



2022 University Research Symposium

Program Book

A Celebration of Creativity, Research and Knowledge



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Welcome to the 2022 University Research Symposium

Research is fueled by curiosity, the desire to innovate, and the need to find solutions to the world's pressing problems. Illinois State University recognizes that research encompasses diverse forms of inquiry, creativity, and innovation and we invite all students to participate in our community of scholars. Student research occurs across the campus in the context of specific courses, independent studies, summer research experiences, and thesis and dissertation projects. Faculty and staff mentors work with our students to make valuable intellectual or creative contributions to their disciplines. In fact, many faculty publications, conference papers, and creative works include student co-authors and student contributions.

Our offices and campus partners are proud to support student research with grants and travel funds, workshops, technical resources, research competitions, and exhibitions. We encourage and enable students to take part in off-campus professional and academic conferences at the regional, national, and international level. On campus, the University Research Symposium is the premier showcase for student scholarship, featuring over 300 individual or group oral and poster presentations. New this year, is an e-poster option with over 80 participants aimed to include students who may not otherwise be able to present on-campus as well as a showcase of the 2022 Image of Research Competition winners. This year also marks the 30th Anniversary of graduate student participation in the Symposium.

We've now lived through two years full of unprecedented challenges that impacted our ability to perform research. Our student researchers and faculty mentors have persevered and adapted and we applaud you. Congratulations on your achievements. We look forward to celebrating with you!

Dr. Gina Hunter, Director, Office of Student Research

Dr. Craig C. McLauchlan, AVP for Research and Graduate Studies

Dr. Noelle Selkow, Director, Graduate School

Morning Session Abstracts

Accounting

EARLY EVIDENCE OF THE EFFECT OF ASU 2017-12 ON DISCLOSURE QUALITY OF DERIVATIVE ACTIVITIES

Presenter: Troyer, Joseph
Undergraduate, Accounting

Mentor: Prof. Madeline Trimble

Co-Mentor: Prof. Joe Johnston

The growth in volume of derivative positions and derivative risk management practices over the last few decades has resulted in increased complexity of derivative accounting and disclosure. As such, users of financial statements have called upon the Financial Accounting Standards Board (FASB) to update guidance to increase transparency while preparers seek clearer guidance for the application of derivative related standards. The most recent derivative accounting guidance update, ASU 2017-12, broadens instruments that qualify for hedge accounting, expands allowable hedge accounting techniques, and reduces reporting requirements by omitting the need to report hedge ineffectiveness. While these changes might simplify reporting requirements, there is a risk that the omitted disclosures are risk relevant to investors (Chen, Liu, Seow and Xie, 2020). In this paper, we examine whether the FASB achieved its goal of increasing disclosure quality. Using a hand-collected sample of twenty S&P 500 firms, we find that, on average, weighted derivative disclosure quality (DDQ) decreased following the adoption of ASU 2017-12; however, this decline was not realized for firms that chose to adopt the standards early. Our early findings suggest that FASB's proposed benefits of applying the standard update were not uniformly achieved.

Agriculture

A HEDONIC ANALYSIS OF THOROUGHBRED HORSES FROM ONLINE AUCTIONS

Presenter: Camp, Madalynn
Graduate, Agriculture

Mentor: Prof. Michelle Kilber

Authorship: Madalynn Camp, Michelle L Kibler, Jada Thompson, Jennifer Earing, Michael Barrowclough, Jennie Ivey

A horse's lifespan ranges from 20 to 30 years while a Thoroughbred racehorse's career averages just 4.45 years. According to the American Horse Council Foundation, 33% of the horses in the United States are involved in the racing industry. After their racing careers, these horses have a variety of options on where they can go. These include being turned out to pasture, inducted into breeding programs, sold for slaughter, or started in a second discipline. Retired Thoroughbred racehorses can prove to be a great investment for equestrians wanting an athletic horse for an affordable price and provide a second career track for these retired racehorses. This study aims to analyze bid price determinants of Thoroughbreds going into non-racing careers on online auction sites. Data was collected on 246 Thoroughbred horses from various online auctions hosted by Sport Horse Auctions.

Preliminary results show a horse's sex, color, and affiliation registration impact listing price. These results will help educated individuals in the equine industry on what demand determinants are most valuable in Thoroughbred horses.

FARMERS' PERCEPTION OF FEASIBILITY AND EFFECTIVENESS OF CARBON MARKETS

Presenter: Holoch, Jacob
Graduate, Agriculture

Mentor: Prof. Iuliia Tetteh

Purpose: With depressive and anxiety symptoms rising among undergraduate college students (Lee et al., 2021), it is imperative to understand the risk and protective factors associated with the emotional well-being of this population. One such risk factor may be use of alcohol and cannabis. Indeed, previous research suggests that both alcohol and cannabis use are independently related to symptoms of depression and anxiety (Geisner et al., 2012; Schry & White, 2013; Troup et al., 2016). Alarming, alcohol use is exceedingly common among college students (SAMHSA, 2019) and recent data suggest cannabis use has dramatically increased within this population (NIDA, 2019). The ways alcohol and cannabis co-use contribute to internalizing symptoms, however, remains uncertain. Therefore, in this study, we examined relationships between college students' alcohol and cannabis co-use and symptoms of anxiety and depression.

PEOPLE WHO FEED THE WORLD: UNDERSTANDING U.S. FARMER POPULATION

Presenter: Lopata, Emily
Undergraduate, Agriculture

Mentor: Prof. Iuliia Tetteh

Authorship: Emily Lopata, Iuliia Tetteh

While it is known that farmers play the vital role of producing the food that we consume every day, who exactly are the people feeding the world? This study will zoom in on the U.S. farmer population using data from the 2017 Agriculture Census conducted by the U.S. Department of Agriculture. The goal of this research project is to study selected farmer characteristics to better understand the demographics of the one percent of the population who feeds us. Additionally, this study will explore how farmer's involvement in the operation and management of their farm businesses as well as the size of the farm vary by age, education, experience, race of the primary operator, etc. Graphical representations made in Excel will be used to identify and summarize trends behind the data analyzed in the study. By understanding these findings, there will be a more accurate description of U.S. farmers.

EXPLORING THE BENEFITS OF PRECISION AGRICULTURE TECHNOLOGIES FOR FARMERS

Presenter: Tibbs, Reagen
Graduate, Agriculture

Mentor: Prof. Maria Boerngen

Since its introduction nearly 40 years ago, precision agriculture technologies have promised to revolutionize the agriculture industry by improving efficiency and increasing profits through increasing

yields or decreasing input costs. Precision agriculture can be thought of more than just one technology, but as a whole suite of different technologies that serve different purposes. From the very first GPS-based guidance systems of the 1980s to self-driving autonomous tractors of the future, the goal of precision agriculture has not changed. One of these benefits is the ability of farmers to conduct their own on-farm research and trials. These precision technologies allow farmers to try new production practices, and better understand how these changes affect their operations. And the benefits of precision agriculture technologies are not just limited to farmers. Researchers that are conducting on-farm research can utilize these technologies to conduct their trials. The results from these on-farm trials can then be used in research and disseminated to farmers. However, despite these promoted benefits, the adoption rates of precision agriculture technologies have remained low throughout the United States. Farmers have yet to recognize the benefits of these technologies on their operations, especially the benefit of conducting their own research on their operations. Additionally, there is skepticism in the agriculture industry towards researchers that attempt to answer questions without consulting farmers and their knowledge. Several studies have addressed the low adoption rates of precision technologies, and ways that researchers can utilize farmers' knowledge to benefit their research. Analyzing the perceptions that farmers have of precision agriculture technologies, and the factors that affect those perceptions and adoption rates, can lead to a better understanding of the complexity of precision agriculture adoption in the United States. Furthermore, researchers can better identify the best practices for conducting on-farm research with farmers. Keywords: Precision Agriculture, Technology Adoption, Drivers of Adoption, Farmers' Perception, On-Farm Research.

Biological Sciences

EVOLUTIONARY RELATIONSHIP OF ISOLATED NORTH AMERICAN DEERMOUSE (*PEROMYSCUS MANICULATUS*) POPULATIONS INHABITING AN ISLAND SYSTEM

Presenter: Berg, Rachel
Graduate, Biological Sciences
Mentor: Prof. Pirmin Nietlisbach
Authorship: Rachel Berg, Pirmin Nietlisbach

Anthropogenic habitat fragmentation is increasing the number of small and isolated organismal populations. Small populations are at increased risk of extinction via demographic stochasticity and inbreeding depression. Natural geographic barriers, such as a rise in sea level, also create population divergence by splitting large populations into small, isolated island populations. Isolated island populations thus are great models to study the consequences of habitat fragmentation over time. The Gulf Islands of British Columbia, Canada provide an ideal study area, isolated by rising sea level several thousand years ago. North American deermouse, *Peromyscus maniculatus*, populations inhabit several of these islands and are an excellent study organism as they cannot easily, if at all, travel between islands, creating highly isolated populations. Previous studies in the area suggested an absence of genetic exchange among *P. maniculatus* island populations for thousands of generations, but these studies were based on limited data or only two large populations. A thorough phylogenetic reconstruction and estimation of the time in isolation are lacking. This proposed research aims to determine the evolutionary relationship of *P. maniculatus* populations in the Gulf Islands and estimate their divergence times. This phylogenetic reconstruction will be compared to the sequence of island isolation events following the Pleistocene Epoch. Understanding the phylogenetic relationship and divergence times of these populations will provide insight into the evolution of small populations and how some have persisted through time. Results of this study will provide a model system for endangered species and generate useful information for conservation genetics.

THE EVOLUTIONARY ECOLOGY OF IMMUNE PRIMING TO AN EMERGING INFECTIOUS DISEASE WITHIN INDIVIDUALS AND ACROSS GENERATIONS

Presenter: Calhoun, Austin
Graduate, Biological Sciences
Mentor: Prof. Ben Sadd

Selective pressures from fitness losses associated with pathogen infection have led to the evolution of diverse mechanisms to attenuate the detrimental effects of pathogens, either through resisting or tolerating infection. Invertebrates in particular have evolved a memory-like innate immune response functionally analogous to vertebrate adaptive immunity, which protects an individual from future pathogenic infection. This phenomenon, referred to as **immune priming**, can offer general or specific protection against infection and can also occur across generations. Based on a progenitor's pathogenic experience, offspring resistance or tolerance can be boosted by **transgenerational immune priming** (TGIP). Exploring this phenomenon is particularly important for species experiencing declines, like wild bumblebees, where novel pathogens could facilitate their demise. Novel infections from pathogen spillover is an additional area of concern. Two viruses known to be detrimental to honeybee fitness called Israeli Acute Paralysis Virus (IAPV) and Deformed Wing Virus (DWV) are found in wild bee species and are infective under laboratory conditions. My proposed work will address the ability of this immune priming phenomenological response to combat novel infection. This will include investigations of the existence of priming against these viruses and effects on resistance and tolerance of infection, its specificity to pathogen types, genetic variation in its expression, and an investigation of the costs of environmental mismatches between priming environments. Finally, the work proposed here would be a first step to assessing the feasibility of analogous efforts to vaccine-induced disease protection that could eventually be employed in natural or managed populations of bumble bees.

METABOLISM OF CORTICOSTERONE PROTECTS AGAINST THE LETHAL EFFECTS OF CORTICOSTERONE ON DEVELOPING CHICKEN EMBRYOS

Presenter: Charboneau, Christina
Undergraduate, Biological Sciences
Mentor: Prof. Ryan Paitz
Authorship: Christina Charboneau, Emily Harders

Early pregnancy loss is complex and many of the mechanisms that cause it are not known nor understood. Experiencing stress during pregnancy increases the likelihood of early pregnancy loss. One aspect of stress that may play a role in this is the increased production of glucocorticoids that could result in embryonic exposure to elevated glucocorticoids. However, as maternal glucocorticoids pass through the placenta, most are metabolized to inactive forms and this is thought to serve as a protective barrier to glucocorticoids in humans. This metabolism, paired with changes in maternal physiology in response to elevated glucocorticoids, make it difficult to discern the direct response of embryos to elevated glucocorticoid exposure. In this study, we investigate the growth and survival of embryos in our model system, *Gallus gallus*, when subjected to elevated levels of the glucocorticoid, corticosterone, and two of its metabolites 5 β -corticosterone and 20 β -dihydrocorticosterone. We hypothesize that embryonic exposure to elevated corticosterone inhibits growth and increases mortality while the metabolites of corticosterone do not affect development. To test this, we conducted two separate experiments. The first experiment compared the effect of corticosterone to 5 β -corticosterone on growing embryos compared to corticosterone. We used a similar experimental design to test the growth and survival effects of another metabolite, 20 β -dihydrocorticosterone. Results show that elevated levels of corticosterone resulted in inhibited growth and increased mortality, while elevated levels of 5 β corticosterone and 20 β -dihydrocorticosterone did not have any effect. This supported our hypothesis that the metabolism of corticosterone is providing protection to the embryos.

GEOGRAPHIC AND TAXONOMIC BIASES IN CLIMATE CHANGE BIODIVERSITY RESEARCH

Presenter: Darter-Krantz, Ava
Undergraduate, Biological Sciences
Mentor: Prof. Lise Comte
Authorship: Ava Darter-Krantz, Lise Comte

Taxonomic and geographic bias is commonplace in research today, and can be caused by funding inequalities, geographic distribution of researchers, how charismatic a species is, and a variety of other factors that influence the collection of scientific data. An example of this could be the study of charismatic species. Typically, certain species, such as megafauna, attract a disproportionate amount of attention from the public. This attention often provides them with more funding resources, conservation energy, and overall research effort. One of the reasons ecological data is more available for birds is due to societal preferences and a greater availability of data through citizen-science programs. In comparison, there is less ecological data on river or stream species, which are commonly seen as less interesting. By examining these biases, it allows researchers to precisely identify context dependent patterns, instead of misdiagnosing them as general, overarching ones. My poster will focus on taxonomic and geographic biases in climate change biodiversity research, particularly on studies that have documented climate change impacts on species distributions. To do so, I will assess potential unequal research effort within major taxonomic groups and latitudinal zones using a previously compiled database of climate change studies. I will further discuss what causes taxonomic and geographic bias and the effects they have on the conclusions derived from these data, especially when conglomerated into larger reports. This research will bring greater awareness of how research bias can affect individual research projects, but also our understanding of ecological phenomena taking place at large spatial and temporal scales.

WHAT MAKES A SONG SIGNAL SEX OR STRIFE? SYNTHESIZED SONGS CAN TELL US WHICH SONG COMPONENTS MATTER TO FREE-LIVING BIRDS

Presenter: DiSciullo, Rachael
Graduate, Biological Sciences
Mentor: Prof. Charles F. Thompson
Co-Mentor: Prof. Scott K. Sakaluk
Authorship: Rachael A. DiSciullo, Charles F. Thompson, Scott K. Sakaluk

Bird song is widely regarded as an iconic sexually selected signal. Although previous studies have examined single facets of bird song in relation to female mate choice and male-male competition, selection typically acts simultaneously on multiple, often-correlated components that collectively influence an individual's mating success. By experimentally decoupling correlated song components, we can identify components of song that are preferred by females or incite males that otherwise might be obscured because of their correlative nature. Male house wrens (*Troglodytes aedon*) are songbirds with highly complex, multi-component songs. Male song is important in female mate choice and male-male competition, as females attend to male song and males respond aggressively to conspecific playbacks. Yet, the components of male song that are most attractive to females, or elicit the most intense aggression in males, remain unknown. Here, we present a study in which we synthesized male house wren songs in Raven Pro 1.6 and broadcast them in the field at unoccupied nestboxes in which newly constructed unlined nests had been placed. Songs were composed of phenotypically uncorrelated components, but all components remained within the parameters of inside wall of the nestbox to increase nestbox temperature during the incubation period, and, after hatching, supplemented the diet of half the nestlings in heated and control nestboxes with the antioxidant vitamin E. The heating pads significantly increased within-nestbox temperatures for about 3-4 hours each morning, the coolest part of the day. I found a significant interaction between

actual song produced by males on our study area in central Illinois. Results from this study allow us to estimate linear and non-linear sexual selection imposed by wild female and male birds on song structure through use of multivariate selection analysis.

LESS PERIL WITH STERILE? STERILE INSECT TECHNIQUE EFFECTIVELY REDUCED AEDES MOSQUITO POPULATION

Presenter: Evans, Katherine
Graduate, Biological Sciences
Mentor: Prof. Steven Juliano
Authorship: Katherine G. Evans, Steven A. Juliano

Aedes mosquitoes are vectors of dengue, zika, and yellow fever. According to the World Health Organization, dengue alone causes 40,000 deaths per year. Recently, research on and implementation of novel mosquito control approaches have increased. Sterile Insect Technique (SIT) is one such approach. Most SIT projects to date have monitored egg number and hatch rate, as well as adult numbers. However, focusing on eggs and adults omits crucial information on how these control approaches affect mosquito larvae. We hypothesized that the effectiveness of SIT would be influenced by density dependent effects that act on the larval stage of mosquitoes. The study area consisted of four zones: (1) a treatment zone where SIT had been implemented since 2020, (2) a zone that received some treatment in 2021 and spillover from the treatment zone, (3) a zone where treatment had yet to occur and was unlikely to have spillover, and (4) a control zone that received no treatment, with no plans to receive treatment. We collected egg papers from traps in the four zones weekly. Larvae hatched from the egg papers from each trap were added to corresponding rearing containers in the lab, and allowed to grow and develop into adults, which were collected for analysis. Our data show lower production of *Ae. aegypti* adults in the treatment zone (1) compared to the two untreated zones (3 and 4). Our results also indicated that while few adult females emerged from the eggs from the SIT treatment zone (1), those that did were significantly larger than females from the control area (4).

EFFECTS OF INCREASED NESTBOX TEMPERATURE DURING INCUBATION AND ANTIOXIDANT SUPPLEMENTS ON HOUSE WREN NESTLING DEVELOPMENT

Presenter: Farchmin, Paige
Graduate, Biological Sciences
Mentor: Prof. Scott Sakaluk
Co-Mentor: Prof. Charles, Thompson

I examined how increased environmental temperature, in the context of ongoing climate change, affects the development of bird embryos, and how vitamin E, an antioxidant, may mitigate expected negative effects on nestlings exposed to higher temperatures while developing in the egg. Embryos exposed to increased temperature grow faster than those exposed to lower temperature and concomitantly increase production of reactive oxygen species (ROS) that damage proteins, lipids, and nucleic acids. One way to reduce this damage is to increase dietary intake of antioxidants. For my research, I used house wrens (*Troglodytes aedon*), small songbirds that build their nests in nestboxes during the summer on my study area in north-central Illinois. I used heating pads attached to the nestbox heating regime and vitamin E treatment in their effect on nestling mass, a trait that is positively correlated with survival and future reproductive success. Vitamin E supplementation led

to increased nestling mass in heated nests, whereas it had the opposite effect in control nests. Heating significantly affected female behavior, with females in unheated boxes spending more time incubating their eggs than those in heated boxes.

