organized by groupings such as "people" - i.e., organized by the semantic content of the words.

Research from lexical access suggests that words are recognized and accessed faster when they are high- frequency (Whaley, 1978), and when they are strongly semantically related to the previous content (Buchanan, et al., 2001). This suggests that boards laid out according to frequency and semantic content will be more intuitive and easier to use for people than boards laid out using other principles.

This study aims to address the gap in the understanding of layout efficiency of AAC devices as they are initially set up for new patients. Three layouts–semantic, alphabetical, and word frequency organization– were chosen and made using Cboard's online website with words related to college. Participants viewed one of the three boards and were instructed to recreate three given sentences with the board to analyze the speed at which participants could recreate given sentences most effectively.

We predict that the AAC boards laid out by semantic content and word frequency will have the fastest times for sentence construction, and that the board laid out by alphabetical organization will have the slowest time for sentence construction.

This has important implications for accessibility. Creating layouts that more closely resemble the ways word recognition happens increases speed, reducing the barriers to communication for people who are using AACs. Because these boards are so widely used, by a variety of people in a variety of situations, boards that are easy to use and require minimal instruction can increase use of this low-cost communication technology.

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IMPLEMENTATION OF A COURSE ABOUT DIVORCE IN HIGHER EDUCATION

Presenter(s):   Owusu, Emmanuel, Graduate, Psychology

Mentor: Dr. Julie Campbell

Authorship: Emmanuel Owusu, Julie Campbell

Learning about the impact of divorce on young adults and children may benefit professionals mentoring those who have experienced the turbulence of divorce. Evidence suggests that a high proportion of people in the United States are affected by divorce. Most have experienced divorce directly or indirectly within their immediate family or friends (Aberg, 2011). The preponderance of negative effects of divorce on child and adolescent development is well documented (Cano & Gracia, 2022). Adolescents and emerging adults who experienced their parents' divorce may not experience typical developmental milestones in the same way as those from non-divorced families (Dykes & Ward, 2022).

Courses may exist at the graduate level within a specific field of study for those training to become professionals working with individuals going through divorce. Some undergraduate courses in the social sciences include a limited component covering the family dynamics of divorce. However, many professionals teaching adolescents may have knowledge of the effects of divorce or that awareness can create empathy for those experiencing this trauma. Becoming aware of the effects of divorce on an emerging adult can assist those in higher education to strengthen their knowledge of those they teach.

This project documents the implementation of a course centered on the topic of divorce. An honors course was taught in which students were exposed to several topics surrounding divorce and asked to examine their own beliefs about the topic. Students engaged in activities in which they analyzed the relation between parents' marital status and society's resulting view of a child. Students examined how milestones during adolescence can be affected by parents' marital status and family structure. Students examined historical and modern patterns of relationships, marriage, and divorce. The course also included the identification of problems faced by modern marriages and the social and environmental factors that play a role in divorce culture. A summary of the students' demographics and their reflections about the class are presented.

THE EFFECTIVENESS OF A MICROAGGRESSION TRAINING SERIES FOR HIGH SCHOOL STUDENTS

Presenter(s):   Rivera, Giselle, Graduate, Psychology
Sierra, Bianca, Graduate, Psychology

Mentor: Dr. Brea Banks

Authorship: Giselle Rivera, Bianca Sierra, Brea Banks

Microaggressions are everyday interpersonal slights enacted against individuals holding minoritized identities that have documented negative effects (Solórzano & Perez Huber, 2020). Most of the literature has focused on the experiences of adults, and even less research has focused on the effectiveness of trainings to combat microaggressions.

We used a quasi-experimental design and sampled students in general psychology classes at two Midwestern high schools. Four classrooms at one school were assigned to the experimental group (i.e., received the training), and two classrooms at another school in the same district were in the control group (no training). Before the training, all participants completed a pretest survey that assessed demographic variables, knowledge (i.e., definition, types, and examples of microaggressions, reasons for why they are harmful, and productive ways to react as a receiver, witness, or perpetrator). Participants also completed well-established measures to assess their experience with race- and sexuality-based microaggressions. The experimental condition was then exposed to the 6-session training. Following the training, all participants completed the posttest survey.

We are still engaged in data coding and analyses but have conducted some preliminary analyses. Using a RM-ANOVA, time and condition interact to predict improvement in knowledge for the experimental condition specifically relevant to Sue's (2017) taxonomy of the types of microaggressions, Wilks $\Lambda = 0.61$, $F(1, 75) = 47.05$, $p < .001$, $\eta p^2 = .39$. We will conduct additional RM-ANOVAs to examine within and between subjects changes in the other specified variables after the completion of coding this spring.

This is the first known study to examine the impact of a microaggression training for high schoolers. The results will add to the microaggression literature and are directly relevant for school psychology practice. As part of the session, we will discuss the implementation of the training, as well as specific implications for practitioners.

ADVERSE CHILDHOOD EXPERIENCES AND ADOLESCENTS' SENSE OF SELF OUTCOMES: THE MODERATING ROLE OF STUDENT-TEACHER RELATIONSHIPS

Presenter(s)*:*   Spraggon, Meredith, Graduate, Psychology

Mentor: Dr. Laura Finan

Authorship: Meredith Spraggon

This study investigates the intricate interplay between adverse childhood experiences (ACES), sense of self outcomes, and student-teacher relationships (STR). Utilizing a sample of 271 undergraduate students from a Mid-Western state, the research investigates the associations between ACES, self- esteem, social self-efficacy, and the role of STR as potential buffers against adverse outcomes. The findings revealed a high prevalence of reported ACES among participants, emphasizing the urgency to understand mitigating factors such as teacher relationships. Consistent with existing literature, ACES exhibited negative correlations with both self-esteem and social self-efficacy, underlining their detrimental impact on psychological well-being. Additionally, the study unveils a positive association between high school STR and college students' sense of self, indicating the enduring influence of such relationships. Despite not finding significant moderation effects, the study underscores the pivotal role of teacher relationships in bolstering student well-being. These insights advocate for educational interventions emphasizing supportive teacher-student dynamics to foster positive developmental outcomes despite early adversities.

INVESTIGATING PRECRASTINATION IN ACADEMIC SCENARIOS

Presenter(s):   Szkapiak, Sadie, Undergraduate, Psychology

Mentor: Dr. Dawn McBride

Authorship: Sadie Szkapiak

Precrastination describes a tendency to complete a task as soon as possible, even when doing so has negative consequences. Previous studies have primarily measured precrastination using a bucket-moving task. The present study examines whether precrastination occurs in academic contexts as well. Participants were asked to consider several hypothetical scenarios involving academic tasks. Variation in the deadline of the assignment, (5, 7, 10, 14, or 30 days) and task length (short or long) were manipulated across scenarios. Additionally, participants completed the traditional bucket-moving task that has shown precrastination in past studies (e.g., Rosenbaum et al., 2014). Results will be analyzed to test if precrastination is seen in academic scenarios. Additionally, we will examine whether precrastination in academic tasks is associated with behavior in the bucket-moving task.

TRUST IN PERSONALITY TESTING

Presenter(s): Taylor, Sean, Undergraduate, Psychology

Tampa, Lindsey, Undergraduate, Psychology

Mentor: Dr. Burak Ozkum

Authorship: Kara Cannon, Sean Taylor, Lindsey Tampa, Burak Ozkum

One's inherent trust in the perceived accuracy of personality test results may rely upon several culturally dependent variables of a population, including the need for cognition, skepticism, confirmation bias, pseudoscientific beliefs, and general self-awareness, which may be exhibited with several degrees of variance between cultures. The present study seeks to replicate the "Trust in Personality Test Results and Associated Factors" project conducted in a Turkish I/O Psychology workshop to discern cultural idiosyncrasies in their trust in personality testing, particularly between Turkey and the US. Participants (n = 250) responded to a personality inventory based on the Meyers-Briggs Type Indicator framework, the NERIS Type Explorer or the "16Personalities Test", before being randomly assigned to one of three conditions which determined the degree to which their MBTI type was accurate (accurate result, adjacent result, opposite result). Participants then responded to a form collecting data regarding their level of agreeableness regarding pseudoscientific beliefs. The present study seeks to determine if the results from the Turkish sample can be replicated within the US sample based upon potentially influential cultural variables between the two populations, and we expect response patterns to vary relative to the assigned condition (accurate result, high trust). We seek to explore two possible outcome explanations; If the Barnum effect, a variable influencing response patterns to be more agreeable to general descriptives is present, irrelevant of the accuracy of feedback, respondents will trust their results. Conversely, the trust of respondents will result from the accuracy of the feedback (no Barnum effect/well developed test). As the study is finalizing data collection, results are hitherto not available but will be for the symposium.