QUANTIFYING THE DECOMPOSITION OF PENNYCRESS

Presenter: Hafner, Alex
Undergraduate, Biological Sciences
Mentor: Prof. Bill Perry
Authorship: Alex Hafner, Ryan Meyer, Nicholas Heller, Bill Perry

As pennycress approaches commercialization, quantification of the ecosystem services it provides will help in quantifying its environmental benefits relative to other cover crops. When cover crops are harvested or terminated, the remaining residues decompose and release nutrients back into the soil and are available to subsequent crops. The timing and magnitude of nutrient release could reduce the amount of added fertilizer that are applied to fields. Nutrient leaching from agricultural fields may then be reduced. A decomposition experiment was conducted to calculate the rate of decomposition by measuring biomass and nitrogen loss over time of wild-type pennycress, geneedited AOP2 pennycress relative to cereal and annual rye. Mesh bags with residue of each species of biomass were placed in two common soil types of McLean County, Illinois (N=5 per soil type) between rows of corn and left to decompose. Samples were collected every 7 days initially and intervals increased over time as decomposition rates slowed. Percent loss of biomass and nitrogen was estimated relative to time 0 samples. Initial findings indicate that decomposition rates were fastest for annual rye followed by cereal rye, wild-type pennycress and AOP2 pennycress decomposed the slowest. This experiment will allow recommendations to be made for future decomposition studies that include multiple agricultural regions and elite lines of pennycress to learn in greater detail how pennycress will function upon commercialization.

EXTRAEMBRYONIC MEMBRANES RESPOND TO MATERNAL STRESS STEROIDS DEPOSITED IN EGG YOLK

Presenter: Harders, Emily
Graduate, Biological Sciences
Mentor: Prof. Ryan Paitz

Exposure to steroids during sensitive times in development can permanently alter an individual's phenotype. During times of maternal stress, exposure to elevated glucocorticoids can have adverse effects on offspring development, like lower birth weight. However, embryos can regulate their exposure to maternal glucocorticoids by metabolizing steroids before they reach the embryo. In bird eggs, it is known that glucocorticoids are metabolized early in development, but the specific routes of metabolism remain to be deciphered. To investigate this, chicken eggs were injected with either 1 ug corticosterone or vegetable oil on day 0 and incubated for four days. Then, the yolk was sampled for quantification of steroids and extraembryonic membranes were collected for quantification of gene expression. We found corticosterone was not increased after four days of development, but metabolites 20 β -corticosterone and 5 β -corticosterone were significantly elevated in the corticosterone injected eggs. We quantified the expression of genes involved in corticosterone metabolism such as AKR1D1 (converts corticosterone to 5 β -corticosterone) and CBR1 (converts corticosterone to 20 β -corticosterone) in addition to a potential corticosterone responsive gene, ACOT13. We found high expression of AKR1D1 and CBR1 on day four, but no difference based on corticosterone treatment. Interestingly, ACOT13 expression was significantly higher in eggs treated with corticosterone. In this study, we demonstrate chicken extraembryonic membranes are capable of

metabolizing and responding to maternally deposited corticosterone in the yolk by day four of development. These results highlight the importance of the extraembryonic membranes in mediating the response to maternal glucocorticoids.

ALTERED TRANSMISSION POTENTIAL OF A BUMBLEBEE PATHOGEN ON CO-EXPOSURE TO THE FUNGICIDE CHLOROTHALONIL

Presenter: Harrod, Audrey
Undergraduate, Biological Sciences
Mentor: Prof. Ben Sadd
Authorship: Audrey Harrod, Austin Calhoun, Ben Sad,

Many pollinators, such as ecologically and economically important bumble bees (*Bombus sp.*) are experiencing concerning declines. These declines are proposed to be caused by a myriad of factors and are predicted to negatively affect natural and agricultural ecosystems. Individual stressors such as pesticides and pathogens can have a variety of negative effects, but bumble bees will often be exposed to multiple stressors simultaneously. These complex interactions are proposed to amplify detrimental effects of individual stressors, under what is known as the multiple stressor hypothesis. Suggestive evidence for this hypothesis comes from a positive association between agricultural use of the fungicide chlorothalonil and the microsporidian bumble bee pathogen *Nosema bombi*. Furthermore, a controlled infection study has shown increased *N. bombi* transmissible spore production in bumble bees exposed to chlorothalonil, indicating potential for increased *Nosema* transmission upon co-exposure. Extending the multiple stressor hypothesis regarding this system, we propose changes upon co-exposure to these stressors in individual bees will lead to altered transmission dynamics with associated detrimental consequences for the bumble bee pollinator community. We used control or chlorothalonil exposed and *Nosema* infected microcolonies to assess the effect of chlorothalonil exposure on within-colony and between-colony dynamics of pathogen infection. The results are still being collected, but we predict that chlorothalonil co-exposure increases the likelihood that an infected individual bumble bee transmits an infection to individuals within its social colony and to other colonies that it shares foraging resources with. Such epidemiological effects may explain the described association of *N. bombi* with chlorothalonil, and further inform our understanding of threats to native bee health by incorporating not only individual host infection dynamics but also between-host transmission.

COMPARISON OF DIFFERENT METHODS FOR CONTROLLING APHID POPULATIONS

Presenter: Haubein, Cailyn
Undergraduate, Biological Sciences
Mentor: Prof. Steven Juliano
Co-Mentor: Prof. Kate Evens

Aphids (Hemiptera: Aphidae) are small plant feeding insects found in many gardens and farms around the world. Aphids can cause immense damage on a large variety of garden plants, from vegetables to ornamentals, which is why many land owners choose to control these pests. Many different methods can be used to control aphids home, including insecticides, dish soap, and natural predators. I was interested in the questions: Are these methods effective in controlling aphid populations and which method is the most effective? To test for differences among these methods, I collected a total of 600 aphids from cherry tomato plants and divided them equally (50 aphids) into twelve containers. Each container had enough foliage for 24 hours and sufficient air flow. Three containers received each treatment: untreated control, pesticide (Bio-Advanced, Rose and Flower

Insect Killer), dish soap (70% water and 30% dish soap), and natural predator (2 hoverfly larvae (Diptera: Syrphidae) per container). The following day, I recorded the number of aphids alive in each container. The experiment resulted in means of 56 ± 3.77 aphids for the control, 14.7 ± 1.77 aphids after insecticide, 6.7 ± 2.53 aphids with dish soap, and 12.3 ± 0.88 aphids with the natural predator. I conducted a one way ANOVA analysis on the data and it indicated that there was a significant effect of treatment ($F(3,8)=22.34$, $p=0.0003$). Individual follow up tests indicated that while the pest control treatments were not significantly different than one another, they all differed from the control. Although reducing aphid numbers is important, it is also vital to consider the non-target effects of the methods you use. Insecticides are effective at killing pests, but are also can kill nontarget organisms and continuous use of them can lead to a decline in biodiversity. Dish soap can also harm non-target organisms and when used improperly, can cause damage to the plant's cuticle. Finally, introducing a natural predator to your yard risks introducing a competitor to other native predators, and care must be taken not to introduce nonnative species. It is important to consider not only the effects on the pest, but what is best for all the organisms in the treated area.

MAPPING THE AMINO ACID SEQUENCES IN THE COILED-COIL DOMAIN THAT MEDIATE DIMERIZATION OF THE KIF3A/KIF3B MOTOR

Presenter: Irwin, Samuel
Undergraduate, Biological Sciences
Mentor: Prof. Martin Engelke
Co-Mentor: Prof. Jessica Adams
Authorship: Samuel Irwin, Jessica Adams, Martin Engelke

Kinesin motor proteins are vitally important for many cellular functions such as mitosis, ciliogenesis, and transporting cellular cargo. They move these cargos along microtubules unidirectionally from minus- to the plus-end. Most kinesins are homodimers. Dimerization is mediated via an elongated, coiled-coil (CC) containing stalk domain that brings two motor domain-containing subunits together. Dimerization allows the N-terminal motor domains to walk along microtubules in a 'foot over foot' fashion. The C termini form tail domains that function in cargo binding, and motor regulation. In our lab, we study the only heterodimeric kinesin motor, KIF3A/KIF3B, encoded in the mouse genome. Previous work mapped the minimal sequences that are required for heterodimerization of the homologous *Xenopus* motor Xk1p3A/Xk1p3B to the C-terminal half of the CC-II and CC-III domain (De Marco et al., 2001). Another study placed a significant emphasis on the N-terminal neck-coils and highly charged region following these coils (Chana et al., 2005). Here we aim to determine the importance of different elements within the CC stalk for the heterodimerization of mouse KIF3A/KIF3B. First, we determined the location of the CC domains in the mouse kinesin using DeepCoil and COILS server. We then created various motor truncation constructs and assessed their degree of heterodimerization in protein-protein interaction assays. Successively truncating KIF3A and KIF3B from the C-terminus, we find that removing the CC-III domain impedes heterodimerization, indicating that this motor behaves similarly to its *Xenopus* homolog.

EFFECT OF SEXUAL SELECTION ON INVESTMENT BY MALE DECORATED CRICKETS IN NUPTIAL FOOD GIFTS

Presenter: Kuna, Will
Undergraduate, Biological Sciences
Mentor: Prof. Ben, Sadd
Authorship: Will Kuna, Jack McKermitt, Bert Foquet, John Hunt, Scott Sakaluk, Ben Sadd

Sexual selection arises from differences in reproductive success that are a product of variation in mating success. Sexual selection has shaped a variety of male-specific sexual traits, such as bird song and elaborate male courtship rituals, but the relative importance of sexual selection should vary across environments. In particular, the ratio of reproductively mature males to females, known as the operational sex-ratio (OSR), determines the intensity of competition for mates. The decorated cricket, *Grylodes sigillatus*, is an ideal model system to study the effects OSRs on male sexually selective traits. Male decorated crickets have several traits that are associated with increased mating success, including acoustic signaling and the manufacture of nuptial food gifts that are presented to females at mating. Previous research has shown that increased mass of nuptial gifts leads to increased mating success, suggesting that gift size is critical to reproductive success. Using an experimental evolution approach, we explored the effect of varying OSRs on the evolution of investment in this important male reproductive trait. Male crickets were taken from replicate populations that had been kept for 20 generations under male-biased or female-biased OSRs, and were screened every other day for 21 days for the production of a nuptial gift. Gifts were extracted and weighed to obtain wet mass, and then dried to obtain a dry mass. Results are currently being analyzed, but we predict that the crickets from the male biased OSR lines will produce larger gifts than those from the female biased lines due to a greater intensity of sexual selection. This work is important because it furthers our knowledge about the evolutionary ecology of sexual selection using an accessible system with readily measurable sexual traits.

PREDATION RATES ON MOSQUITOES IN SIMPLE AND COMPLEX ENVIRONMENTS

Presenter: Lamkin, Maya
Undergraduate, Biological Sciences
Mentor: Prof. Steven Juliano
Co-Mentor: Prof. Jaclyn Everly
Authorship: Maya Lamkin, Jaclyn Everly, Steven Juliano

The use of native organisms in the biological control of mosquitoes aids in reducing the unintended consequences of current methods of larviciding, specifically in the ecosystem functioning in these environments. There are interspecific interactions that are a major part of mediating resource populations, and can be influenced by a number of biotic and abiotic factors. Within these environments, our focus were temporary wetlands and the mosquito larvae *Culex pipiens*. Predator species to mosquitoes also inhabit these areas, and the potential to use the natural predators of mosquitoes as potential larvicides, managing outbreaks of mosquitoes and the diseases they vector have been a more researched topic in recent years. We can gauge the efficacy of these biological control methods through functional response experiments, which in turn are frequently influenced by the size and complexity of the environment these species inhabit. The naiads of the damselfly genus *Enallagma* are a known natural predator to mosquito larvae, and are native to Illinois, where this research was conducted. Our experiment aimed to see if complexity of an environment would decrease

predation, and we hypothesized that predation would increase until the damselfly naiads reached satiation. We predicted that the data would show a Type II functional response and that more habitat complexity would result in less predation. We observed the interactions between *Enallagma* and the *Culex* larvae with a single damselfly naiad per five levels of prey density (10, 20, 30, 60, 120 larvae within each container), in containers labeled simple (with no artificial detritus) and complex (with the artificial detritus), and ran functional responses on our parameters- the mortality rate of larvae after a six-hour experiment and the handling time- how much time the predator spent engaged with the prey. Preliminary results suggest a Type II functional response curve, with attack rates of *Enallagma* higher in the simple habitats than in complex. This evidence supports our conclusion that damselfly naiads are competent predators and could act as natural mosquito control. We can also support that the attack rate is more successful when density is low. This study emphasizes that the predators are more efficient at hunting when density is low, and could potentially be used as an alternative to larviciding.

DOES INDIVIDUAL QUALITY AFFECT THE PRODUCTION OF A SECOND BROOD IN HOUSE WRENS (*TROGLODYTES AEDON*) IN ADDITION TO TIMING?

Presenter: Leischner, Lauren
Graduate, Biological Sciences

Mentor: Prof. Pirmin Nietlisbach

Authorship: Lauren Leischner, Charles Thompson, Scott Sakaluk, Pirmin Nietlisbach,

Climate change affects seasonal reproduction of birds and other organisms by raising temperatures, changing the precipitation patterns, and increasing extreme weather events, which leads to changes in food abundance and breeding season length. Some species raise two broods in a season to increase their reproductive success. However, not all individuals produce a second brood even if there would still be enough time to permit a second brood. The objective of this proposed research is to determine whether variation in individual quality, in addition to timing, explains some of the variation in production of a second brood. We will address this question in a house wren population along the Mackinaw River in north-central Illinois that is well suited for this purpose as this double-brooded species readily accepts nestboxes, providing easy access to nests for experiments. Females that nest early often have high quality territory, may be in better condition, and have an increased probability of having a second brood. It is unclear whether the production of a second brood is solely due to timing or also female quality. To test this question, we will cross-foster eggs between early, high quality females and later, low quality females. This leads high quality birds to raise nestlings later than intended. If delayed, high quality females produce a second brood, quality may affect the production of a second brood in addition to timing, suggesting that there may be a higher chance for the population to be able to adjust to future changes in the climate.

CLONING OF THE GENE ENCODING SULFOLOBUS ISLANDICUS GLYCEROL KINASE

Presenter: Marcheschi, Michael
Undergraduate, Biological Sciences
Mentor: Prof. Jon Friesen
Authorship: Michael Marcheschi, Jon Friesen

Over the course of this school year, I have begun research on a protein from a thermophilic archaeon named *Sulfolobus islandicus* that is a putative glycerol kinase. To make the protein we enlist the help of *E. coli* cells that are engineered to do specific tasks. We first ran a Polymerase Chain Reaction (PCR) to amplify the DNA encoding the protein. For *E. coli* to use our DNA to produce glycerol kinase we insert it into a plasmid via restriction enzymes. The plasmid we inserted our DNA into is called pET-45b, it contains multiple restriction enzyme sites and codes for ampicillin resistance. We cut our DNA and plasmid with restriction enzymes Pst 1 and Hind III and used agarose gel electrophoresis to see if we successfully cut the DNA samples. When our cut pieces are put together some of them will loosely attach, to make a stable bond we use the enzyme DNA Ligase. To see if we successfully carried out the ligation, we transform our recombinant DNA into *E. coli* and grow those cells on an agar plate with ampicillin. We then selected several colonies from each plate and performed a PCR and electrophoresis on them. The idea is that some of the *E. coli* contain our plasmid that do not have our target DNA and we can identify those colonies by analyzing the gel. Next, we grew the cells in media and took samples of those cells and extracted our plasmid from them, cut the plasmid using the restriction enzymes, and ran an electrophoresis as a double check to ensure our *E. coli* cells contain our recombinant DNA. After confirmation, we purified the rest of the DNA from the *E. coli* cells to obtain our recombinant DNA. Next we performed a transformation of our recombinant DNA into a new strain of *E. coli* (BL21(DE3)RIPL) that is designed to create proteins. We grew these cells on agar plates with ampicillin and chloramphenicol and further grew the colonies that appeared on the plate. Our future goal is to obtain, purify, and study our protein.

WORSE OFF TOGETHER: CONSEQUENCES OF MICROSPORIDIAN AND VIRUS CO-INFECTION FOR PARASITE DYNAMICS AND BUMBLE BEE HOST HEALTH

Presenter: McCormick, Elyse
Graduate, Biological Sciences
Mentor: Prof. Ben Sadd
Authorship: Elyse McCormick, Ben Sadd

Host-parasite interactions do not occur in a vacuum, but in connected networks with multiple parasites. Resulting co-infections can have important consequences for host health but also for infectious disease ecology, including disease outbreaks. However, most host-parasite studies examine pairwise host-parasite interactions, meaning we still lack a general understanding of the influence of co-infections. Furthermore, as parasite dynamics are shifting in response to global changes, and as hosts become exposed to novel parasite combinations, studies of co-infections are critical. Bumble bees (*Bombus spp.*), pollinators of ecological, economic, and conservation concern, are exposed to multiple parasites. I will study the effects of co-infection using a microsporidian *Nosema bombi*, implicated in worrying declines of bumble bees, and Israeli Acute Paralysis Virus (IAPV), an emerging infectious disease of bumble bees due to spillover from honey bees. I hypothesize that infection outcomes of *N. bombi* and IAPV will be modified by co-infection, due to changes in host allocation to immunity. Specifically, infection outcomes of host resistance and tolerance and parasite virulence and transmission potential will be altered, depending on relevant temporal interactions. *Nosema bombi* is

established as a severe, larval-infecting parasite in isolation, and I predict that a time-lagged coinfection will result in a decreased immune response and thus host resistance to a subsequent IAPV infection in adults. Also, I predict co-infection will reduce host tolerance, as measured by host survival. Current results indicate that IAPV drives host mortality, with no significant effect of co-infection or *Nosema bombi*. Molecular quantification of transmission potential is forthcoming.