DEAF/HARD OF HEARING EARLY CHILDHOOD EDUCATION MOVEMENT AND MATH STUDY

Presenter(s): Czirjak, Annie, Undergraduate, Special Education

Mentor: Dr. Christy Borders

Co-Mentor: Dr. Michelle Gremp

Authorship: Annie Czirjak, Christy Borders, Michelle Gremp, Julien Corven, Mary Henniger, Skip Williams

Language acquisition is directly related to number learning because of the strong correlation of vocabulary to number word learning. Deaf/hard of hearing (DHH) students who receive delayed exposure to language tend to fall behind their hearing peers in mathematics even though DHH individuals have the same foundational, non-symbolic cognitive systems that lay the foundation for mathematical development and a similar ability to learn from perceptual experience (Shusterman & Peretz- Lange, 2022). Through this research study, the team of researchers will be examining the impact of various math activities incorporating movement on Deaf preschool students' counting, subitizing (quickly and fluently recognizing sets without counting individually), and problem-solving. Participants' problem-solving, subitizing, and counting will be measured across conditions such as fine motor vs. gross motor activities; nonacademic movement prior vs not; and balance/coordination vs. reaction time activities. There is a strong link between body and mind in learning, so by increasing movement in the classroom, children are more actively engaged, and their brains are better prepared to learn (Kosmas et al., 2019).

The research team, which will be working closely with preschool DHH teachers, comprises faculty across various disciplines, including early childhood math, math education, physical education, and education of the deaf and hard of hearing, as well as two teacher candidates in the DHH program. The team will meet two times a week for one and a half hours with rotating conditions to see whether movement affects math acquisition in young DHH students. The students will be broken up into three groups, each group receiving a different treatment, and they will rotate treatments monthly. The groups will be broken up into fine motor math, gross motor math, and gross motor with no math. The alternating treatment design will allow researchers to evaluate and compare the conditions. Through this study, we are looking at three specific questions: 1) What is the impact of regular math activities incorporating movement on problem-solving, counting, and subitizing in preschool DHH students? 2) What do teacher candidates who are involved on an interdisciplinary team delivering math activities incorporating movement to DHH preschoolers see as benefits and obstacles to their teacher training? 3) How does engagement in this project impact selfefficacy to teach math to DHH students for DHH preschool teachers and teacher education candidates? Individual students will be analyzed to discover the possible effects of movement and to inform future math instruction for those students.

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GENDER NORMS AND VIOLENCE: ATTITUDES TOWARDS RAPE AND INTIMATE PARTNER VIOLENCE IN NIGERIA

Presenter(s): Ebubechukwu, Mmeri Patricia, Graduate, Sociology/Anthropology

Mentor: Dr. Winfred Avogo

Societal norms are deeply rooted in attitudes towards Gender Based Violence. Different societies have cultures distinct to them that influence Nigerian individuals. Socio-cultural norms play a critical role in shaping attitudes towards gender-based violence. In Nigeria, diverse ethnic, cultural, and religious traditions influence individual and collective perceptions of GBV, including rape and intimate partner violence (IPV). This study examines the interactive effects of gender norms on attitudes towards IPV across various ethnic groups in Nigeria. It also explores the influence of cultural and religious institutions in shaping legal frameworks and societal responses, determining whether GBV is tolerated or condemned.

This study uses Pierre Bourdieu's theory of practice, especially because of its two important concepts that are deemed relevant to this study, which are meaning and cultural capital. Habitus is the way by which one internalizes and perpetuates a society's norms and values as they relate to the roles of gender in such a way that people come to normal or abnormal attitudes towards Gender Based Violence. On the same note, it will also open up the discussion on the different powers within such cultures and societies response to Gender Based Violence.

Much of the existing research on the determinants and mechanisms of gender-based violence (GBV) has been conducted outside Africa, limiting the development of context-specific policy interventions. This study is essential for understanding how cultural and religious beliefs shape attitudes towards GBV in Nigeria. It examines the roles of traditions and legal systems in either reinforcing or challenging GBV, highlighting the profound influence of societal norms on perceptions of violence. Additionally, this study explores how these harmful gender norms are passed down and normalised in society; it also considers Nigeria's ethnic and cultural backgrounds, offering an intersectional view of GBV.

The main focus of this study is on ethnic differences in gender-based violence in Nigeria- specifically differences in gender norms, cultural and religious practices, family structure, socio- economic status and women empowerment between the ethnic groups in Nigeria.

The study uses secondary data drawn from the Demographic and Health Survey (DHS) conducted in Nigeria in 2018. We use descriptive statistics and multivariate techniques to examine the social determinants of gender-based violence among the major ethnic groups in Nigeria. This study seeks to uncover the cultural, social and institutional factors influencing attitudes toward Gender-Based Violence (GBV) in Nigeria. The findings aim to provide an understanding of the interplay between gender norms and legal frameworks in shaping perceptions of GBV.

INTERFAITH MARRIAGES: EXPLORING THE ROLE OF UPBRINGING AND LIVED EXPERIENCES ON INTERFAITH COUPLES' RESPONSES TO STEREOTYPES AND UNION DECISIONS

Presenter(s):   Gogoi, Meghna, Graduate, Sociology/Anthropology

Mentor: Dr. Marion Willetts

This study on interfaith marriages is a fine example of the micro-macro linkage that we seek to make in sociology. Marriage is a "primary," intimate relationship but one that increasingly involves "intermarriage" across lines of race/ethnicity, religious and cultural backgrounds. Interfaith marriages, which refer to unions between individuals from different religious backgrounds, are becoming very common in today's contemporary society. Therefore, it is relevant to understand the experiences of couples in an interfaith marriage. This study explores how upbringing and lived experiences shape the ways interfaith couples respond to stereotypes and make decisions about their union. This study tries to understand the motivations to participate in an interfaith marriage despite societal resistance. I have found a relative lack of attention to the interpretive, contextual understanding of "interfaith marriage," still less that focuses on the marriage dyad as the unit of analysis. Therefore, I conducted online Zoom interviews with five interfaith couples by interviewing both spouses separately who are living in the United States and belong to Christian, Hindu, or Muslim religious backgrounds. These interviews explore how both spouses navigate cultural and religious differences, deepening my understanding of the interplay between individual agency and structural forces. This qualitative approach acknowledges the unique cultural, social, and personal contexts of each partner, providing a comprehensive understanding of their experiences. Also, I hope and believe that my future findings may also inform clinical/counseling professionals who must deal with the array of issues surrounding the couple that shape the quality and longevity of such marriages.

THE DEVELOPMENT AND TRANSMISSION OF NUT-CRACKING AND STONE- KNAPPING SKILLS IN YOUNG CHILDREN

Presenter(s):   Salmons, Heather, Undergraduate, Sociology/Anthropology Mentor:

Dr. Shelby S. J. Putt

Authorship: Heather Salmons, Shelby S. J. Putt

One of humanity's defining features is the ability to transmit skills and behaviors through social learning, starting from a young age. The archaeological record of stone toolmaking offers some insights into the evolution of this feature; however, there is little research done on children's stone toolmaking abilities. A sample of 14 preschool-aged children participated in a study focusing on two stone tool-related tasks involving the extraction of a toy prize: a puzzle box , requiring a knapped flake to open, and an artificial nut, requiring a hammerstone to crack it open. The children were assessed on their working memory capacity and the effect this had on how they solved each task under three different learning conditions (insightful problem solving, reverse engineering, and imitation). Productivity, efficiency, and expediency at each task were used to measure success in relation to their working memory size. Participants were successful at the nut-cracking task under each learning condition, and working memory size had no detectable effect on their performance. However, there was significant improvement on the knapping task between the asocial and social learning conditions, and there was a significant positive correlation between knapping task success and working memory size. Therefore, social learning may be necessary for hominins with a limited working memory size to successfully transmit knapping behaviors due to the complexity of the task. These results support an early emergence of complex social learning in human evolution.

LECTURES OF LANGUAGE: THE LONG-TERM EFFECTS ON ELL STUDENTS' MENTAL HEALTH

Presenter(s):   Guzman, Jasmine, Undergraduate, Teaching and Learning

Mentor: Dr. Miranda Lin

There is plentiful research in the field of education about English Language Learners (ELLs) in the U.S. Throughout history, there have been extensive policy changes that have evolved for ELLs in the classroom. These have been essential to creating an effectively inclusive environment for all students, no matter their upbringing. The literature review focuses on the long term effects the current ESL programs might have on ELL students as they grow older guided by Bronfenbrenner's ecological theory (1979). Bronfenbrenner's theory emphasizes the learner's context in various systems. Although students often transition out of English as a Second Language (ESL) programs once proficiency is tested and demonstrated, there are continuous impacts on these students even subsequently. In this literature review, I assess different educational policies and ideologies in history and how these affect multilingual learners in the classroom. Additionally, I research ELL student outcomes and how being in ESL programs specifically impacts their mental health later on. To conclude, I look at these correlations and focus on what teachers can do to ensure the most effective and beneficial experience for ELL students and their mental health throughout their education and later on.

TECHNOLOGY IN THE SECOND LANGUAGE ACQUISITION CLASSROOM: ATTITUDE, PERCEPTION, AND PREPAREDNESS OF LANGUAGE TEACHERS IN GHANAIAN IB SCHOOLS

Presenter(s):   Tay, Amanda, Graduate, Teaching and Learning

Mentor: Dr. Anna Smith

The integration of technology in education has become increasingly essential, particularly in the wake of the COVID-19 pandemic, which forced schools worldwide to rethink traditional teaching methodologies. In the Global South, including Ghana, school closures accelerated the adoption of online learning, challenging both educators and students to adapt to digital tools that were previously underutilized in educational settings. Since then, technology has become an integral part of teaching, requiring educators to continuously enhance their digital literacy. This is particularly evident in Ghanaian International Baccalaureate (IB) schools, where the curriculum explicitly prescribes the use of technology to improve teaching and learning outcomes.