CALLING OUT FOR LOVE: EFFECTS OF VARYING SEXUAL SELECTION INTENSITIES ON REPRODUCTIVE EFFORT

Presenter: McKermitt, Jack
Graduate, Biological Sciences
Mentor: Prof. Ben, Sadd
Co-Mentor: Prof. Scott Sakaluk
Authorship: Jack McKermitt, Ben Sadd, Scott Sakaluk

Sexual selection is a critical selective force that promotes the evolution of traits that enhance an individual's reproductive success. To better understand the evolution of sexually selected traits, it is important to identify factors underlying variation in sexual selection. The mating system of an organism is one key component that can influence the magnitude of sexual selection. A common proxy used to characterize the mating system is the operational sex ratio (OSR), or the number of sexually active males to sexually receptive females. In addition, individuals may modulate their trait expression depending on the environment via behavioral plasticity. Using the decorated cricket (*Grylloides sigillatus*), we established two selective regimes under different OSRs to investigate how the intensity of sexual selection influences the evolution of calling effort, a sexually selected trait of male crickets. I also exposed males from each OSR to different levels of perceived competition from rivals, recording their calls in the presence of an experimentally muted competitor or as solitary individuals. By manipulating the perceived risk of competition, it is possible to discern if males from different OSRs modulate their calling depending on the level of competition present. This study will contribute to our growing knowledge of the evolutionary ecology of sexual selection, using a system where fitness-relevant traits favored by sexual selection and male-female interactions can be easily quantified.

LOCAL VS NOVEL PRAIRIE SOIL MICROBES: TESTING FOR LOCAL ADAPTATION IN THE RESPONSE OF LOBELIA SPICATA FROM ILLINOIS VS KANSAS

Presenter: Metternich, Sydney
Graduate, Biological Sciences
Mentor: Prof. Diane Byers
Authorship: Sydney Metternich, Diane Byers

Plant-soil feedbacks have been well described as interactions between plants and soil microbes; soil microbes associated with plant roots, acquire nutrients for plants that are otherwise unavailable. Plants quickly differentiate a soil microbial community by attracting additional conspecific microbes, and while these microbes are often mutualistic, species-specific microbial pathogens can accumulate in the soil as well, generating negative plant soil-feedbacks. Biotic factors, such as soil history, in combination with abiotic factors, such as rainfall, determine the diversity of the soil microbial community. The North American Tallgrass Prairie ecosystem has been subjected to severe habitat fragmentation. The rainfall gradient (increasing eastward) which crosses where native prairie plant populations are found, provides a unique opportunity to study the effects of varying rainfall on soil microbial communities and how these communities subsequently influence the fitness of geographically constrained plant

populations. To test for plant-soil feedbacks we performed a greenhouse study that subjected *Lobelia spicata*, a perennial prairie forb, sampled from populations in Illinois and Kansas to local and novel conspecific soil microbes. Additionally, they were treated with heterospecific soil microbes differentiated by native Illinois and Kansas *Andropogon gerardii* and *Lespedeza capitata*, grown in both states. Rosette diameter and biomass are used as estimates of plant fitness. Local adaptation is expected when *L. spicata* fitness is correlated positively with the locality of soil microbes; this would provide support for positive plant-soil feedback. Negative plant-soil feedback is suspected if *L. spicata* incurs a fitness advantage when freed from conspecific pathogens.

EFFECTS OF WINTER CASH CROP PENNYCRESS (THLASPI ARVENSE) ON NUTRIENT EXPORT IN THE UPPER MIDWEST

Presenter: Meyer, Ryan
Graduate, Biological Sciences
Mentor: Prof. Bill Perry
Authorship: Ryan Meyer, Nicholas Heller, Bill Perry

Nutrient loss from row crop agriculture in the upper Midwest has become a major issue for downstream water quality. This is particularly apparent in the Gulf of Mexico hypoxic zone where economic losses exceed two billion dollars annually. The EPA has identified the Upper Midwest as one of the primary contributors to the hypoxic zone with agriculture being a major source of nutrient export. Cover crops have the potential to immobilize nutrients and reduce nutrient export to surface water while improving soil fertility and reducing weed biomass. However, cover crops are poorly implemented, particularly in Illinois in which only 3% of row crop production utilizes cover crops. The novel, gene-edited, winter cash crop golden pennycress (*Thlaspi arvense*) has the potential to provide both ecosystem services and economic incentive through biofuel production. At the Illinois State University Farm, nine 0.8ha experimental plots have been established to quantify the reduction in nutrient export from subsurface drainage caused by pennycress. Plots are independently tiled with subsurface drainage collected using ISCO sampling units on agridrains. Preliminary results demonstrate a statistically significant reduction of nitrate nitrogen in soil porewater. Pennycress did not significantly reduce nitrate nitrogen in subsurface drainage or within the soil. While results are not yet conclusive, pennycress has the potential to reduce nutrient export while also providing economic incentive which can spur widespread adoption. Pennycress implementation would provide green cover on agricultural land during the cold season when it is most necessary to have crops keeping nutrients from leaving agricultural systems.

THE PRESENCE OF FOOD PRESERVATIVES IN THE DIET HAS NO SIGNIFICANT EFFECT ON THE BODY CONDITION OF HOUSE CRICKETS

Presenter: Nickel, Allison
Undergraduate, Biological Sciences
Mentor: Prof. Steven Juliano
Co-Mentor: Prof. Katherine, Evans

There has been a rising demand for certified organic foods over the past decade in the United States. This trend indicates that consumers are asking more questions about ingredients in their food and what potential adverse effects those ingredients may cause. The house cricket, *Acheta domesticus*, is often found living in close proximity to humans, often in or around our homes. As omnivorous insects, house crickets will eat a diverse array of available foods, and they may be therefore exposed to the additives found in human food when they eat our scraps. In this experiment we sought to test the hypothesis

that food preservatives have an effect on the body condition of house crickets. We set up two treatments with eight replicates per treatment. Individuals were fed diet treatments with or without the preservative sulfur dioxide present. The crickets were weighed twice per week to track and compare the mass changes between the two treatment groups. There was no significant difference in mass change between the two treatments (two-sample t-test) and in both cases the crickets lost mass, but the group with preservatives in their diet lost 1.6x the mass lost by the control group. We conclude that our experiment did not provide sufficient evidence to show that preservatives in the diet affect the body condition of crickets. The small size of this study and other confounding variables suggest that further research on this topic is needed to verify these results and determine their broader implications. Effects of added preservatives in the diet remain a topic of concern for many consumers, so it is worthwhile to investigate any potential negative effects they may cause, be it for our own health, or other organisms that are model systems for an omnivorous diet.

SICK TO DEATH: SCREENING FOR THE THREAT OF PATHOGENS TO THE ENDANGERED RUSTY PATCHED BUMBLE BEE

Presenter: Palmer, Justin
Undergraduate, Biological Sciences
Mentor: Prof. Ben Sadd
Authorship: Justin Palmer, Ben Sadd

In recent years, there has been an alarming decline in biodiversity. Many species vital to the wellbeing of natural and human ecosystems, and thus our lives, are under threat. Pollinator insects epitomize this problem, and numerous bumble bee species are considered “threatened” in North America. One of those species, the rusty patched bumble bee (*Bombus affinis*), has seen a sharp decline over recent decades and is considered as “critically endangered” by the US Fish and Wildlife Service and represents the first federally listed endangered bee species. *B. affinis*, native to Eastern and Midwest US, as well as Eastern Canada, has seen a reduction in range of up to 85% over recent decades. Many threats to native bees are proposed, including pathogens, pesticides and climate change, and a previous study has found higher infectious disease prevalence in declining *Bombus* species. However, there is little knowledge about pathogens in *B. affinis*. This study surveys the disease prevalence of samples recovered from identified and protected nests and incidentally found individual bees in the Midwest. Samples are characterized based on stage (larva, pupa, adult) and caste (queen, male, worker). They will further undergo DNA and RNA extraction and analysis for the molecular detection of specific pathogens, as well as screening by microscopy. This work will reveal the extent of the threat of pathogens to remaining *B. affinis*’ populations and contribute to the drafting of the recovery plan for rusty patched bumble bees.

DOES PROGESTERONE REGULATE 5B REDUCTASE (AKR1D1) LEVELS IN CHICKEN EMBRYOS?

Presenter: Parks, Megan
Undergraduate, Biological Sciences
Mentor: Prof. Ryan Paitz

During embryonic development, numerous developmental processes are affected by the presence of maternally derived steroids. Exposure to maternal steroids can be regulated by metabolism that takes place in the placenta (live bearing species) or extraembryonic membranes (egg laying species). The extraembryonic membranes are thought to prevent steroid access to embryonic tissues. 5 β reductase (*AKR1D1*) is an enzyme found in the extraembryonic membranes of chicken embryos that can metabolize multiple steroids like testosterone and progesterone, but levels of this enzyme drop as development proceeds. Concurrent with the drop in *AKR1D1* levels, progesterone levels in the yolk of

chicken eggs drop during first few days of development as progesterone is metabolized. Given this, we hypothesized that progesterone induces the expression of *AKR1D1*. Based on previous knowledge, we will research two questions. Do injections of progesterone increase concentrations in the yolk? Do injections of progesterone increase *AKR1D1* gene expression? Understanding the relationship between progesterone and *AKR1D1* can provide insight on how steroid metabolism is regulated during embryonic development. For this study, quantitative polymerase chain reaction (qPCR) was used to measure *AKR1D1* expression within the extraembryonic membranes. Liquid chromatography-mass spectrometry (LC-MS) measured progesterone levels within the yolk. We found that progesterone injections increased levels of progesterone in the yolk but did not affect *AKR1D1* expression. Our results indicate that progesterone is not inducing the expression of *AKR1D1*.

IDENTIFYING B CELLS IN HATCHLING AND ADULT TRACHEMYS SCRIPTA, RED-EARED SLIDER TURTLES

Presenter: Paton, Hanna
Undergraduate, Biological Sciences
Mentor: Prof. Laura Vogel
Co-Mentor: Prof. Rachel Bowden
Authorship: Hanna Paton, Allison Mool, Christen Fairow, Whitney Hurst, Rachel M. Bowden, Laura A. Vogel

Evidence suggests there are important differences between reptile and mammalian immune strategies, yet little is known about humoral immune responses in reptilian vertebrates. Our laboratory is interested in reptile B cell development and function and our undergraduate research project involved B cell detection using flow cytometry in spleens of hatchling and adult turtles. We made use of a previously developed monoclonal antibody (HL673) that recognizes turtle light chain protein. The murine HL673 mAb was purified using a protein A affinity column and reactivity was tested by ELISA. Some of the purified antibody was biotinylated and incubated with blood and spleen samples from adult and hatchlings. Bound antibodies were detected and B cell populations identified using flow cytometry. We were able to identify B cell containing populations based on scatter and specific staining. Our results showed detection of turtle B cells using the labeled mAb in both adults and 6 week old hatchlings. Future studies will use this reagent to further investigate the distribution and function of B cells. This work was supported by NSF 1725199 and NIH 1R15AI140118 – 01.

REGULATION OF THE INHIBITION OF TELOMERIC TRANSPOSONS VIA P38KB IN DROSOPHILIA MELANOGASTER

Presenter: Pranskevicius, Emily
Undergraduate, Biological Sciences
Mentor: Prof. Alysia Mortimer
Authorship: Emily Pranskevicius, Jayla Snell, Samuel Esterly, Alysia Mortimer

As an organism ages, their gene expression changes. One change associated with aging is loss of inhibition of transposons. Transposons are sequences of DNA that contain their own DNA and are able to change position within the genome. When transposons move, they can potentially alter the expression of surrounding genes. *Drosophila melanogaster* (fruit flies) use transposons as their telomeres, and in humans, changes in telomeres are associated with aging. So far, we have found that loss of the p38Kb gene leads to premature aging, while over-expression of p38Kb leads to increased longevity. We have also found that altering the level of p38Kb results in changes in the expression of proteins that are encoded by genes off the telomeric transposons. We hypothesize that p38Kb regulates the inhibition of telomeric transposons. To test this, we are using eye color as a reporter of

transposon activation, in which red eye color indicates activation and white eye color indicates inhibition of the transposon. First, we are testing if using this reporter allows us to detect changes in transposon expression with age. We are using a collection of reporters for transposons that are located in different regions of the chromosome, such as the telomeres and centromeres. We are currently analyzing flies with these reporter lines at varying ages to see if changes in reporter expression are present.

Chemistry

TEMPORAL AND SPATIAL PROFILING OF PRIORITY SOIL POLLUTANTS USING FILTER CONE SPRAY IONIZATION - MASS SPECTROMETRY (FCSI-MS)

Presenter: Addo, Rosemary
Graduate, Chemistry
Mentor: Prof. Christopher Mulligan
Authorship: Rosemary Addo, Shahnaz Mukta, Christopher C. Mulligan

Long-term monitoring (LTM) of environmental matrices can assist in detecting the onset or changes in chemical contaminant plumes and evaluating subsequent remediation efforts, but bears extreme cost, with significant funds going towards shipping costs of field-collected samples for off-site processing via hyphenated MS methods. To this end, portable technologies that offer both direct sampling capability and high throughput operation are appealing. We report and characterize the use of filter cone spray ionization-mass spectrometry (FCSI-MS) towards the temporal and spatial profiling of pollutants from unprepared soil samples and demonstrate its utility on portable and commercial MS systems alike. FCSI-MS allows direct profiling of analyte residues from complex matrices by employing onboard filtration and an ESI-like ionization mechanism. MS system employed for this work included a lab-scale ion trap MS (Thermo LCQ Fleet) coupled with a home-built FCSI ionization source. Soil standards of varying compositions were spiked with target analytes and exposed to variable, yet controlled environmental conditions (such as moisture, temperature, etc.). Subsamples of soil samples were then analyzed directly via FCSI-MS, utilizing common spray solvent systems and high voltage (4.5 kV) delivered via a clamping electrode. Systematic experiments were performed on well known (e.g., amitraz) and emerging (e.g., neonicotinoid pesticides) agricultural chemicals and other priority pollutants to monitor the persistence and fate in varying soil types. By varying soil type, residence time in soil, water content, light exposure, and pH, degradation kinetics were accurately assessed, deducing the role of known breakdown processes like hydrolysis and photolysis.

IMPROVING DETECTION OF ILLICIT DRUGS USING PLASMONIC NANOPARTICLES BY PAPER SPRAY IONIZATION-SURFACE ENHANCED RAMAN SPECTROSCOPY

Presenter: Adehinmoye, Adewale
Graduate, Chemistry
Mentor: Prof. Jun-Hyun Kim
Co-Mentor: Prof. Christopher Mulligan
Authorship: Adewale Adehinmoye, John Harms, Jeremy Driskell, Christopher Mulligan, Jun-Hyun Kim

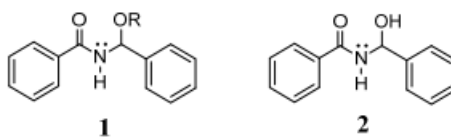
Surface-enhanced Raman spectroscopy (SERS) is an analytical technique in which the vibrational signal of samples can be amplified via adsorption onto nanoscale plasmonic materials. Our previous work has demonstrated the possibility of improving the detection limits of illicit drugs (i.e., cocaine, fentanyl, 2C-B, hydrocodone and JWH-018) on a plasmonic paper by utilizing a dual-instrument system consisting of paper spray ionization mass spectrometry (PSI-MS) and SERS. In this study, we attempted to control

the arrangement of the drugs with plasmonic gold nanoparticles (AuNPs) onto a plasmonic paper to further improve SERS-based sensing capability without sacrificing the PSI-MS performance. This approach involves the generation of highly intense plasmonic environments for these drugs (e.g., vertically and laterally sandwiching drugs between plasmonic materials) where the SERS signals can be maximized by increasing the probability of plasmonic couplings. The optimized systems utilizing plasmonic nanoparticles can further be applied to the sensitive detection of various samples at low concentrations.

THE EFFECT OF THE ALKYL GROUP ON THE HYDROXIDE CATALYZED BREAKDOWN OF O-ALKYLATED CARBINOLAMIDES

Presenter: Arndt, Tom
Undergraduate, Chemistry
Mentor: Prof. Richard Nagorski
Authorship: Tom Arndt, Sarah Stewart, Yejun Park, Richard Nagorski

Carbinolamides are a class of compounds that have been shown to be vital in a large number of biological processes. As interest in this functionality has continued to grow, O-alkylated derivatives of carbinolamides have also been found to have interesting biological and pharmaceutical properties. The mechanism of the aqueous reaction of these carbinolamide derivatives is difficult to predict as alkylation of the hydroxyl group of the carbinolamide effectively blocks the primary routes by which carbinolamides are thought to react. The acid and hydroxide-dependent mechanisms for the breakdown of carbinolamides both require the loss of the proton on the hydroxyl group as some point during their aqueous reaction and the O-alkylated compounds lack this proton. The understanding of the reaction of O-alkylated carbinolamides is further complicated by the fact that the mechanisms of their reactions have never been investigated. Studies from our group have shown that, under acidic conditions, the O-alkylated carbinolamides (1) react at the same rate as the related carbinolamide compound (2). It was concluded that loss of the O-alkylated group was very fast as compared to the reaction of the carbinolamides themselves. However, under basic conditions, the O-alkylated carbinolamides reacted much slower than their related carbinolamides but yielded the same reaction products. What is reported here is the reaction of a series of structurally similar O-alkylated carbinolamides where the structure of the alkyl group attached to the oxygen has been varied. It has been discovered that, in the hydroxide dependent reaction, the structure of the alkyl group has a significant effect on the rate of the reaction of the compound. This is the first evidence that has pointed to the rate determining step of the O-alkylated carbinolamides involving the loss of the O-alkyl group itself. The kinetic studies and their implications towards the understanding hydroxide-dependent O-alkylated carbinolamide breakdown will be discussed.



AMIDE IMITATION AS A PROBE OF STERIC INTERACTIONS

Presenter: Barnes, Andy
Graduate, Chemistry
Mentor: Prof. Andrew Mitchell
Authorship: Andrew Mitchell, John Goodell

Like the Diels-Alder, oxidopyrylium-alkene [5+2] cycloaddition reactions require extensive heating to undergo cycloaddition – or so we thought. Recently, silyloxyprones utilizing tert-butyl amide tethers

have shown a propensity to undergo [5+2] cycloaddition at far lower temperatures with some varieties even achieving extensive room temperature cycloaddition. What causes this substantial decrease in activation energy is not yet known with both the amide and tert-butyl group offering potential steric explanations while resonance with the alkene and amide or R-groups suggests electronic interactions may have a role. With its location at the pivot of the tether, the amide demands particular attention. Amides are sterically unique as their high resonance character generates a bond angle somewhere between the hybridizations sp^2 and sp^3 which, in turn, appears to be more favourable to cycloaddition than either extreme. Synthesis of imine- and iminium-tethered analogues offers sterically similar structures to probe the importance of this hybrid bond angle to the cycloaddition mechanism through direct comparison to amide-tethered analogues.