Despite the emphasis on technology in IB schools, many language acquisition teachers struggle with its integration. As a former IB language teacher and Head of the Language Acquisition Department, I observed firsthand the difficulties some colleagues, particularly older educators, faced when using digital tools. Their frustration with new technologies in lesson planning and instruction highlighted a need to examine the attitudes, perceptions, and preparedness of language teachers regarding technology use in IB schools in Ghana.

In this study, I employed a mixed-methods approach, combining quantitative and qualitative research to provide a comprehensive analysis of the issue. A survey was conducted across selected IB schools in Ghana to gather large-scale data on teachers' perceptions of technology and the factors influencing their integration of digital tools. This was followed by in-depth interviews with selected participants to gain deeper insights into their experiences and perspectives.

The findings reveal four key insights: (1) Teachers generally feel prepared to use technology, primarily due to their self-motivated efforts to stay updated; (2) While teachers maintain a positive attitude towards technology, resistance persists, irrespective of age, education level, or teaching experience; (3) There is a strong demand for specialized professional development, particularly in advanced digital tools and troubleshooting; and (4) Infrastructural challenges, such as limited resources and unreliable internet, remain significant barriers to effective technology integration.

To address these challenges, I would like to recommend targeted training programs focusing on troubleshooting, graphic design, and advanced educational technology, particularly for language instruction. Additionally, structured mentorship and technical support should be strengthened to ensure equitable access to professional development. Finally, systemic changes—including policy support, investment in digital infrastructure, and strategic planning—are necessary for the successful

integration of technology in IB language classrooms in Ghana. By addressing these barriers, educators can be better equipped to leverage digital tools to enhance language learning.

STUDENT SUCCESS COURSES INTRODUCING STUDENTS TO THE MAJOR DEPARTMENT

Presenter(s):   Campbell, Claire, Undergraduate, Physics

Mentor: Dr. Matthew Hagaman

Authorship: Szymon Lucer

Students who have early introductions to their department and its resources, personnel, and opportunities are more likely to feel a sense of belonging, increasing departmental retention. Departments or schools at ISU can provide students with these introductions through student success courses.

In Fall 2024 and Spring 2025, ISU Inclusive Excellence STEM Ambassadors conducted faculty interviews and student focus groups, identifying ideal models for student success courses introducing students to the major department.

This work led to a greater understanding of the approaches being taken in these courses in different departments or schools across campus, from bringing research faculty and community members into the classroom to sharing school or department resources that might otherwise go underutilized.

This work also led to a record of students' hopes for these courses and an accounting of students' reactions to proposed course changes in ISU's School of Biological Sciences.

PROJECT 7408 - GAMIFYING THE LEARNING THROUGH IMMERSIVE VIRTUAL REALITY

Presenter(s): Clark, Alex, Undergraduate, Technology
Coomans, Jack, Undergraduate, Technology

Mentor: Dr. Isaac Chang

Co-Mentor: Prof. Jordan Osborne

IC 7408, a chip widely used in digital circuits and programmable logic controllers, is a good candidate for learning logic design. Nevertheless, the domain knowledge could easily overwhelm the novice, especially when considering the relationship between the chip's operating principles, the interpretation of a given schematic, and the construction of the physical circuit.

This presentation will report a preliminary study using an immersive virtual reality (VR) environment to gamify the students' learning of IC 7408. The learning experience is built upon the escape room scenario, where the learner will be required to solve multiple IC 7408 operating principles puzzles. By visualizing how the component works, the learners will learn how to use the virtual chip to build a logic circuit. Since the learner is "miniaturized" in the VR environment, interacting with items in the room and plugging the water-hose-like electrical wires to power the items could be an exciting experience and might help reinforce learning.

We will discuss how the learning assessment will be performed by measuring the learners' speed and accuracy in constructing the same logic circuit with the physical IC 7408. A post-test survey will be deployed to determine the learners' knowledge retention and individuals' self-efficacy in this subject. We will conclude the presentation with lessons learned and future work.

USING DRIVER DECISION - MAKING PATTERNS FOR DRIVING SIMULATOR VALIDATION

Presenter(s):   Darne, Harish, Graduate, Technology
                Wisniewski, Marc, Undergraduate, Technology

Mentor: Dr. Isaac Chang

This study aims to validate a virtual reality (VR) driving simulator by comparing drivers' decision- making patterns in the immersive virtual environment with those observed in real-world driving conditions. The goal is to assess whether the driving simulation accurately replicates the driver's cognitive loads and behavioral responses to various driving scenarios. To increase the fidelity of the simulation, traffic density, pedestrian crossing, weather conditions, and signals are adjustable within the VR environment.

We will report the methodology, including the VR simulation setup, participant demographics, and data collection. The driver's decision-making patterns will be evaluated with the participant's eye movement, pedal inputs, steering behaviors, and biometric feedback. The participant's behavior measures will include reaction time, braking intensity, lane-change pattern, and speed regulation. Cognition load & stress level will be measured by eye-tracking data and heart rate variability. Statistical tests, including paired t-tests and Pearson correlations, are used for data analysis. Preliminary findings and lessons learned will be reported.

THE OREGON SOLAR PATHWAY: ENERGIZING CAMPUS SUSTAINABILITY

Presenter(s):   Das, Daya, Undergraduate, Technology
Mears, Joe, Undergraduate, Technology
Sheridan, Orla,Undergraduate, Technology
Hiclin, Gavin, Undergraduate, Technology
Delfino, Josh, Undergraduate, Technology

Mentor: Dr. Jin Jo

This project aimed to decrease reliance on grid electricity by implementing on-site solar energy production at the University of Oregon. The primary objective was to enhance the efficiency of solar photovoltaic (PV) systems to offset the energy consumption of nearby buildings and electric buses on campus. Our approach involved analyzing potential installation locations and optimizing system size to align with electrical demand while preventing energy meter overloading. We selected a combination of efficient modules and inverters that were practical for the specified meter configurations and array positioning.

This methodology enabled us to design an optimized solar array and predict energy production in kilowatts. We employed a quantitative financial analysis tool from the National Renewable Energy Laboratory (NREL) to evaluate financial viability, incorporating data on electrical load and energy consumption. This analysis was instrumental in identifying the most cost-effective module and inverter options for our project. Our study thoroughly assessed various sites across the university, weighing their advantages and constraints to determine optimal locations for solar panel installation. A key aspect of our project's design was ensuring that the solar array had at least partial visibility to the public, promoting the University of Oregon's commitment to sustainability and illustrating the investment in creating a cleaner campus environment.

DESIGNING AN ARDUINO-BASED NAVIGATION ASSISTANT FOR VISUALLY IMPARED INDIVIDUALS

Presenter(s):   Deslaurier, Nolan, Undergraduate, Technology
                Black, Jayde, Undergraduate, Technology

Mentor: Dr. Isaac Chang

This presentation covers an ongoing project to develop an on-body unit (OBU) to assist visually impaired individuals with campus navigation. The OBU continuously scans the surroundings using autonomous driving technology and delivers real-time navigation guidance. The Arduino-based navigation assistant can improve mobility and safety for blind or low-vision users by combining object identification, lane keeping, and collision detection. Auditory and haptic feedback will be used to guide the user's movement.

We will discuss the project background, problems to solve, and the initial results. The operating principles of the following functions will be described: (1) Evaluate alternative travel paths based on real-time road conditions; (2) identify objects and lanes for auditory instruction; and (3) detect potential collision and provide action or maneuvering strategies. Preliminary results will be reported, and the project outlook and lessons learned will be discussed.

DATA MANAGEMENT AND SECURITY STRATEGIES IN COMPANIES' PROJECT MANAGEMENT: A MULTI-COMPANY INVESTIGATION

Presenter(s):   Ekeiwu, Marycynthia, Graduate, Technology

Mentor: Dr. Pranshoo Solanki

In an era defined by the exponential growth of digital data and the increasing sophistication of cyber threats, effective management and data security have become mission-critical for organizations across diverse industries. The companies featured in this study have recognized the strategic importance of implementing robust and stringent data management and security measures to protect their internal and client data. This paper aims to examine the data security and management strategies employed by these organizations and identify industry-wide data management and security systems used in project management. A mixed research methodology which includes literature reviews, a combination of in- depth interviews and surveys collected from IT professionals working for various companies (Caterpillar, State Farm Insurance, Illinois State University IT, Country Financial, R.R. Donnelley, etc.,) This is an ongoing study, and preliminary findings indicate that these companies incorporate cutting- edge technologies for data security throughout project life cycles.

Keywords: Data management, Security strategies, Data security, Project Management

THE ROLE OF INNOVATION IN REDUCING UNEMPLOYMENT THROUGH JOB CREATION, ENTREPRENEURSHIP, AND WORKFORCE ADAPTATION

Presenter(s):   Kinoti, Hildah, Graduate, Technology

Mentor: Dr. Sally Xie

Unemployment is one of the most pressing global challenges, worsened by rapid technological advancements and economic upheavals. Yet, within this challenge lies a powerful opportunity: innovation. Innovation has the potential to not only disrupt but also transform labor markets, create entirely new industries, and drive sustainable economic growth.