RAPID, FIELDBORNE PROCESSING OF BULK SAMPLES WITH A 3D-PRINTED CONE SPRAY IONIZATION-MASS SPECTROMETRY (3D-PCSI) AUTOSAMPLER PLATFORM

Presenter: Bondzie, Ebenezer
Graduate, Chemistry
Mentor: Prof. Christopher, Mulligan
Authorship: Ebenezer Bondzie, Rosemary Addo, Trevor McDaniel, Matthew Aldeman, Christopher Mulligan

3D-printed cone spray ionization is an ambient technique which provides some advantages over paper cone spray ionization. The rigidity of the polymeric-constructed cone makes it possible to scoop bulk material during sampling without damaging the integrity of the cone's tip. One major drawback to 3D-PCSI is that the manual positioning of the cone in front of the mass inlet reduces its reproducibility. In this study, a low-cost automated 3D-PCSI platform for use on portable MS system has been developed using off-the-top-shelf (COTS) parts and customized 3D-printed pieces. Application of this platform on portable MS system was demonstrated toward forensic, defense and environmental settings. The automation allows reproducible position, improved sample throughput and automated delivery of solvent for rapid and flexible analysis. The selection of conductive polymers for 3D cone based on compatibility with commonly used spray solvents and strength test to assess the ruggedness of different geometries has been investigated.

OXIDOPYRYLIUM-BASED [5+2] CYCLOADDITIONS

Presenter: Darko, Kwabena
Graduate, Chemistry
Mentor: Prof. Andrew Mitchell
Authorship: Kwabena Darko, Andrew Mitchell

The cycloaddition reaction is an important transformation in the field of organic chemistry since it serves as an indispensable tool in organic synthesis. Among these reactions, [5+2] cycloadditions afford seven-membered heterocyclic ring systems that are very useful in chemical synthesis. The oxidopyrylium-based [5+2] cycloaddition reaction has received enormous attention in chemical synthesis due to its usefulness in the formation of seven-membered heterocyclic ring systems present in complex natural products and biologically active compounds. ¹ Due to this, studies of the synthesis of these ring systems are of great importance. Previous work in the Mitchell research group on the investigation of silyl transfer group, tether proximity, and alkene substitution revealed that bulky transfer group, substituted olefin and proximity of the tether to the transfer group are effective for

cycloadditions.² Herein, we extended the previous work in the Mitchell research group to an interesting amide substrate. The aim of this work is to afford a heterocyclic ring system with an amine handle, which is difficult to achieve via intermolecular cycloadditions. Different amine sources including ammonia, methyl amine and tert-butyl amine were used. The tert-butyl amine is seen to be very effective for cycloaddition since it affords cycloadduct at room temperature. The Kojic acid substrate which has shown to be really poor for cycloadditions from the previous work in the Mitchell research group gave trace amount of cycloadduct at room temperature when tert-butyl amine was used. The tert-butyl group is thought to lock the olefin underneath the pyrone due to steric hindrance, which is crucial for cycloadditions. These results provide more opportunities to investigate the reactivity and mechanistic pathway of oxidopyrylium-based [5+2] cycloadditions.

Reference:

- 1) a) Gao, K.; Zhang, Y. G.; Wang, Z.; Ding, H. Recent development on the [5+2] cycloadditions and their application in natural product synthesis. *Chem. Commun.* 2019, 55, 1859-1878. b) Ylijoki, K. E. O.; Stryker, J. M. [5 + 2] Cycloaddition Reactions in Organic and Natural Product Synthesis. *Chem. Rev.* 2013, 113, 2244-2266.

RAPID VERTICAL FLOW IMMUNOASSAY VIA SANDWICHED PLASMONIC APPROACH FOR ENHANCED POINT OF CARE DIAGNOSTICS

Presenter: Ebbah, Eunice
Graduate, Chemistry
Mentor: Prof. Jun-Hyun Kim
Co-Mentor: Prof. Jeremy Driskell
Authorship: Eunice Ebbah, Richard Frimpong, Jeremy Driskell, Jun-Hyun Kim

Many diagnostic tools for the accurate detection of diseases are time consuming and must be conducted by a trained professional. Thus, there is a critical need to develop an alternative point of care test that provides rapid, reliable, and affordable diagnostics outside a laboratory. Recently, surface-enhance Raman spectroscopy (SERS) has been established as an analytical technique that enables low levels of detection and quantitative chemical analysis. Properly controlling the structural features of plasmonic materials could further enhance SERS-based diagnostics. Here, we exploit SERS in the development of a rapid diagnostic test, using human IgG as a model diagnostic biomarker. The vertical flow immunoassay system utilizes filter paper embedded with gold nanoparticles (AuNP). Capture antibody (anti-hIgG) is then immobilized onto the prepared plasmonic paper and inserted into a vertical flow device. Sample is passed through the filter paper and the target antigen (hIgG) is selectively capture by the immobilized antibody to form an antibody-antigen complex. In a second step, a functionalized AuNP (extrinsic Raman label) passes through the filter paper to label the captured biomarker molecules. This sandwiched system enhances plasmonic coupling and SERS signal to provide ultra-sensitive detection. Importantly, this vertical flow test can be performed in less than 5 minutes, meeting the demands for point of care diagnostics.

SYNTHESIS, CHARACTERIZATION AND ANALYSIS OF STRUCTURE-ACTIVITY RELATIONSHIPS OF RUTHENIUM-BASED ALZHEIMER'S DISEASE THERAPEUTICS

Presenter: Ehlbeck, Johanna
Graduate, Chemistry
Mentor: Prof. Michael Webb
Authorship: Johanna Ehlbeck, Jimmy Garcia, Michael Webb

The aggregation and subsequent extracellular buildup of the amyloid-beta (A β) peptide around neurons is a key hallmark found in the brains of patients with Alzheimer's disease (AD), the most

common neurodegenerative disorder and seventh leading cause of death in the United States. Post-mortem studies have shown increased concentrations of redox-active metals within A β plaques, therefore promoting aggregation and cytotoxicity. Taking advantage of the A β peptide metal binding capabilities, ruthenium(III) complexes that coordinate to A β have shown success in decreasing the formation of insoluble A β aggregate species. Previous research within our group studied a series of Ru(III) complexes with pyridine-based ligands where a variety of functional groups were evaluated to determine structure activity relationships (SAR). It was determined that having a primary amine on the pyridine ring showed the greatest disruption of A β aggregation. Building upon these findings, the current study evaluates the impact of the location of the amine on the pyridine ligand in regards to modulation of A β aggregation. The prepared Ru(III) complexes were analyzed through a series of studies including turbidity, dynamic light scattering (DLS), transmission electron microscopy (TEM) and cytotoxicity assays. The results of these studies as well as obtained SAR will be discussed.

OXIDOPYRYLIUM-BASED [5+2] CYCLOADDITION REACTION

Presenter: Erzuah, Marymoud
Graduate, Chemistry
Mentor: Prof. Andrew Mitchell
Authorship: Marymoud Erzuah, Andrew Mitchell

Over the last decade, several developments and advancements have been made towards the oxidopyrylium-based [5+2] cycloaddition reaction which is geared towards the production of natural products. Given its worth, focus on reaction limitations and development of new reaction pathways continue to be of interest to synthetic organic chemists, providing avenues to a wide range of new heterocyclic seven-membered rings embedded within biologically active natural products. Due to the underlying application of oxidopyrylium-based cycloadditions, the Mitchell group has actively explored this area of research. Oxidopyrylium-based [5+2] cycloaddition allows the formation of complex heterocycles in a single step with high stereoselectivity. Earlier studies done by the Mitchell group demonstrated three characteristics of silyloxypyrone-based [5+2] cycloadditions that contributed to their conversion. First of all, greater reactivity was observed with maltol-derived substrates in comparison with kojic acid-derived substrates. The steric interaction between the silyl group and the tether affected the reaction rate of the terminal olefin formed from maltol, as opposed to the kojic acid, thus affecting the formation of the cycloadduct. Among the silyl-transfer groups investigated, the t-butyl-diphenylsilyl (TBDPS) group showed faster reaction rates than the t-butyl-dimethylsilyl (TBS) group. Also, the electronic effect of α,β -unsaturated esters afforded much higher reactivity than the terminal olefins presumably by lowering the LUMO (Lowest Unoccupied Molecular Orbital). Based on these findings, further studies on dearomative indole [5+2] cycloadditions are under investigation. A synthetic approach involving the construction of fused seven-membered indoline compounds via dearomative [5+2] cycloadditions between the 2 component derived from the C2-C3 bond of indole and the pyrone is employed. Due to the development of non-bonding interactions in the transition state and the combination of entropic factors, seven-membered cyclohept(b)indoles are difficult to access via direct cyclization reactions. Utilizing cycloaddition rather than cyclization is the key to overcoming this challenge. Using the [5+2] indole cycloaddition with an oxidopyrylium ylide is a simple and economically efficient way to generate seven-membered fused indolines with a wide range of biologically active applications.

EFFECTS OF FUNCTIONAL POLYMER PARTICLES ON THE FORMATION OF GOLD NANOPARTICLES AND THEIR CATALYTIC PROPERTIES

Presenter: Eyimegwu, Faith
Graduate, Chemistry
Mentor: Prof. Jun-Hyun Kim
Authorship: Faith Eyimegwu, Frank Egemole, Pascal Eyimegwu, Jun-Hyun Kim

A series of homo poly(N-isopropylacrylamide), PNIPAM, particles possessing different levels of crosslinking density was initially prepared to serve as stable colloidal hosts that can physically integrate guest gold nanoparticles (AuNPs) via the in situ reduction of gold ions. Given the precisely controlled polymer networks with crosslinkers, the formation process strongly influenced the structural features (e.g., size, shape, and distribution) and loading efficiency of the final AuNPs. The crosslinking degree of the homo PNIPAM particles also impacted the overall catalytic reactivity. In addition, copolymer particles possessing functional groups were systematically prepared to examine how these particles were selectively interacted with AuNPs to influence catalytic properties. Various reaction conditions including time, temperature, base and catalyst amount were further screened to optimize the reactivity, and recyclability of the composite particles as quasi-homogenous catalysts. Understanding the influence of host polymer networks on the in situ formation of guest metal nanoparticles, as well as their structural and catalytic properties, is important for the development of novel and practical catalysts that can be utilized in various chemical transformation reactions.

PROGRESS TOWARDS GENERATING DISCRETE CLUSTERS FROM MO₆I₁₂

Presenter: Harris, Arthur
Undergraduate, Chemistry
Mentor: Prof. Lisa Szczepura
Authorship: Arthur Harris, Lisa Szczepura

A major focus of the Szczepura research group is the study of organometallic compounds, which are comprised of organic molecules bonded to a central core containing metal atoms. This study is concerned with the metal cluster core of $[\text{Mo}_6\text{I}_8]^{4+}$, which is made up of six molybdenum atoms and eight bridging iodide ligands. This cluster core is the backbone of the 2D polymeric starting material, Mo_6I_{12} . The goal of this study was to synthesize discrete molybdenum iodide clusters from Mo_6I_{12} and characterize the resulting products. Specifically, attempts were made to coordinate triethylphosphine oxide in absolute EtOH, THF, and DMF to form $[\text{Mo}_6\text{I}_8(\text{OPEt}_3)_2\text{I}_4]$, followed by a comparison of product solubilities among each of the solvents tested. Absolute EtOH appeared to facilitate the coordination of OPET3 the best out of the three solvents tested, as its $^{31}\text{P}\{^1\text{H}\}$ NMR spectra contained signals for OPET3- coordinated products. This presentation will focus on experiments involving the attempted coordination of OPET3 and other ligands, towards the generation of discrete clusters from Mo_6I_{12} .

SYSTEMATIC CONTROL OF THIOL GROUPS ON PROTEINS FOR MANIPULATING INTERACTION WITH GOLD NANOPARTICLES

Presenter: Ogunlusi, Tosin
Graduate, Chemistry
Mentor: Prof. Jeremy Driskell

Proteins adsorbed to gold nanoparticles (AuNPs) form bioconjugates and are critical to many emerging technologies for drug delivery, diagnostics, imaging, and other biomedical applications. A robust interaction between the immobilized protein and AuNP is essential for the bioconjugate to perform as designed. Thus, extensive effort to understand protein-AuNP interaction is necessary. Recently, our group demonstrated that IgG has a stronger adsorption affinity to AuNPs than many other abundant blood proteins, and we attributed this high affinity to the number of free thiols displayed by IgG. Here we explore a potential correlation between the number of free thiol groups present in a protein and the protein-AuNP adsorption affinity. In this study, human serum albumin (HSA) was chemically modified to introduce additional free thiols using Traut's reagent. We quantified the displacement of unmodified and thiol-modified HSA analogs adsorbed on AuNPs by IgG using complementary analytical techniques, such as dynamic light scattering (DLS), inductively coupled plasma optical emission spectrometry (ICP-OES), UV-vis spectrophotometry, and an enzyme mediated assay. We found that HSA displacement from the AuNP correlated with the experimentally measured number of accessible free thiol groups. This work provides a pathway to control the number of free thiols on a protein to facilitate the synthesis of a robust bioconjugate capable of surviving a complex biological environment.

5+2 OXIDOPYRYLIUM BASED CYCLOADDITION

Presenter: Promise, Ifeanyichukwu
Graduate, Chemistry
Mentor: Prof. Andrew Mitchell
Authorship: Andrew Mitchell, John Goodell, Ifeanyichukwu Promise

The ability to synthesize cycloadducts from simple molecules is continually being developed by organic chemists and is considered as one of the most useful tools in organic synthesis. Cycloaddition reactions are utilized to develop compounds which eventually find a broad range of applications in diverse sectors such as pharmaceuticals. The Mitchell research group is focused on understanding various limitations (including steric, electronic, functional group and temperature) and mechanisms related to the silyloxyprone-alkene [5+2] cycloaddition reaction. Recent studies showed that there are three factors that influence the outcome of this reaction: (1) tert-butyl diphenylsilyl group for silylation was more productive than other silyl groups; (2) alpha-beta unsaturated carbonyls were more productive at room temperature than terminal alkenes; (3) the positions of the tether group in relation to the silyloxy group impacts the outcome. Speculation regarding the reaction pathway of silyloxyprone-based [5+2] cycloadditions based on these results has led us to consider alternate tethers. We consider previous work with tethers that possess an amide group which gave a favorable outcome. Although tert-butyl amides showed higher reactivity at low temperatures, the paramethoxybenzyl amide cycloadducts are more synthetically useful due to their ability to be deprotected under milder conditions. Based on these observations, we will synthesize triisopropylsilyl amides which should provide favorable steric properties and milder deprotection conditions.

PROTEIN MODIFICATION AS A FACILE APPROACH TO RETAIN ACTIVITY UPON CONJUGATION TO GOLD NANOPARTICLES

Presenter: Riley, McKenzie
Graduate, Chemistry
Mentor: Prof. Jeremy Driskell
Authorship: McKenzie Riley, Evan Standquist, Christopher S. Weitzel, Jeremy D. Driskell

Gold nanoparticles (AuNPs) have garnered wide interest over the last decades in applications such as drug delivery, biosensing, electrochemical devices, and immunoassay development due to the unique optical properties and easily manipulatable surface chemistry. Protein-NP bioconjugates have gained particular interest in physiological applications, however a complete understanding of the protein-NP interaction to maximize bioconjugate stability and function is highly desired. In this work we explore chemical modification of a protein to precisely control the number of protein thiols and evaluate the impact of thiols on bioconjugation. Specifically solvent exposed lysine residues on the model protein -chymotrypsin (ChT) were reacted with 2-iminothiolane (Traut's) to introduce additional thiol groups that facilitate adsorption to gold nanoparticles. We hypothesize that multi-point adsorption through several thiol-Au bonds will yield robust, stable bioconjugates that retain enzymatic structure/function and resist aggregation. Dynamic light scattering and UV-vis spectroscopy confirms the formation of conjugates while salt induced aggregation kinetics demonstrate the increased stability due to chemical modification. Further, fluorescence spectroscopy was used to investigate the secondary structure post conjugation and was found that native ChT loses its secondary structure upon interaction with the gold surface. Ongoing efforts are focused on quantifying the activity of the immobilized ChT. The results of this study provide additional evidence for the importance and role of free thiols in the formation of stable and enzymatically active bioconjugates.

ESTABLISHING THE TOTAL ANALYTICAL EFFICIENCY OF SUBSTRATES EMPLOYED FOR SURFACE SWABBING PSI-MS PROTOCOLS

Presenter: Taylor, Jasmine
Undergraduate, Chemistry
Mentor: Prof. Christopher Mulligan
Authorship: Ebenezer H. Bondzie, Trevor J. McDaniel, Christopher C. Mulligan

Paper spray ionization-mass spectrometry (PSI-MS) can be used to analyze the collection of chemical residues on a surface swab. This methodology performance is affected by the transfer/ collection and ionization events. Herein, the transfer/collection efficiency of a variety of paper and surface candidates have been investigated to assess the performances of diverse papers and surface swabbing.

Chemical residues, of known masses, were deposited on surfaces of interest by spotting and drying exact volumes of serially-diluted analytical standards. The paper substrates were wetted with extraction solvent and used to swab the surface residues. The substrates were then placed in the appropriate solvent in auto-sampler vials and analyzed with LC-MS (Thermo Q Exactive HRMS with UltiMate 3000). Transfer efficiency was determined by comparing calibration curves with similar analytes. The different papers analyzed varied in size, pore size, and material to determine which has maximum transfer efficiency. The different surfaces analyzed simulated possible surfaces that are likely seen in forensic or police work that may have chemical evidence. Factors were considered that could affect the transfer methods used are solvents, pressure applied to swab, etc. Ionization efficiency was determined by using known and replicated measurements of the standards and its corresponding signal intensities.

The extraction, transfer and ionization efficiency provide information to anticipate situational performance of surface swabbing PSI-MS and ideal paper substrates for specific applications.