This study explores how innovation reduces unemployment through job creation, entrepreneurship, and workforce adaptation. Employing a mixed-method approach, including case studies and surveys, it identifies critical factors such as educational reform, inclusive policies, and public-private collaboration in maximizing the employment benefits of innovation.

The findings underscore that while innovation can displace traditional roles, it simultaneously creates pathways for entrepreneurs and upskilled workers to thrive in new opportunities. This research offers actionable strategies for bridging resource gaps, nurturing entrepreneurial ecosystems, and aligning workforce development with emerging technological trends. By doing so, it aims to guide policymakers, educators, and industry leaders in leveraging innovation as a transformative force for inclusive economic growth and resilient labor markets (Schumpeter, 1942; World Economic Forum, 2020; Autor & Salomons, 2019).

TECHNO-ECONOMIC ANALYSIS OF INSTALLING LED LIGHTING, SOLAR, AND BATTERY STORAGE THROUGHOUT A MANUFACTURING FACILITY

Presenter(s):   Markham, Matthew, Undergraduate, Technology

Mentor: Dr. Jo Jin

A manufacturing company leading in industrial equipment manufacturing, specifically steel and vacuum tanker manufacturing, is exploring the economic feasibility of implementing sustainable energy solutions at its facility. This research evaluates three key initiatives, along with four important case studies: retrofitting outdated lighting with energy-efficient alternatives, installing a solar farm on company property, and incorporating a battery storage system. The study aims to determine these investments' financial and operational benefits while assessing potential cost savings, return on investment (ROI), and environmental impact. The research methodology involving environmental impacts remained stern and was used to determine any benefits. The first case study assessed current energy consumption, upgrade costs, and projected savings from LED or other high-efficiency alternatives already in place. The second case study presented the savings, costs and other profits of replacing all existing halogen lighting with LED's. The third case study examined solar farm feasibility and examine site-specific solar potential, installation costs, available government incentives, and expected energy generation. Additionally, battery storage was studied as part of the fourth case study for its ability to charge, reduce peak demand charges, and optimize solar energy generation. These findings suggest that upgrades should kept being made, as well as that LED lighting offers a rapid payback period through reduced electricity consumption and maintenance costs. The solar farm presents long-term savings and potential revenue generation through net metering programs. However, its economic viability depends on capital costs and incentive availability, as incentive rates are decreasing. Battery storage, while enhancing energy security and grid independence, depending on an off grid or on grid system, requires careful financial modeling to justify its investment. By integrating these sustainability measures, this manufacturing company can lower operational costs, reduce carbon emissions, and improve energy efficiency. The research presented a detailed financial projection, helping the company make informed investment decisions. Final recommendations were outlined with the most cost-effective path to achieving energy efficiency and sustainability goals.

COLORING OUTSIDE THE POWER LINES: HOW REDBIRDS CAN ELECTRIFY GRIDLESS NAVAJO HOMES

Presenter(s):   Navickas, Tommy, Undergraduate, Technology
Mentor: Dr. Jin Jo
Authorship: Tommy Navickas, Jin Jo

Of the 15,000 U.S. homes without access to the power grid, more than 13,000 reside in Navajo Nation, spanning four states and 27,000 square miles. By the time many of Navajo Nation's PK-12 students arrive home after lengthy bus rides, they must complete their schoolwork by lantern. The humanitarian issue rests largely unaddressed, but change is afoot. A collaboration between Solv Energy, Heart of America, and California Polytechnic State University (Cal Poly) in San Luis Obispo titled Skip-the-Grid empowers college students to install 1 kWh solar battery systems for unelectrified Navajo homes. The work takes place during Cal Poly's spring break, and students receive course and service credits for their work. Since 2022, they've installed 60 systems, but they need help to make a larger impact. Enter Illinois State. Redbird staff were invited observe the Skip-the-Grid project in 2025 with the goal of adapting it for Illinois State University students by the 2025-2026 school year. The experiential learning project is interdisciplinary, involving technical training, professional communication, cultural learning, and a teaching component. College students present a lesson on the importance of renewable energy to elementary-level students at a Navajo school. Through the creation of an independent study, this opportunity would bring value to Redbird student experiences across programs at both the undergraduate and graduate levels. The work empowers students to improve the lives of others while receiving an immersive understanding of an underreported domestic crisis.

STRATEGIES FOR PROMOTING STUDENT-FACULTY CONNECTIONS AND FOSTERING STUDENT SUCCESS

Presenter(s):   Swinford, Rylie, Undergraduate, Geography, Geology, and the Environment

Mentor: Dr. Matthew Hagaman

Students who feel connections with faculty have reported higher belonging, which has a strong correlation with student success, as measured through GPA, retention, and graduation rates. Even in large classes with students whose knowledge and skills vary, strategies to promote positive student-faculty connections can lead to improved learning outcomes and greater student success.