CLONING, EXPRESSION, AND KINETIC CHARACTERIZATION OF THE FLAVIN COFACTOR SYNTHESIS ENZYMES FAD SYNTHETASE AND RIBOFLAVIN KINASE FROM SULFOLOBUS ISLANDICUS

Presenter: Zaman, Faeq
Undergraduate, Chemistry
Mentor: Prof. Jon Friesen
Authorship: Faeq Zaman, Jon Friesen

The metabolization of riboflavin is an essential pathway in all living organisms. The coenzymes produced, flavin mononucleotide (FMN) and flavin adenine dinucleotide (FAD), are so critical to energetic metabolism that insufficient quantities of them are known to cause poor responses to several human diseases. Riboflavin is metabolized in two main steps. Riboflavin kinase first phosphorylates riboflavin using ATP to create FMN. FAD synthetase then adenylates FMN using ATP and produces the final products FAD and pyrophosphate (PPi). The FAD biosynthetic pathway has been extensively studied in both bacteria and eukaryotes, but not much in archaea. In this project, two genes from the thermophilic archaeal organism *Sulfolobus islandicus* are annotated and suspected to encode for these two flavin cofactor synthesis proteins, FAD synthetase and riboflavin kinase. The genes are amplified and cloned, and their resulting protein products are expressed in *Escherichia coli*. Agarose gel electrophoresis and sodium dodecyl sulfate polyacrylamide gel electrophoresis are performed to check and analyze each step of the cloning and protein expression procedures, respectively. Following purification of these monofunctional enzymes, catalytic activity is tested using a multitude of assays. After investigating many reaction conditions, results were finally obtained, through phosphorus-31 nuclear magnetic resonance spectroscopy, indicating that the enzymes indeed catalyze the phosphorylation and adenylation of riboflavin. Although FAD was ultimately formed, further work is still in progress to find the best conditions for these enzymes so that their kinetic parameters may be determined.

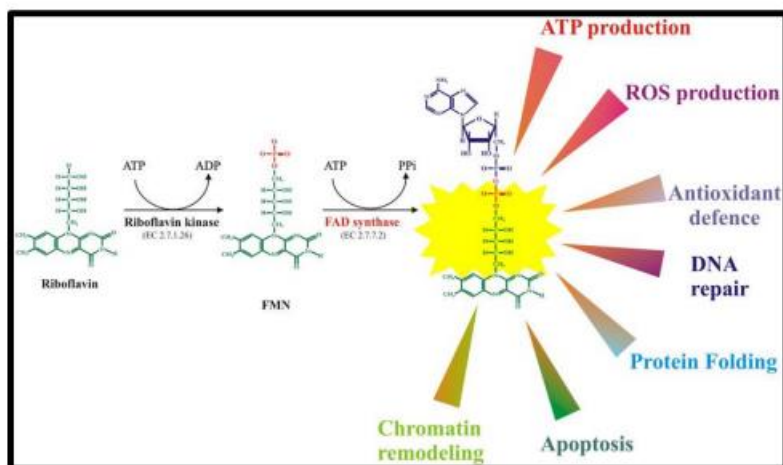


Fig. 1 Biosynthesis of FMN and FAD from riboflavin and the main functions of flavoproteins in living organisms (Giancaspero et al. 2015).

IN VITRO INHIBITORY ACTIVITY OF ANAEPHENE B AND ANALOGUES AGAINST LEISHMANIA TARENTOLAE

Presenter: Zaman, Shariq
Undergraduate, Chemistry
Mentor: Prof. Marjorie Jones
Authorship: Shariq Zaman, Juan Canchola, David Kukla, Timothee Staley, Jonathan Mills, Marjorie Jones

Amphipathic molecules such as detergents are characterized by having polar and nonpolar elements in their structure, making them effective in causing physical changes in many different substances. Some natural products have amphipathic properties that make them useful for therapeutic treatments to cure disease (1). In this study, a specific alkylphenol natural product, anaephene B, and unique synthesized derivatives of it, were tested for their inhibitory effect on the protozoan parasite *Leishmania tarentolae*. After a series of cell viability tests and enzyme assays, these test compounds have produced interesting results, showing similar potency against *L. tarentolae* as they do against drug-resistant bacteria such as methicillin-resistant *Staphylococcus aureus* (MRSA) (2). The experimental findings from this study allow for enhanced understanding of the structure-activity relationship between anaephene B and its analogues. Among the compounds tested, certain analogues were more effective than others in inhibiting *L. tarentolae*. So far, the natural product (anaephene B) and compound 7 seem to be potentially harmful to host organisms, whereas compounds 18, A, and B have shown encouraging experimental results. Depending on how well these antibiotic compounds perform against *L. tarentolae* in initial tests, more experiments may be conducted to assess whether they can be used in the formation of new therapeutics for leishmaniasis. Additional synthetic analogues will be tested in the continuation of this study.

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ASSESSING THE TOXICITY OF LEURS-I IN ESCHERICHIA COLI BL21 (DE3)

Presenter: Ziegler, Logan
Undergraduate, Chemistry
Mentor: Prof. Christopher Weitzel
Authorship: Logan Ziegler, Christopher S. Weitzel

Sulfolobus islandicus contains a duplication of leucyl-tRNA synthetase (LeuRS). These paralogs are referred to as LeuRS-F and LeuRS-I. LeuRS-F is known to be the canonical LeuRS for *S. islandicus*; however, the function of LeuRS-I is currently unknown. Past results have shown that LeuRS-I is toxic to *Escherichia coli*. We postulate that the enzymatic activity of LeuRS-I negatively influences the fitness of this model organism by promoting errors in protein synthesis by mischarging cognate leucine onto non-cognate tRNA substrates. In an attempt to determine the root cause of this toxicity, catalytic mutants of this paralog were assayed for their effects on the viability of an overexpressor strain of *E. coli* referred to as BL21(DE3). Experimental conditions tested for the plating assays included altering both the leucine content and inducer (IPTG) concentration within lysogeny broth (LB) solid supports. We speculate that increasing the leucine content will promote mischarging of the noncanonical tRNA substrates, while increasing IPTG concentrations will lead to the generation of more protein, both

promoting the toxicity of wild-type LeuRS-I. Preliminary results assaying wild-type LeuRS paralogs alongside LeuRS-I mutants will be presented.

Communication

THERE'S A DOC FOR THAT! HOLDING EMPLOYEES ACCOUNTABLE TO USE ONLINE DOCUMENTATION

Presenter: Godinez, Ertemisa
Graduate, Communication

Mentor: Prof. John Baldwin

In light of the increasing availability of information online in organizational setting, it is necessary to review how organizations can ensure that their employees are utilizing those resources to its full potential. Online documentation is any electronic media that an organization stores for their employee to access information required to accomplish their work tasks. While online documentation is designed to be easily accessible for employees, managers still report addressing numerous questions throughout the day regarding information that is already available in these online resources. Using expectancy theory, information seeking, and a ventriloquial approach to seven semi-structured interviews with managers from various Midwestern based companies, I identified communication patterns commonly used by managers to communicate expectations and accountability. While expectations are discussed when online documentation is first introduced or updated, managers use tokens of accountability continuously to motivate employees to use regularly use online documentation. Managers also use documentation as ventriloquists to communicate to employees that they are not using the online documentation as they should. These findings illuminate how ventriloquism is manifested in organizations, as well as how managers can consciously choose to act as ventriloquists to address difficult subjects that risk leading to negative relational consequences with their employee. Findings also highlight that information seeking in combination with expectancy theory can provide a framework for managers to clearly set up expectations around using online documentation that is in line with the employees' motivation and desire for timely information.

GAMING MINORITIES: ANALYZING THE EXPERIENCES OF NON-MALES IN ESPORTS GAMING

Group Leader: Wilson, Madison:
Graduate, Communication

Group Member: Taylor Newswander, Graduate, Communication

Mentor: Prof. John Baldwin

This study aims to analyze the experiences of non-males in eSports gaming. Objectives include understanding the experiences of non-males and the treatment of non-males by male counterparts in eSports gaming. Current literature suggests that issues related to gender broadly plague the video gaming sector. Semi-structured interviews with seven non-male identifying participants were conducted. Emerging themes include gaming culture, communal support, friendship building, males as entry points, othering and accommodation, and representation and empowerment. Experiences varied some among assigned male and assigned female at birth participants. The results of this study have implications for future gaming and queergender research.

Keywords: eSports, gaming, gender, experience, representation, culture, othering

Criminal Justice Sciences

EXONERATION COMPENSATION ACROSS THE UNITED STATES

Presenter: Rivers, Davey
Graduate, Criminal Justice Sciences
Mentor: Prof. Michael Gizzi

Each year an unknown number of innocents are wrongfully convicted and sentenced to serve time in prison for crimes they did not commit. It can take many years for their innocence to come to light through exoneration, wasting much of their lives. These exonerees are released back into the community with nothing, often not even an apology, but many states offer legal means through which they can receive compensation for their lost years. This research provides a comparative overview of the 39 compensation statutes around the country and assesses their provisions using qualitative research methods. The research shows the significant variation in the scope of compensation provided and the process for applying for it. The primary areas of variation in the statutes are the amount of financial compensation, the processes by which compensation claims can be filed, any additional benefits, and what renders an exoneree ineligible for compensation.

UNDERSTANDING EXPUNGEMENT OF CANNABIS-RELATED ARRESTS AND CONVICTIONS IN LEGALIZED STATES

Presenter: Swanson, Alexis
Graduate, Criminal Justice Sciences
Mentor: Prof. Ralph Weisheit

In recent years, the United States has become more accepting of recreational cannabis. A majority of states and the District of Columbia have either decriminalized or legalized small, personal amounts of cannabis for adult recreational use (Harman, 2021). In addition, many states and Washington, D.C. have record-clearing laws that may be applicable to cannabis arrest and convictions (Hartman, 2021). Decriminalization and legalization of cannabis have helped to decrease the number of cannabis-related arrests and convictions across the U.S. (Adinoff & Reiman, 2019). In addition, the development of policies that allow for the expungement of certain cannabis-related arrests and convictions has helped reduce collateral consequences for people who have been impacted by punitive cannabis laws (Transform Drug Policy Foundation, 2021).

For this project, expungement and record-clearing procedures applicable to cannabis arrests and convictions in twelve states and Washington, D.C. with legalized recreational cannabis prior to 2021 are reviewed and compared. In addition, a search for data kept on expungement of cannabis-related arrests and convictions within these states is conducted.

Preliminary analysis shows that expungement policy differs somewhat significantly by state. Differences in expungement policy relate to the accessibility of expungement. In addition, only one out of the twelve states examined is shown to keep a limited special index on completed expungements. Considering these preliminary findings, barriers to accessing expungement and the drawbacks of

limited data kept on expungement will be discussed, including how they relate to the cannabis criminal records expungement paradox coined by Julie E. Steiner (2021) as well as the possibility for racial disparities to exist.

CHILDHOOD PARENTAL DEATH EFFECT ON DELINQUENCY

Presenter: Vargas, Stephanie
Undergraduate, Criminal Justice Sciences
Mentor: Prof. Joanne Savage

Some argue that the most critical period of time for a human being is childhood. Children are extremely dependent on their caregivers. Some Developmentalists emphasize the importance of the attachment bond. When a child loses his or her caregiver, it can cause development disruptions. It has been argued that when children lose a caregiver, they do not just lose the person, they lose the attachment. Losing a parent in early childhood can lead to mental and behavioral disorders. Research also shows that young children with insecure attachments are at higher risk of developing behavior problems. In this paper I will examine the literature on the effects of parental death on child behavior problems. I will also analyze these associations using data from the National Longitudinal Survey of Adolescent Health.

English

BUT YOU SAY YOU'RE NOT A READER? EXPLORING THE ROLE OF READING EXPERIENCES IN HIGH SCHOOL CLASSROOMS

Presenter: Blake, Kaitlyn
Undergraduate, English
Mentor: Prof. Danielle Lillge

My research disrupts the underlying assumption in many English Language Arts (ELA) classrooms that students need to identify readers, and instead asks the question: how can we support the needs of nonreaders and create meaningful reading experiences for all our students? By doing so, my research presents the argument for reframing the goal of reading instruction in secondary classrooms to focus less on students being readers and more on students valuing reading as a skill they can use throughout their lives.

Drawing on data from a larger qualitative study, this abstract focuses on the results of my survey data. The survey English IV students filled out asked a range of questions focusing on if they considered themselves a reader, if they believed others considered them a reader, what kinds of texts and for what purposes they read. The survey asked them to recall a time they enjoyed reading and a time they were challenged by reading.

One clear finding from this survey is that many participants considered themselves to not be readers and an even larger number believed others would not consider them readers. However, they still noted a range of genres, numbers of texts, and purposes for reading. My analysis of these student responses illustrated a range of answers narrating their reading experiences with one clear commonality: students were reading, even when they did not consider themselves to be readers. Many English teachers, like I did when the study began, believe the role our classrooms serve is to be the change and to help students see themselves as readers. There is not anything wrong with this desire. However, when English classrooms position being a reader as the goal, they also position being a nonreader or not a reader as not reaching the goal, as failing in a sense.

To embrace all students without the pressure to see themselves as a reader, we English teachers can reframe our classroom goal to be illustrating to students the value of reading. The results of this study suggest that if we shift the focus from being readers to valuing reading, we will be able to help students see the purpose of our classroom in their lives and will give them something all students can use in

their lives—the skill of reading. Through this approach, my research complicates a commonly held framework among ELA teachers and offers a path forward for our classrooms that will make the purpose and importance of reading more relevant to the lives of our students.

Family and Consumer Sciences

MEDIA PORTRAYAL OF FEMALE CHARACTERISTICS WITHIN DISNEY MOVIES INFLUENCING CHILDREN'S BODY IMAGE

Group Leader: Blasko, Kaitlyn
Undergraduate, Family and Consumer Sciences

Group Members: Mary Pohlman, Undergraduate, Family and Consumer Sciences; Kehinde Ayedun, Undergraduate, Family and Consumer Sciences

Mentor: Prof. Ui-Jeen Yu

Authorship: Kaitlyn Blasko, Mary Pohlman, Kehinde Ayedun, Mollie Spoerer, Savannah Strassheim

As early as the 20th century, Disney, the company that specializes in media and film production, has been creating movies and films for young audiences. However, young girls have been more affected by the appearances of the characters within these films especially when there is not enough diversity with regards to ethnicity, body type, or overall appearance of these characters. The Disney characters are more likely to have a fair skin-tone and slimmer body frames, unrealistic to the way that a lot of young girls look in our society. Our study aims to examine whether there has been a change in the way that Disney portrays female characters in the films after the body positivity movement in 2012 and how they were portrayed in the films after 2012. A content analysis was conducted by collecting female characters of thirty Disney movies, fifteen that were shown before 2012, and fifteen that were shown after 2012. For each female character, physical attractiveness, body thinness, breast size, and ethnicity were analyzed. Results indicate that the Disney female characters after 2012 tend to show more diversity when it came to ethnicity, physical attractiveness, body thinness, and breast size. Disney has used more ethnically diverse female characters as well as a different range of body types after 2012. As female characters in Disney movies have a major influence on girls' body image, the change toward portraying more diverse beauty ideals in Disney movies will have a positive impact even though the change is slowly making progress for your audience. This study provides an insight of incorporating diversity and inclusion in media for children.

GERT SIMULATION TO STRENGTHEN THE KNOWLEDGE AND EMPATHY OF INTERIOR DESIGN STUDENTS

Presenter: Elsey, Erica
Undergraduate, Family and Consumer Sciences

Mentor: Prof. Gabriela Fonseca Pereira

Authorship: Erica Elsey, Gabriela Fonseca Pereira,

The GERT suit is a series of components that simulate the aging experience, aiming to help people empathize and gain insight into the needs of the aging population. It simulates changes in eyesight, hearing loss, mobility restrictions, stiffness, and loss of strength (Moll, n.d.; Yumuşak, 2019).

In the Interior Design Program, students theoretically learn about the aging process and how to address the needs of older adults. However, there is an age gap of at least 40 years between most college students and their target clients. This study is aimed at understanding what students experience while wearing the GERT suit and if it has made them more understanding of the design needs of the aging process. The question guiding this study was: How does wearing a GERT suit influence students' learning about the aging process and applying design solutions for the aging population?

This study was proposed at the 'Human Factors in Interior Environments' class in the Fall 2021. There were 22 students and each one wore the GERT suit and completed five tasks: Go up and down a flight of stairs, sit down and get up from a seat, enter and exit a bathroom and stall, get directions from someone in the hallway, and use a wheelchair to leave and return to the classroom. After finishing, students were given questions to answer based on how they felt physically and mentally during the simulation (Johnson et al., 2018). By doing content analysis, emerging themes were identified based on students' common experiences and feelings.

The results showed that students frequently experienced changes with hearing loss, eyesight, and problems with coordination. Words that appeared frequently in responses were 'Tired' and 'Uncomfortable'. The majority also felt that it was difficult to complete their tasks safely and felt self-conscious walking through the building. When it comes to the experience, students empathized with the aging population and thought that this would have been more difficult with any cognitive impairments and that this simulation would make them more aware of older adults' needs when designing different spaces.

This study shows that students were able to experience some of the changes that come with age and with this, a better understanding of the experiences and needs of the aging population. By experiencing some of the difficulties that arise with the aging process, students understand the diverse range of needs that must be considered during the design process.

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IMPACTS OF COMMUNITY GARDENS ON OVERALL HEALTH PROMOTION IN REGARD TO DIETARY BEHAVIORS AND PHYSICAL ACTIVITIES: EMPHASIS ON MODERATED MEDIATION

Presenter: Ho, Cheng Yi
Graduate, Family and Consumer Sciences

Mentor: Prof. Julie Schumacher

Introduction: The purpose of this study was to investigate how community gardening participation impacts and benefits the health of various populations on their fresh produce consumption and physical activities. This study was designed to identify innovations to reduce the barriers of participation in community gardening.

Methods: This study was approached via moderated mediation, which identifies the moderating effect on direct and indirect paths among variables. The predictor variable (X) was level of participation in community gardens, and the overall health outcome was regarded as the outcome variable (Y). Between X and Y, the variety of grown produce was considered as the mediator while the highest nutrition education was the moderator.

Results: As a result, the analysis revealed that there were no significant statistical relationships regarding moderated mediation. However, the direct moderating effect between X and Y was revealed to be statistically significant ($t = -2.2066$, $p < .05$). Another significant correlation was shown between the level of participation and the overall health outcome (coefficient = $-.2716$, $p < .05$).

Discussion/Conclusion: Overall, most regressions, mediation, and moderated mediation among benefits generated by community gardening were not significantly revealed in this study although the moderating effect of highest nutrition education was revealed. Perhaps, the statistical insignificance of the data can be explained by the difference of research settings. Other studies investigating mediation or moderation of community gardens' benefits applied intervention to the same group of individuals and therefore more apparent and clear development shown. Even though this study did not show that overall health outcome can keep improving as participation levels elevated in statistical sense, positive health impacts of community gardening were still revealed via community gardeners' perceptions. The finding of this study also showed that nutrition education has potential to be considered as moderator in community gardening to optimize disease management and prevention with a more comprehensive understanding.