In Spring 2024, ISU Inclusive Excellence STEM Ambassadors interviewed 33 first- and second-year STEM students asking for their advice to future students, instructors, advisors, and administrators. The frequency of themes in student responses highlighted what was most important to students: a need for students to get involved and reach out for help earlier as well as a desire for faculty to meet students where they are in their current knowledge. These themes emphasized a desire for student-faculty connections, leading to a new study.

In Fall 2024, the STEM Ambassadors conducted surveys to capture perceptions of connections from both ISU students and faculty members. Following email invitations, 75 students and 49 faculty responded. Both qualitative and quantitative results showed that students and faculty value connections and that both groups recognize challenges building and maintaining connections in large and general education courses. Students and faculty rate connections at present as neutral; however, there also appears to be a disconnect between faculty intent and student perceptions. Based on student and faculty responses and with support from literature, five big ideas for forming connections were identified: being approachable, being responsive, encouraging investment, giving classes a conversational focus, and reaching outside of the classroom.

There are clear steps related to each big idea that both students and faculty can take to better leverage connections in the classroom. With increased application of these strategies, measures of student success including GPA, retention, and graduation rates can all be positively impacted, and student success may lead to successes further in the future.

VACATION PLANNER

Presenter(s):   Tucker, Jack, Undergraduate, Communication Sciences and Disorders

Mentor: Dr. Elahe Javadi

Problem/Opportunity

Forming a vacation takes a lot of research, time, and sketchy websites. When looking for hotels or activities for a trip, scouring the internet can take hours. Using the power of ai, gathering all of that information as well as it being catered to your interests grants us a huge opportunity to grow the traveling industry.

Major Features of Your Prototype, LLM, Tools

Ability to find hotels, or living conditions for your trip in specific places. Ability to find activities for a trip depending on your interests (outdoors, arts, history).

Benefits of The Project

This project can enhance how people travel, creating catered vacations for each singular person.

Potential Audience

The potential audience would be young adults and older who love to travel across the world but aren't familiar with what is available in the different locations regarding living and activities

Costs, Learning Time, Risks

There shouldn't be any cost or high learning time or risks involved with this project, other than getting data from the internet for finding hotels, air bnbs or other living situations.

REDEFINING THEATRICAL PRACTICES FROM COLOMBIA'S INDIGENOUS

Presenter(s):   Alexander, Michelle, Undergraduate, Theatre, Dance, and Film

Mentor: Dr. Le'Mil L. Eiland

Authorship: Michelle Alexander

La Yonna, a traditional dance of the Wayuu, and *La danza Jepa*, a dance adaptation of the traditional healing movement of the Emberá-Chami, are both Columbian dance practices built upon ancestral indigenous customs that are performative in nature. While these dances can be seen today at native dance conventions and competitions in Colombia, they are history and culture preserved. These matrilineal tribes demonstrate different ways that culture survives under oppressive structures and further expose the falsehood behind the claim that "Spain brought theatre to South America". These two distinct dances from Colombia present the power behind femininity in their cultures. Practices common to indigenous populations pre-colonization seldom utilized the word "theatre" to define them, however, does that mean they are not theatre? The theatre zeitgeist often leaves dance or "ritualistic" performances out of its definition despite the rich history of their conceptual integration. By including their practices as part of the "theatre canon", we further debunk the assertion that femininity is a "weak" or "demeaning" trait, as has been previously pushed by feminine stereotypes in theatrical spaces (i.e. the ingenue, the damsel in distress, the blonde, etc.). For these dances to best dispel the misconceptions that theatre was brought to South America by the Spanish, we must first review and revise the definition of 'theatre'. This research seeks to highlight the importance of indigenous and gender studies as it pertains to theatre with the goal of encouraging cultural compassion and diversifying the canon.

EVALUATING APPLIED THEATRE INTERVENTIONS: A CASE STUDY OF THE ASUBOA PROJECT

Presenter(s): Igwe, Fredrick, Graduate, Theatre, Dance, and Film

Mentor: Dr. Derek Munson

Authorship: Fredrick Igwe

The efficacy of applied theatre remains a subject of debate, with some arguing that it fails to bring about meaningful change, while others, drawing on Augusto Boal's philosophies, view it as a powerful tool for transformation. A key issue fueling this debate is the challenge of evaluating impact, as no universal method exists to measure outcomes. My research highlights the necessity of context-specific metrics to assess applied theatre's effectiveness. I developed an evaluation framework for the Asuboa Project, one of my earliest applied theatre experiences in Africa that measures short- and long-term impacts at both community and individual levels. Using the Asuboa Project as a case study, my research traces the development, practice, and influence of applied theatre and argues that meaningful assessment requires evaluation tools tailored to specific contexts.