KEYWORDS: moderated mediation; community gardening; disease management; nutrition education; overall health outcome; level of participation; grown produce

THE APPLICATION OF COLLABORATIVE ROBOTS IN GARMENT FACTORIES

Presenter: Nguyen, Kim Phung
Graduate, Family and Consumer Sciences
Mentor: Prof. Yoon Jin Ma
Authorship: Kim Phung Nguyen, Yoon Jin Ma
Ma

Industry 4.0 (I4.0) is reshaping and transforming many business models and manufacturing versions to bring the latest breakthroughs in the development and competition of many areas such as electricity, automotive, etc. (Jin & Shin, 2021). Mainly, robotics, intelligent manufacturing, 3D printing and knitting, virtual and augmented reality, and AI are the most significant applications of the I4.0 in the fashion industry (Jin & Shin, 2021). Regarding the robotics and intelligent manufacturing sectors of the I4.0, collaborative robots (Cobots), robot models, is a new significant technology of I4.0 and can function together with humans in an uncaged environment to have a better performance in safety and productivity (Perez et al., 2019). The current research of Cobot's applications in garment factories is still at the beginning stage (Lee et al., 2021). To the researcher's knowledge, at present, academia has not yet wholly explored how Cobots can be applied nor the impact of Cobots in the garment factories based on employees' perspectives. Especially, Vietnam is potential outsourcing for many famous brands globally with thousands of textile and garment factories. Therefore, it is a significant opportunity to understand the relationship between Cobot's factors and adoption intention in garment factories in Vietnam. The purpose of the study is to explore the feasibility of Cobots in the context of Vietnam's garment factories. A preliminary study was conducted with the garment employees at the management level to develop scenarios that illustrate how collaborative robots can be applicable to the production process in garment factories. As a theoretical framework, the Unified Theory of Acceptance and Use of Technology (UTAUT) of Venkatesh et al. (2003) is employed, and three additional constructs are included in the theoretical model to explore the acceptance level of Cobot's

applications based on employees' intention in Vietnamese garment factories. Using an online survey tool, the data will be collected from 150 participants who are currently working in garment factories in Vietnam. They will answer a questionnaire on a 7- point Likert scale measuring variables of UTAUT models about Cobots implementation: performance expectancy, effort expectancy, social influence, behavioral intention, anxiety, trust to Cobots, personal innovativeness, facilitating conditions, and demographic and background information. The data will be analyzed using SPSS 28.0, including exploratory factor analysis, internal reliability assessment, and simple regression. The findings will be reported at the presentation.

THE EFFECT OF WASH TIMES ON THE COTTON JERSEY FABRIC PROPERTIES

Presenter: Nguyen, Kim Phung
Graduate, Family and Consumer Sciences
Mentor: Prof. Yoon Jin Ma

In the fashion industry, many wearers are concerned about how long their clothing can last to see whether the price is worthy. It depends on many factors, among which is the refurbishing. After every washing, the fabric properties get worse. In reality, the wearers can see that the fabric surface becomes fuzzier, more loose yarns coming out, and pilling, etc. Therefore, this project aims to figure out how much home laundry factor changes fabric performance based on the number of washing times. The experiment was applied for 100% greige cotton Jersey fabric. This fabric was washed under the standardization of home laundry test conditions of the American Association of Textile Chemists and Colorists (AATCC). The fabric tests were followed two popular primary standards in the world, including AATCC and the American Society for Testing and Materials (ASTM). In this experiment, the six tests were run utilizing the standard test methods. First, ASTM D3776 Mass Per Unit Area (Weight) of Fabric was used to measure fabric weight. Second, the water absorbency of the fabric was measured by AATCC 79 Absorbency of Textiles. Third, ASTM D737 Air Permeability of Textile Fabrics was utilized to define the airflow rate per unit area at a given differential pressure, which is normally expressed as cfm/ft² at 0.5 inch water gauge. Fourth, AATCC 201 Drying Rate of Fabrics: Heated Plate Method was used to measure the rate at which a textile specimen dries after being exposed to water. Finally, AATCC TM198 Horizontal Wicking of Textiles and AATCC 197 Vertical Wicking of Textiles were employed to evaluate the ability of horizontally and vertically aligned fabric specimens to transport liquid along or through them. For each test, the results were collected after washing three times, five times, seven times, ten times, fifteen times, and twenty times. In conclusion, this study shows different testing results between those washing times to see how much fabric properties changed over the course of washing process and figured out what factors caused those differences to think about how to improve the fabric properties and hand feel. If the fabric properties can remain good quality after every wash, the long term usage of garments can be increased to be more economical and sustainable.

Finance, Insurance, and Law

IMPACT OF THE PAYCHECK PROTECTION PROGRAM ON THE BANKING INDUSTRY

Group Leader: Morr, Rudy
Undergraduate, Finance, Insurance and Law

Group Members: Wyatt Frere, Undergraduate, Sociology/Anthropology; Kristen Carlson, Undergraduate, Accounting; Joshua Crull, Undergraduate, Mathematics; Stephen Sloan, Undergraduate, Finance, Insurance and Law

Mentor: Prof. Vladimir Kotomin

Authorship: Kristen Carlson, Joshua Crull, Wyatt Frere, Rudy Morr, Stephen Sloan

A multidisciplinary team of undergraduate students researched specific effects of the Paycheck Protection Program (PPP) on the banking industry and county-level unemployment. The program helped small businesses stay afloat during the pandemic by providing low-interest loans with built-in forgiveness. The team aggregated PPP loan data at the bank and county levels and used regression analysis to answer the following questions:

- 1) Is greater county-level PPP participation associated with a lower increase in unemployment? Indeed, a 1% increase in the county-level ratio of PPP loans to the endof-2019 county GDP is associated with the unemployment increase between 2019 and 2020 that is lower by 0.02%.
- 2) How did participating in the PPP affect banks' noninterest income and expenses? a. Did banks with greater PPP participation have their noninterest expense increase. Processing many loans on a short notice is costly and drains resources, which may increase a bank's noninterest expense (e.g., salaries) in the short run. Consistent with this reasoning, a 1% increase in the ratio of PPP loans made by the bank to its pre-pandemic total assets is associated with a 0.02% increase in the bank's noninterest expense in 2020. b. Did banks with greater PPP participation have their noninterest income decrease? Processing many loans on a short notice may force banks to divert employees and other resources from other services that generate noninterest (i.e., fee) income for the bank. Our findings contrast this prediction: a 1% increase in the ratio of PPP loans made by the bank to its pre-pandemic total assets is associated with a 0.05% increase in the bank's noninterest income. It may be related to higher fees generated for processing PPP loans.
- 3) Were banks with higher pre-pandemic interest expense (cost of funds) more likely to take loans from the Federal Reserve's Payment Protection Program Lending Facility (PPPLF)? The PPPLF had a fixed interest rate of 0.35%, while PPP loans had an interest rate of 1%. We find that banks with the higher pre-pandemic ratios of interest expenses relative to total assets were more likely to resort to PPPLF loans.

Based on these analyses and anecdotal evidence that many banks struggled to find resources necessary for an emergency lending program with such short notice, the team has recommended to have a centralized facility next time where both applicants and lenders would register.

Geography, Geology, and the Environment

BREAKING DOWN A TRACER IN A SATURATED BUFFER ZONE: COMPARING THE USE OF RHODAMINE WT TO SODIUM CHLORIDE

Presenter: Hoberg, Joseph
Undergraduate, Geography, Geology, and the Environment

Mentor: Prof. Eric, Peterson

Authorship: Joe Hoberg, Eric Peterson, Eli Schukow, Alhasaan Sahaad, Richard Twait

Tracer tests are a common means to discern hydrologic and transport properties of an aquifer. Conservative ion tracers, such as dissolved salts, are common choices for use as groundwater tracers, but the introduction of large quantities of salts can elevate the concentrations to acute levels for organisms and can create density driven flows. Rhodamine WT dye is widely used in karst systems but not in Darcian systems. We explored the questions “Can Rhodamine WT dye be used as a groundwater tracer in a Darcian system comprised of weathered diamicton?”, and “How does the transport of Rhodamine compare to transport of chloride?” Six (6) Kg of sodium chloride (NaCl) and 1 Kg of Rhodamine WT dye (25000 ppm) were injected into a saturated buffer zone (SBZ) via diversion box and drainage tiles. Following the injection, water samples from wells installed in the SBZ were collected and analyzed for the dye and Cl concentrations.

Breakthrough curves for the dye were similar to those of Cl, confirming similar transport dynamics. Inspection of the breakthrough curves indicated the average travel time for the peak dye concentration was 12 days following injection and two days after the peak dye concentrations within all wells had lowered. Peak concentrations for Cl arrived on average 16 days after injection. Identification of the time each tracer had left the system was difficult to discern, a storm event occurring 31 days after injection will serve as the upper limit. Breakthrough curves modeled utilizing TRAC simulated travel velocities and longitudinal dispersivities of the tested constituents. Average velocities for both Cl and dye were relatively equal, however, dye displayed high variance. Modeled Cl dispersivities are two orders of magnitude larger than the dye. Overall, the similar arrival times and breakthrough curves of the constituents suggest that Rhodamine dye can be used as a groundwater tracer in weathered diamicton. Future research and replication must be conducted in order to further explore and refine this technique.

ENVIRONMENTAL SECURITY IS THE KEY TO SUSTAINABLE DEVELOPMENT AND CONFLICT RESOLUTION

Presenter: Zak, Bridget
Undergraduate, Geography, Geology, and the Environment

Mentor: Prof. Alec Foster

Although Environmental security is still a relatively new area of study, there is a lot of evidence that suggests interdisciplinary study could be the key to sustainable development and conflict resolution for the future. Environmental security is the interrelated protection of the natural environment from threats both natural and anthropogenic, in order to prevent conflict and ensure resource stability. Through researching past environmental security missions carried out by the United States Department of Defense, there is a clear relationship between environmental security and conflict prevention and resolution. One of the leading causes of global conflicts are over natural resources like water, oil, and fertile land. The goal of environmental security is to encourage and enforce sustainability to prevent and end disputes. However, I have found that those responsible for creating conditions that produce

environmental security threats are not likely to be involved in solving them. Organizations like the United Nations Environmental Programme and the United States Department of Defense are some of the leading environmental security agents, their efforts demonstrate how focus on environmental security is an innovative method of conflict resolution, while promoting sustainability.

Health Sciences

I-U NH VS. LEURS-I: INFLUENCING GROWTH CHARACTERISTICS OF SULFOLOBUS ISLANDICUS

Presenter: Bergh, Allison
Undergraduate, Health Sciences
Mentor: Prof. Christopher Weitzel

The Sulfolobaceae are a family of Archaeal extremophiles, with each member conserving two fulllength leucyl-tRNA synthetases (LeuRS) referred to as LeuRS-F and LeuRS-I. LeuRS is one member of a superfamily of proteins that catalyze the attachment of amino acids to transfer RNAs (tRNAs) in ATP-dependent reactions known as aminoacylation or charging. While *LeuRS-F* efficiently charges leucine onto tRNA^{Leu}, *LeuRS-I* has diverged to such a degree that this activity is seemingly disabled. Notably, while classical *LeuRS* activity is undetectable, a *Sulfolobus islandicus leuRS-I* knockout strain displays growth defects relative to an isogenic wild type strain, particularly at low temperatures and during extended stationary phase. While this likely underscores the importance of *LeuRS-I* for optimal *S. islandicus* viability, the gene for this LeuRS paralog was recently found to be the second of three within an operon. Directly downstream of *leuRS-I* is a gene encoding a purine-preferring nucleoside hydrolase (inosine-uridine nucleoside hydrolase, I-U NH) important for the recycling of RNA. Furthermore, sequence analysis also suggests that there may be two promoters in the 3' end of *leuRS-I* that may regulate the expression level of I/U NH. Therefore, removing *leuRS-I* may affect the transcription of I-U NH leading to the observed phenotypes in the *leuRS-I* knockout. The purpose of this study is to determine if the observed growth defects of $\Delta leuRS-I$ are due to the removal of leuRS-I or the mis-regulation of iu nh. Three *S. islandicus* knockout strains were made using homologous recombination and the gene for arginine decarboxylase (*argD*) from *S. tokodaii*. One strain had *leuRS-I* replaced by *argD* (known as ΔI), another had i-u nh replaced by *argD* (ΔNH), and a third strain had both *leuRS-I* and *i-u nh* replaced ($\Delta I/NH$). A wild type strain (RJW003) was used as a control. Strain construction was confirmed via PCR analysis. Results from growth curve experiments of these four strains will be presented and discussed.

RECOVERING NUTRIENTS FROM WASTEWATER

Presenter: Carroll, Rowan
Undergraduate, Health Sciences
Mentor: Prof. LC Yang

Excessive nutrients, such as nitrogen and phosphorus, harm aquatic life and limit recreational opportunities by promoting the growth of toxic algae and eutrophication. Therefore, finding ways to separate the excess nutrients from wastewaters with the ability to reuse them is of great interest. This study aimed to recover nutrients from anaerobic digestion effluent, which contains ammonium and phosphate. Digestion effluent was taken from a local wastewater treatment plant and was diluted

before measuring the concentrations of ammonium nitrogen, reactive and total phosphorus. After that, magnesium chloride was added to react with these compounds to produce struvite (magnesium ammonium phosphate, $\text{NH}_4\text{MgPO}_4 \cdot 6\text{H}_2\text{O}$), a slow-release multi-nutrient fertilizer. A series of experiments was carried out to evaluate the effects of pH value, mixing ratio, and mixing time. The N and P concentrations in the supernatant were measured to evaluate the recovery efficiency.

USING COARSE-GROUND RECYCLED GLASS IN GEOPOLYMER CONCRETE

Presenter: Lyons, Ashley
Undergraduate, Health Sciences
Mentor: Prof. Guang Jin
Co-Mentor: Prof. Pranshoo Solanki
Authorship: Guan Jin, Ashley Lyons,

Portland cement-based products, specifically concrete, are one of the most commonly used building materials. Although, the cement industry faces important environmental issues such as the use of fossil fuels, emission of greenhouse gas, and high levels of energy consumption. To combat these issues, geopolymer concrete (GeoPC) emerges as an excellent alternative to Portland cement concrete due to its superior properties and lower greenhouse gas emissions. GeoPC is prepared from recycled industrial/municipal waste such as fly ash and waste glass. In this study, we 1) prepared **GeoPC activators** by dissolving recycled waste glass in sodium hydroxide solutions, 2) prepared **GeoPC** by using activators from step 1) and fly ash. The objectives of this study include:

- 1) investigate the relationship between dissolved silica concentration of **GeoPC** activators and i) glass particle size, and ii) concentration of sodium hydroxide
- 2) investigate the relationship between the compressive strength of **GeoPC** and i) dissolved silica concentration in activators, ii) concentration of alkali in activators, and iii) alkali/silica ratio in activators

A series of bench-scale glass dissolution reactions were performed using sodium hydroxide solutions with commercially cleaned and characterized recycled glass. Reactions were performed at 95°C and intermittent mixing of 30 minutes per day where all glass particles are suspended. Concentration of dissolved silica were monitored for every 96 hours for 3 weeks and analyzed using inductively coupled plasma – atomic emission spectrometry (ICPAES). A set of three cubes of 2.54 cm x 2.54 cm x 2.54 cm were molded for all the AAM mixtures. After molding, specimens were cured in an oven at $80 \pm 2^\circ\text{C}$ for 24 hours followed by curing inside an ice chest at a temperature of $23.0 \pm 2^\circ\text{C}$ for 24 hours. Compressive strength was measured in accordance with ASTM C 109 test method. Highest dissolved silica concentration was found to be at 70,000 ppm with the finest glass particle size of around 70 μm using 2M sodium hydroxide. Highest compressive strength of 41 MPa was observed with $\text{SiO}_2\%$ of 6.5 – 7%, alkali concentration of 12 M and alkali/silica ratio in activators of 0.175.

Information Technology

CLASSIFYING AND CATEGORIZING LUNAR CRATERS USING CONVOLUTIONAL NEURAL NETWORKS

Presenter: Johnston, Jamie
 Graduate, Information Technology
Mentor: Prof. Matt Caplan
Authorship: Jamie Johnston, Matt Caplan

Traditionally, lunar crater counting has been done by visual inspection of images of the moon's surface. This method is time consuming and has poor inter-rater reliability for smaller craters. Automating this process using a Convolutional Neural Network (CNN) greatly improves the speed and reliability at which surface features can be detected and classified. Using available high resolution Digital Elevation Model (DEM) images from the Lunar Reconnaissance Orbiter (LRO), we train a CNN to identify craters and classify them based on the slope of their ejecta blanket. Presently the population of small impactors is not well understood but improved detection of the smallest craters can constrain the size distribution of asteroids in the solar system. Additionally, we intend to search for small craters with novel features that are inconsistent with traditional asteroid impacts to potentially constrain the moon's interaction history with MACHO dark matter from the Galactic halo.

DETECTING NEURONAL SYNCHRONIZATION IN THE BRAIN

Presenter: Katuri, Gangadhar
 Graduate, Information Technology
Mentor: Prof. Rosangela Follmann
Co-Mentor: Prof. Epaminondas Rosa
Authorship: Gangadhar Katuri, Rosangela Follmann, Epaminondas Rosa

Billions of neurons make up our brains where the emergence of synchronous behavior is one of the most fundamental questions in the field of neuroscience. In a system as complex as the human brain, synchronization of neuronal activity can be useful and necessary as during the sleep cycles and in consolidation of memory but can also be problematic and undesirable as in disorders such as epilepsy and Parkinson's disease. The goal in this study is to shed light on a particular type of neuronal synchronization associated with epileptic seizures that result from a central nervous system disorder characterized by abnormal brain activity. The approach proposed here consists of analyzing electroencephalogram (EEG) data containing information about neuronal electrical activity of epileptic patients before, during and after a seizure. The database includes EEG recordings of 14 patients obtained from the Unit of Neurology and Neurophysiology of the University of Siena, with electrical activity collected from 29 brain areas through electrodes placed on the scalp of the patients. The data is initially preprocessed using filters to reduce the noise level and the phase of the filtered signal is extracted using the Hilbert Transform and the Phase Estimation by Means of Frequency (PEMF) methods. The phase of each of the 29 signal is then compared over time with each of the other 28 signals to verify whether the signal have their phases in synchrony, or not. A measure of the level of synchronization is evaluated and used to produce color maps for graphical visualization of the overall behavior of the brain electrical activity. Our preliminary results indicate that neurons of certain areas of the brain tend to be more synchronous than others during the epileptic seizure. The approach considered in this work can be extended beyond epilepsy, with potential implementation to study other neurological disorders including schizophrenia and Parkinson's disease, for example.

A QUANTITATIVE ASSESSMENT OF UNIVERSITY PRIVACY STATEMENTS ON READABILITY AND COMPLIANCE

Presenter: Li, Yunpeng
Graduate, Information Technology
Mentor: Prof. Yousra Javed

In this digital age, the notion of privacy primarily refers to the freedom that an individual should have for determining how his personally identifiable information (e.g., name, date of birth, email address, and IP address) are processed, i.e., collected, used, and disclosed.

One channel through which users' personal information is processed, is the publicly accessible websites of business and service entities. Ensuring that the users of these websites are aware of how their personal information is processed, how the accuracy of their data is maintained, how its data integrity and confidentiality is preserved is vital. These aspects are important because user information is now considered a valuable commodity. For example, business entities either analyze user information themselves or share/sell them to advertisers and researchers to best tailor commercial services to the online consumer market. Therefore, it is expected that all websites include a relevant privacy statement to ensure lawful, fair, and transparent processing of user data.

A wide amount of literature exists on privacy compliance of websites in sectors such as ecommerce, health, banking, and Government etc. However, limited work has been done on websites in the education sector. This project, therefore, takes a first step in developing a dataset of privacy statements belonging to the educational institutions. We manually collected privacy policies of top 150 universities in the United States (10 per state). These universities were selected using US News website and ISU library as the resource. We present our findings from a quantitative analysis of these policies with regards to their readability and their compliance with GDPR, COPPA, and FERPA.

Kinesiology & Recreation

NATIONAL ATHLETE'S PERCEIVED IMAGE OF THE GOVERNMENT IN THE DEVELOPMENT OF SPORTS IN MALAYSIA

Presenter: Azizan Durisic, Danial Bin
Graduate, Kinesiology & Recreation
Mentor: Prof. Liz Sattler
Authorship: Danial Bin Azizan Durisic, Liz Sattler

Malaysian national sports depend on the support of the government to further improve its quality and continue to grow. The declining quality of Malaysian sports prompted this study which seeks to explore the perceptions of the Malaysian government's sport development efforts through the lens of the national athletes and provide recommendations that could lead to strengthened sports development and improved quality of sports in Malaysia. This research intends to compare the results obtained from current and former national athletes and compare it with the Sport Policy Factors Leading to International Sporting Success or SPLISS Model (Bosscher et al., 2010) which identified nine pillars that influence elite sporting success and main issues in Malaysian sports. The nine pillars are financial support, facilities, integrated approach to policy development, structured competitions, solid approach

to coaching provision and their development, foundation and participation, talent identification and development system, athletic and post-career support, and scientific research. The main issues identified in Malaysian sports include lack of management skills, incompetency of sport administrators, lack of financial aids, corruption, involvement of politicians in sports, and scarcity of availability and accessibility of venues and facilities. This study will provide a foundation of research on sports development in Malaysia due to the dearth of research on this topic. The full study results and implications will be shared at the University Research Symposium. Keywords: Sports development, national athletes, SPLISS model, government support.

A 10-WEEK SHOULDER STRENGTHENING PROGRAM TO INCREASE SHOULDER STRENGTH AND DECREASE INJURY RISK IN COLLEGIATE VOLLEYBALL PLAYERS.

Presenter: Bergeron, Kathryn
Graduate, Kinesiology & Recreation
Mentor: Prof. Kelly Laurson

Shoulder strength is of significant importance in volleyball athletes. Due to the emphasis placed on overhead movements, symmetrical strength imbalances are common concerns and can lead to increased risk of shoulder injury. Additionally, shoulder strength is directly related to swing and serve performance. This study was designed to quantify how a shoulder strengthening program might impact such performance outcomes. This study followed a shoulder strengthening program created by a strength and conditioning coach for a women's junior college volleyball team. It was hypothesized that by increasing overall shoulder strength, it would increase the speed at which the ball traveled at after being hit. The team (n = 17) completed a 10-week program that was performed 3 times a week. These exercises consisted of prone T-raises, banded external rotations, Prone 90/90 external rotations, and banded pull aparts. Pre and post-tests were used to assess the effectiveness of the program. The results of this study suggest that an increase in maximal reps of weighted prone 90/90 external shoulder lead to increases in both serve and spike speed. Overall increased shoulder strength can be theorized to decrease risk of injury in collegiate volleyball players.

THE RELATIONSHIP AMONG RESTING METABOLIC RATE, RER, SUBSTRATE UTILIZATION, AND STEP COUNTS IN COLLEGE STUDENTS

Presenter: Hobson, Brandon
Graduate, Kinesiology & Recreation
Mentor: Prof. Tyler Kybartas
Co-Mentor: Prof. Kristen Lagally
Authorship: Brandon Hobson, Emily Reynoso-Romero, Tyler Kybartas, Kristen Lagally, David Thomas

Low resting metabolic rate (RMR) and low physical activity (PA) levels are two factors with significant impact on the energy balance equation. These two variables can lead to a positive energy balance, which over time can lead to obesity. Understanding the relationships between these variables and respiratory exchange ratio (RER) and substrate utilization is important in understanding how a balanced energy equation can be maintained long-term.

PURPOSE: To determine the relationships among RMR, step counts, resting RER, and substrate utilization.

METHODS: Volunteer participants ranging from 19-24 years of age (n=10; 6 men, 4 women; 21.4 ±1.8y) were recruited for this study. Prior to RMR testing, participants followed a protocol requiring a 6 hour fast, no exercise for 14 hours, and no alcohol or nicotine for 2 hours. Participants reclined, awake, on a

padding table in a dimly lit room for 20-25 minutes while respiratory gases were measured using open-circuit spirometry. RMR, RER and substrate utilization were determined during a 5-minute period where variation in VO₂ was less than 10%. Following RMR measurement, participants wore an accelerometer on their non-dominant wrist for at least 5 days. Step count data were averaged over days in which the participant had 6 hours of wear time or more. Means and standard deviations were determined for all variables. Spearman correlations were used to determine relationships among the variables.

RESULTS: The mean RMR, step count, and RER of participants were 1833±382 kcal/day, 13080±1893 steps/day, and 0.84±0.07, respectively. Mean substrate utilization was 62.6±19.3% fat and 37.4±19.3% carbohydrates. There was a significant correlation between RMR and step count ($r = 0.721$, $r^2 = 0.520$, $p = 0.019$), RMR and RER ($r = -0.732$, $r^2 = 0.536$, $p = 0.016$), and RER and step count ($r = -0.817$, $r^2 = 0.667$, $p = 0.004$). Correlations between other variables were not significant ($p > 0.05$).

CONCLUSIONS: Results suggest that individuals with higher measured RMR have higher step counts and lower RER. Additionally, individuals with higher step counts have lower RER. This suggests that higher levels of PA could lead to higher RMR and lower RER, which may help with long-term energy balance.

AN EXAMINATION OF BASIC BIOMETRIC VARIABLES, PHYSICAL ACTIVITY, AND STRESS MANAGEMENT EDUCATION ON HEART RATE VARIABILITY

Presenter: Kraft, Allena
Undergraduate, Kinesiology & Recreation
Mentor: Prof. Karen Dennis

PURPOSE: Exploring the relationship between physical activity, biometric variables, and stress management training on heart rate variability (HRV) over a 16-week semester-long course that teaches healthy lifestyles and stress management.

METHODS: Students enrolled in KNR 113 Personal Fitness at Illinois State University during the fall 2021 semester were used to gather data for the study. During the 16-weeks of the study, students were given instructions to wear a university provided pedometer to track their total steps per day. KNR 113 students also participated in physical activities aimed at improving fitness, measured through pre- and posttesting. HRV measurements were taken during the pre- and post-testing using HeartMath emWave Pro software measured by a pulse plethysmograph ear sensor. KNR 113 students also completed the State-Trait Anxiety Inventory for Adults during the pre- and post-testing sessions. Weekly assignments were distributed throughout the course from HeartMath Institute to teach students stress management techniques that they could implement into their own lives. A t-Test paired two sample for means will be conducted to test for statistical significance.

RESULTS: Analyzing results.

RELATIVE ENERGY DEFICIENCY IN SPORT (RED-S) RISK FACTORS AMONG COLLEGIATE ATHLETES

Presenter: Metz, Hope
Graduate, Kinesiology & Recreation
Mentor: Prof. Kelly Laurson
Authorship: Dale Brown, Samantha McDonald

BACKGROUND: Low energy availability is a topic of concern for recreational and elite athletes alike due to its negative impact on both physiology and performance. The introduction of the Relative Energy Deficiency in Sport model by the International Olympic Committee in 2014 highlighted the widespread effects of poor fueling on an athlete's overall health. Unfortunately, RED-S is not typically detected until the athlete has already suffered significant health or performance detriments from inadequate calorie intake.

PURPOSE: By identifying early warning signs of RED-S development, it may be possible to intervene before the syndrome significantly impacts the athlete's health or performance. The purpose of this study is to examine the prevalence of risk factors associated with RED-S among collegiate athletes and evaluate the potential need for further RED-S screening and intervention measures at the university level.

METHODS: The subjects include collegiate athletes who participate at the NCAA Division I level. The study involves two methods of data collection: a survey and a bone density scan. The survey will be distributed electronically using Qualtrics and bone density will be evaluated by a dual-energy x-ray absorptiometry (DXA) scan.

RESULTS/CONCLUSIONS: The results from the survey and the DXA scan are expected to indicate the presence of RED-S among the subjects. There will likely be athletes who have experienced many of the risk factors addressed in the survey, which indicates an energy deficiency. Those who exhibit more risk factors associated with RED-S are also more likely to report a lower bone mineral density than the athletes who report fewer or no symptoms. We hope to underscore the need for coaches, trainers, and practitioners to identify and monitor athletes who are particularly at risk for RED-S, helping to ensure the health and safety of the athletes during their collegiate careers and beyond.

INVESTIGATION OF FACTORS INFLUENCING THE RELATIONSHIP OF COMPETITION LIFTS TO STRENGTH LIFTS IN OLYMPIC-STYLE WEIGHTLIFTERS

Presenter: Mintun, Bronson
Graduate, Kinesiology & Recreation
Mentor: Prof. Kelly Laurson
Authorship: Bronson Mintun, Kelly Laurson

The sport of Olympic Weightlifting consists of two contested lifts, referred to as the classic lifts. These lifts are the snatch, in which the barbell is lifted from ground to overhead in one swift movement; and the clean & jerk, in which the barbell is lifted from ground to shoulders in one movement (the clean), and from shoulders to overhead in another (the jerk). Besides requiring great amounts of physical strength to attain success, weightlifters must also become very technically proficient in the snatch and clean & jerk to achieve the greatest competition result with their present level of strength. These movements are very technically complex and often take years of training to truly master, so weightlifting training must balance specific work on the classic lifts with foundational strength exercises

such as squats, presses, and deadlifts. The purpose of this study is to examine a number of factors, primarily length of training experience in weightlifting, and determine how these factors influence the ratio of classic lift to strength lift performance. Participants will complete an anonymous survey distributed electronically to determine personal bests in the classic lifts and foundational strength lifts (front squat, back squat, deadlift, strict press, bench press, push press), as well as personal factors such as age, sex, years of experience in resistance training and weightlifting, training days per week, whether or not the athlete works with a coach, whether or not the athlete competes in weightlifting, body weight when personal records were achieved, and performance enhancing drug use status. It is the primary hypothesis of this study that as weightlifting training experience increases, performance in the snatch and clean & jerk will represent a larger percentage of the athlete's performance in squats, presses, and deadlifts. Secondly, it is hypothesized that females, lighter athletes, and older athletes will snatch and clean and jerk larger percentages of their best strength lifts. Additionally, it is expected that strength lifts will be correlated with classic lift performance, with the front squat and push press showing a stronger correlation than deadlift, bench press, and strict press.

THE DIFFERENTIAL EFFECTS OF PRENATAL EXERCISE TRAINING TYPE ON MATERNAL GLUCOSE METABOLISM AND RISK OF GDM: A SECONDARY DATA ANALYSIS OF A PROSPECTIVE RANDOMIZED

Presenter: Prostko, Stephanie

Graduate, Kinesiology & Recreation

Mentor: Prof. Samantha McDonald

Authorship: Stephanie Prostko, Samantha McDonald, Kelly Laurson, Linda May

Background: Gestational diabetes mellitus (GDM) complicates 10-12% of pregnancies worldwide and poses significant, immediate and long-term health risks to both the mom and baby. While some studies demonstrate that prenatal exercise may aid pregnant women in managing their glucose levels and decreasing the risk of GDM, nearly all these studies exposed women to aerobic exercise. As such, the effects of different exercise training types, such as resistance training and combined aerobic and resistance training are unclear. In non-pregnant populations, these exercise training types show positive, independent effects on glucose metabolism. As such, the purpose of this study is to evaluate differential effects of prenatal exercise training types during mid-to-late pregnancy on maternal glucose and risk of GDM.

Methods: This study employed a secondary data analysis using data derived from a 24+ week exercise intervention among pregnant women. At 16 weeks of gestation, women were randomized to one of four groups: aerobic training (n=50), resistance training (n=50), combined training (n=50), and stretching and breathing (n=50). All groups participated in 50-minute, supervised sessions, three times per week. The exercise groups engaged in moderate intensity exercise while the non-exercise group performed stretches and breathing movements at light intensity. Maternal fasting glucose levels were measured via fingerstick blood draws at 16 and 36 weeks of gestation, GDM diagnoses were extracted from medical records and determined via oral glucose tolerance tests performed between 24-28 weeks of gestation. We will perform multiple linear regression models and Poisson regression models with robust error variance to assess the effects of exercise training type on maternal glucose levels and risk of GDM. Potential covariates include maternal age, parity, body mass index, race/ethnicity and baseline glucose and lipid levels.

Results: We anticipate that all exercise training types will elicit lower levels of glucose and risk of GDM compared to the stretching and breathing group. Further, we posit that the resistance training group will exhibit lower glucose levels compared to the aerobic training group. Lastly, we posit the combined training group will elicit the lowest levels of glucose compared to aerobic and resistance training-only groups.

Discussion: We expect to further elucidate the potential differential effects of various prenatal exercise training types on maternal glucose metabolism and risk of GDM. Our results may better inform practitioners, exercise specialists and the like on designing and implementing more effective exercise prescriptions, leading to healthier mothers and babies during and after pregnancy.

RELATIVE AGE EFFECT IN NCAA DIVISION I VOLLEYBALL

Presenter: Redman, Grace
Graduate, Kinesiology & Recreation
Mentor: Prof. Scott Pierce
Authorship: Grace Redman, Scott Pierce, Adam Kelly

The Relative Age Effect (RAE) is a phenomenon in athletics related to an over-representation of individuals born closer to an arbitrary cut-off date based on their greater biological maturity. RAE has been shown in many different countries, at many different levels, and in many different sports, but no studies have been conducted on volleyball in the United States. Public data will be collected from the websites Division I and II volleyball programs. Specifically, birthday, class, home state, athletic timing, and red shirt status will be collected for approximately 1000 male and female student-athletes. The purpose of this study is to examine two aspects of RAE in NCAA volleyball. First, to see if RAE exist at this level of volleyball related to school and club cutoffs. Second, to see the relationship between RAE and the delaying of athletes in kindergarten and the delaying of athletes through freshman redshirting at the collegiate level. Data collection is in progress. Using Chi squared goodness of fit tests analysis, we hypothesize that RAE will exist in on time athletes for both men and women's Division I volleyball. We also hypothesize that delaying athletes at either kindergarten or freshman year (red-shirting) will reduce the effects RAE in these collegiate athletes. The findings of this study will provide unique insights on the impact of RAE on the developmental pathways for volleyball athletes and provide implications for coaches and administrators on ways to potentially reduce the effects of RAE at the collegiate level in hopes to equal the playing field.

THE RELATIONSHIP BETWEEN BMI, WAIST CIRCUMFERENCE, WAIST TO HEIGHT RATIO, AND RESTING METABOLIC RATE

Presenter: Reynoso-Romero, Emily
Undergraduate, Kinesiology & Recreation
Mentor: Prof. David Thomas
Authorship: David Thomas, Brandon Hobson, Kristen Lagally, Tyler Kybartas

Obesity levels are rising in the United States, as are morbid diseases such as cardiovascular disease, metabolic syndrome, and type 2 diabetes. Ascertaining the relationship between metabolism and anthropometric estimates of overweight/obesity is important in understanding the causes of the problem. **PURPOSE:** To determine the relationship between body mass index (BMI), waist circumference (WC), waist to height ratio (WHtR) and resting metabolic rate (RMR). **METHODS:** Eighteen (10M, 8F) individuals, 19-26 years old, were recruited to participate in this study and had their HT, mass, WC, and RMR measured. HT and mass were measured on a clinical stadiometer. BMI was calculated by taking the participant's mass in kilograms and dividing it by the square of their HT in meters. WC was measured using a standard measuring tape with the measure taken at the narrowest part of the trunk between the ribs and iliac crest. WHtR was calculated by dividing the WC by the HT of the participant. RMR was assessed using a metabolic cart that measured oxygen consumption and carbon dioxide production. RMR was also divided by mass to provide relative measures of RMR based on body mass (RMR/kg). Means and standard deviations were determined for all variables. Pearson product-moment correlations were used to statistically analyze the results. **RESULTS:** Means and standard deviations for each variable were: Age 22 years + 1.7; HT 173.1 cm + 12.06; Mass 83.5 kg +

27.75; RMR 1709 kcals/d + 391; BMI 28.00 + 9.9; WC 84.7 cm + 16.7; WHtR 0.49 + 0.10, RMR/kg 21.15 + 4.07. Correlation coefficients for RMR and BMI was $r = 0.44$, $R^2 = 0.19$; RMR and WC was $r = 0.59$, $R^2 = 0.35$; RMR and WHtR was $r = 0.37$, $R^2 = 0.14$. Correlation coefficients for RMR/kg and BMI was $r = -0.65$, $R^2 = 0.43$; RMR/kg and WC was $r = -0.60$, $R^2 = 0.36$; RMR/kg and WHtR was $r = -0.68$, $R^2 = 0.46$. CONCLUSIONS: RMR displayed a weak to moderate correlation with all three variables when absolute measures were used. RMR/kg displayed moderate negative relationships with BMI, WT, and WHtR. The results show that, in absolute terms, RMR is related to body size with larger bodies exhibiting higher RMR scores. However, when measured in relative terms, individuals with higher BMI, WC and WHtR scores exhibited lower metabolic rates per unit of mass which would be indicative of lower metabolically active tissue.

THE EFFECTIVENESS OF MYOFASCIAL RELEASE ON OVERHEAD ATHLETES WITH POSTERIOR SHOULDER TIGHTNESS

Presenter: Richey, Breiann
Graduate, Kinesiology & Recreation
Mentor: Prof. Nicole Hoffman
Authorship: Breiann Richey, Nicole Hoffman

Context: Posterior shoulder tightness is common among collegiate overhead athletes due to repetitive overhead patterns, often resulting in altered range of motion mechanics. This may be associated with additional non-painful hypersensitive areas of taut muscle called latent myofascial trigger points (MTrPs), which have been linked to muscle imbalances and weaknesses, impaired motor recruitment, and internal rotation (IR) deficits. Evidence supports improvements in glenohumeral range of motion (ROM) and isometric strength through instrument-assisted manual therapy techniques on MTrPs in baseball players. Ischemic compression (IC) is a form of therapeutic myofascial release that can be performed by any clinician trained in manual therapy. Although improvement in ROM and isometric strength have been indicated within other regions of the body using instrument-assisted techniques, it is unknown if IC treatment of latent MTrPs will improve glenohumeral ROM and isometric strength in other overhead athletes.

Objective: The purpose of this study was to determine the relationship between short- and longterm IR and ER ROM and isometric strength measurements before and after IC treatment. Additionally, we compared the effectiveness of IC on glenohumeral ROM and isometric strength improvements between various overhead athletes.

Study Design and Setting: Single-blinded randomized controlled trial in a controlled athletic training laboratory.

Patients or Other Participants: Forty healthy Division I collegiate overhead athletes from baseball, cheer, softball, swimming, track and field, and volleyball were included in this study. To be eligible, participants must have a total arc ROM deficit of $\geq 5^\circ$ in the dominant shoulder compared to the ideal 180° for overhead athletes or deficits of $\geq 20^\circ$ of IR compared to the contralateral shoulder, and at least two latent MTrPs in the dominant shoulder infraspinatus muscle.

Intervention: Participants were randomly allocated to one of two intervention groups: IC or sham IC. Participants in the IC group completed passive IR and ER glenohumeral ROM and isometric strength measurements before and immediately after IC treatment session #1, within 24-48 hours of IC treatment session #1, and final measurements taken within 24-48 hours after IC treatment session #2. The sham IC group completed the same procedures as the IC group, except researchers did not apply manual pressure to MTrPs.

Main Outcome Measures: Passive IR and ER glenohumeral ROM, isometric strength, and pain pressure threshold (measured by a digital pressure algometer). The Kerlan-Jobe Orthopedic Clinic scores and

Penn Shoulder Scores were used to determine each participant's perceived level of dominant shoulder function before and after interventions.

Mathematics

NEW MATH IN NIGERIA

Presenter: Jegede, Kehinde
Graduate, Mathematics
Mentor: Prof. Óscar Chávez
Authorship: kehinde Jegede, Óscar Chávez

This paper is a historical presentation of mathematics education reform, on both the primary and secondary levels, that took place between 1962–1977. In the 1950s and 1960s, at the end of the British Imperial rule in Nigeria, which lasted from 1900 to 1960, there was a mathematics education reform that swept not only the United States and Great Britain but many other countries. Birted as a result of the launching of the Sputnik, the first earth satellite in space, in November 1957 by the Soviet Union, the reform led to the development of several school mathematics curriculum projects, such as the School Mathematics Study Group (SMSG, 1959) Project, the University of Illinois Committee on School Mathematics Project (UICSM, 1958), the Greater Cleveland Mathematics Program (GCMP, 1959) in the US, and the School Mathematics Project (SMP, 1962) in the UK, among others. This reform eventually affected the school mathematics curricula and program in Nigeria, where the new programs were in place for a period of about 15 years. The following factors militated against successfully enacting Modern Mathematics in Nigeria: shortage of qualified mathematics teachers, lack of suitable textbooks, lack of laboratory provisions or space for storing instructional materials or for experimenting and trying things out, and concerns of and criticisms by parents, teachers, politicians, and mathematicians regarding poor performance of students in mathematics.

VERTEX ALGEBROIDS AND CONFORMAL ALGEBRAS ASSOCIATED WITH SOLVABLE LEIBNIZ ALGEBRAS

Group Leader: Martin, Emma
Undergraduate, Mathematics
Group Members: Cesiley Barnes, Undergraduate, Mathematics; Josalyn Service,
Undergraduate, Mathematics
Mentor: Prof. Gaywalee Yamskulna
Authorship: Gaywalee Yamskulna, Cesiley Barnes, Josalyn Service, Emma Martin

Vertex algebroids were first introduced in 1999 by Gorbounov, Malikov, Schechtman, and Vaintrob. Recently, vertex algebroids associated with simple Leibniz algebras were studied and classified by Bui, Jitjankarn, and Yamskulna, however there is still more to classify. The goal of our research is to study and classify vertex algebroids associated with cyclic Leibniz algebras by constructing vertex algebroids using two and three dimensional Leibniz algebras. We first investigate the vertex algebroids associated with a two dimensional cyclic Leibniz algebra, for which there are two types, solvable and nilpotent. We then move on to construct vertex algebroids from three dimensional cyclic Leibniz algebras, for which there are four types.

Nursing

LIMITED PATIENT RESOURCES FOR TWO IMMUNOTHERAPY CANCER TREATMENTS: THE DEVELOPMENT OF A HANDOUT

Presenter: Klann, Kalista
Undergraduate, Nursing
Mentor: Prof. Megan Rappleyea

Oncolytic Viral Immunotherapy and Cancer Treatment Vaccines are both forms of immunotherapy, which is a treatment for cancer that teaches the immune system to attack specific cancer cells. Oncolytic Viral Immunotherapy uses a virus specific to targeting and eliminating cancer cells, and Cancer Treatment Vaccines treat patients by triggering an immune response against the cancer cells (Cancer Research Institute, 2020a). The purpose of my research was to develop a deep understanding of the treatments and determine the need for patient resources. There are currently 2 approved Cancer Treatment Vaccines (BCG live, and Sipuleucel-T) and 1 Oncolytic Viral Immunotherapy agent (T-VEC) in the U.S (Cancer Research Institute, 2020a). Additionally, about 11 clinical trials are registered for the use of Oncolytic Viral Immunotherapy and about 317 clinical trials for Cancer Treatment Vaccines, which shows the potential for growth with these treatments (National Institutes of Health, n.d.). Some of the resources I utilized to further my knowledge on the treatments included a training program provided by Oncology Nursing Society, a novel by Neil Canavan titled *A Cure Within*, and many readings from medical journals using primarily PubMed for literature searches. After completing incognito Google searches with key words/phrases related to the treatments, I found only one resource for patients. However, this resource does not contain comprehensive information over both treatments. I have made a two-sided patient handout that clearly describes what the treatments are, how they work, common side effects, and links to clinical trial information.

Keywords: immunotherapy, oncolytic viral immunotherapy, cancer treatment vaccines, patient resources

Physics

MEASUREMENT AND MODELING OF THERMAL TRANSPORT IN COMPOSITES

Presenter: Cole, Mason
Undergraduate, Physics
Mentor: Prof. David Marx

Carbon fiber/carbon matrix (CC) composites are used as the primary aerospace friction material in any mechanical braking application. They are also used for thermal management and as structural materials. In braking applications, the goal is to minimize wear and improve the friction performance of these components. To achieve this, the reduction of heat accumulation and thermal stresses within the composite from the dissipation of energy are required. To reduce thermal gradients and increase dissipation rate in a carbon composite, the most effective method is to improve upon the material's effective thermal diffusivity.

Thermal conduction is often described in terms of the thermal conductivity. In these composites, thermal conductivity is, in turn, determined by the product of the material's specific heat, its density,

and its thermal diffusivity. This project is designed to determine the thermal diffusivity on the microscale.

Determining the most appropriate manufacturing methods of CC to maximize thermal diffusivity can be done experimentally - by studying the influence of component types, fiber orientation, and matrix materials on thermal conduction. Using ideas from Angstrom's method, carbon composites can be heated from one side of the sample using a pulsed laser and can be analyzed by a thermal imaging camera. Intensity data is extracted from the camera images using a customized program that then can find diffusivity from selected points on the image produced by the thermal imaging camera.

INCORPORATING COMPUTATIONAL ACTIVITIES IN A GENERAL EDUCATION ASTRONOMY COURSE

Presenter: DiCaro, James
Undergraduate, Physics
Mentor: Mr. Raymond Zich
Authorship: James DiCaro, Quinn MacKenzie

We report on the impact of an instructional intervention incorporating computational activities into a one semester general astronomy course. As science teaching is becoming more technologically inclined, new methods of teaching are being utilized through computers. One method becoming more prominent is the inclusion of computation as a core part of the instruction. Computation is an effective active learning tool for developing understanding of concepts, connecting concepts with formulae, and associating science with prediction. Spreadsheet-based computational exercises were included in the course curriculum and completed collaboratively, along with other active learning activities. Student learning pre to post was measured with the Test of Astronomy Standards (TOAST) and the Lunar Phases Concept Inventory (LPCI), and qualitative data was collected in the form of student surveys to investigate student learning, attitudes toward computational exercises, and overall perceptions of the course. Data collection over four semesters with one control semester shows an average increase in general student learning of astronomy by 14.4% on the TOAST and by 12.2% on the LPCI when given a computation-based curriculum compared to the control semester. An individual question correctness analysis of the TOAST and LPCI post-tests revealed a higher understanding of the moon's orbit, energy levels of atoms, and the origin of stars while there was a lesser understanding of the new moon, gravity in space, and the relationship between position of the moon in the sky and time. Student surveys revealed an overall positive attitude toward the addition of computational activities as well as the collaborative component of these activities. This study analyzing the effects of implementing computational activities in a general astronomy course shows an overall improvement in student learning of astronomy as well as student attitudes towards computation as a whole.

PREDICTING THE BEHAVIOR OF CHAOTIC NEURONS USING RESERVOIR COMPUTING

Presenter: McGinnis, Cassie
Undergraduate, Physics
Mentor: Prof. Epaminondas Rosa
Co-Mentor: Prof. Rosangela Follmann
Authorship: Cassie McGinnis, Epaminondas Rosa, Rosangela Follmann

Reservoir computing in machine learning has become a powerful tool for anticipating the behavior of complex systems. Still, it remains not a small challenge to make long term predictions in the case of chaotic neuronal activity, as opposed to the case of periodic behaviors. In this study we test three different network topologies in the context of machine learning in order to find an optimal tool for

neuronal predictability. We vary multiple parameters including the size of the reservoir, the probability of edges forming, the number of edges each node had, and the regularization constant to find the best fit between real and predicted data. We tested different network topologies and used error analyses along with Lyapunov exponents to obtain measurable quantities for the reservoir's performance.

STUDENT ATTITUDE CHANGES AND CURRICULAR BENEFITS FROM TWO INSTRUCTIONAL INTERVENTIONS

Group Leader: Rosauer, Jeffrey
Undergraduate, Physics

Group Member: Grant Kaufman, Undergraduate, Physics

Mentor: Mr. Raymond Zich

Authorship: Jeffrey Rosauer, Grant Kaufman

We report on a study comparing the effects on student attitudes about science and student scientific reasoning skills of two instructional interventions applied in a single semester general education physics course. Testing indicates that students often have a poorer attitude about science after taking a science class. In addition, a goal of general science courses is to enhance scientific reasoning abilities in students. In the first intervention students watched eight short videos on physics topics and completed worksheets answering specific questions testing their comprehension of the concepts and the scientific reasoning shown. The second intervention consisted of having students manipulate 11 PhET simulations and complete worksheets based on the investigations using the simulations. The instructional interventions were applied for two control semesters, three video treatment semesters, and two PhET treatment semesters. The Colorado Learning Attitudes about Science Survey (CLASS) was used for pre and posttests to investigate changes in students' attitudes about science and Lawson's Classroom Test of Scientific Reasoning (CTSR) was used to measure student scientific reasoning skills. Findings showed overall pre to post shifts in student attitudes of 6.3% toward more expert-like attitudes, and improvements of 7% students' scientific reasoning skills with both interventions.

Politics and Government

TIME IS MONEY: THE EFFECT OF LEGISLATIVE PROFESSIONALISM ON TIME SPENT FUNDRAISING

Presenter: Seeley, Max
Graduate, Politics and Government

Mentor: Prof. Michael Hendricks

Despite the promise to increase the diversity of state legislatures through better pay, increased support staff, and longer legislative sessions, professionalization has failed to increase member diversity. However, these professionalization incentives to increase member diversity have unintentionally led to more electoral competition, an increase in the number of candidates, and higher campaign costs, which have ironically crowded out candidates from underrepresented backgrounds. Since candidates for seats in professionalized legislatures face more competition and a greater need for campaign funds, I argue they will need to dedicate more time to fundraising operations. This study examines my hypothesis by surveying 533 state legislators across three states about their campaign activities' time commitments and restraints. I expect that candidates running for seats in more professionalized legislatures will dedicate more time to fundraising as a function of campaigning. The expected findings can potentially

advance our understanding of the unwritten requirements placed on candidates for state legislative seats and the barriers to entry created by those requirements.

"FROM HOPELESS TO HOMELESS TO HIRED TO HOUSING- ELIMINATING VETERAN HOMELESSNESS AND HOUSING INSECURITY IN THE 21ST CENTURY"

Presenter: Walsh, Jeffrey
Graduate, Politics and Government
Mentor: Prof. Michael Hendricks
Co-Mentor: Prof. Carl Palmer

On any given day, in the world's richest country, 1 in 4 Americans who experience chronic homelessness and housing insecurities are Veterans. Unfortunately, government initiatives from previous administrations have not directly addressed the root causes of veteran homelessness and veteran unemployment, merely throwing money at the problem. However, homelessness in the veteran population is preventable. Yet, with the proper active duty job/career training and their wealth of knowledge and experience, America's veterans can significantly contribute to the American GDP and workforce. If we can use their skills appropriately in the 21st Century civilian workplace, we would likely see a significant reduction in veteran homelessness. In this study, I examine how the types of transferrable job skills post 9-11 veterans received during training affect their housing insecurity and homelessness once they return stateside. For my research methods, I have chosen a multi-method approach. I will use deductive reasoning and specific research questions to learn about military job training and military jobs held by post 9-11 soldiers who rank E-1 to E-4 while on active duty. Finally, I rely on qualitative interviews of officials at the Department of Veterans Affairs regarding any trends, patterns, and insights regarding veteran job insecurity and veteran housing insecurity. All of America's displaced veterans deserve the opportunity to go from hopeless to homeless to hired to housing.

Psychology

CHECK-IN/CHECK-OUT: VIRTUAL IMPLEMENTATION

Presenter: Akpan, Jessica
Graduate, Psychology
Mentor: Prof. Shengtian Wu

Check in/Check out (CICO) is described as a tier 2 targeted intervention commonly used within the school-based positive behavioral interventions and supports framework and applied behavioral analysis (Collins et al., 2016). This intervention can be used to decrease chronic, low level behaviors in children that are not dangerous. There are numerous articles that examine the effectiveness of the CICO intervention in traditional school-based settings (Drevon et al., 2018). There are also studies that test the use of CICO in non-traditional implementation (Boden et al., 2018). This study examined the effectiveness of Check-in, Check-up, Check-out for students with moderate intellectual disability during on- and off-site vocational trainings. Although that study addressed CICO in nontraditional settings, they did not address complete virtual implementation. It is important that we examine the feasibility of CICO being executed in a virtual format as we have seen the impacts that the COVID-19 pandemic has had on the world and educational system.

In the case of another global emergency, students should still be able to work on their behavioral goals, which makes it important for students, educators, and caregivers to implement CICO when needed. This descriptive study aims to describe the process of virtual CICO. This will require technology, such as

reliable internet connectivity, a laptop/desktop computer/cellphone with a camera that receives and expresses audio. Participants will also need to have access to video conferencing software (e.g., Zoom). The teachers will then be able to access CICO materials that are used to track student progress. Steps of virtual implementation include an initial virtual check-in meeting through videoconferencing with the student and the teacher to discuss intervention goals. Second, the teacher and student will go over the electronic BRC and assess goals. The last step is the check-out component, which can be conducted through another videoconferencing call. Considerations of this descriptive study include potential lack of funds as it pertains to purchasing technical hardware, the potential for poor internet connection, and a lack of presence of the students during videoconferencing. With accurate access to the required tools, virtual CICO can be effective for students.

AN EVALUATION OF USING TELEVISION SHOWS TO IDENTIFY AND APPLY DIAGNOSTIC CRITERIA OF PSYCHOLOGICAL DISORDERS THROUGH FICTIONAL CASE STUDIES

Group Leader: Auth, Sydney
Undergraduate, Psychology
Group Member: Grace Hughes, Undergraduate, Psychology
Mentor: Prof. Jeffrey Kahn
Authorship: Sydney Auth, Grace Hughes

Research shows that using visual/auditory media can help lead to better understanding and deeper processing of material learned in class (Berk, 2009). In this study, we will examine the effectiveness of how well students are able to apply diagnostic criteria of psychological disorders learned in class to fictional case studies. These fictional case studies will be presented in the form of episodes of various television shows. We expect to have no more than 86 participants as participants are students in Psychopathology who voluntarily elected to participate in this extra-credit activity. We have selected multiple options of episodes from television shows that feature different kinds of psychological disorders for students to choose from. Once they've watched the episode they selected, they will be asked to respond to a Likert scale question to determine how much students enjoyed the assignment, and open-ended response questions to demonstrate how they were able to identify the specific disorder featured in the episode they selected, and whether it was portrayed accurately to clinical criteria they learned in class, and they will be asked to provide diagnostic evidence from the show to support their claim. Students will also respond freely about how much they feel they've learned from this assignment and what improvements could be made for future classes. Students will be graded largely on the quality of their responses in order to receive extra credit, making this assignment not anonymous. We will collect a limited amount of quantitative data with responses to the Likert scale, as well as data on how many students complete it, and respond accurately to identifying the disorder in the show they watched. We will also collect qualitative data from the open-ended responses. We will evaluate how much students enjoy this type of application activity and examine how beneficial it is to their overall comprehension of course content related to diagnosis and treatment of disorders. We intend to sort through all of the qualitative data we receive from students and come to empirical conclusions about what the general response to the assignment was and whether or not this is a suitable assignment for future classes related to psychopathology.

COVID-19 RELATED STRESSORS PREDICT DISORDERED EATING BEHAVIORS AMONG COLLEGE STUDENTS

Group Leader: Baker, Andie
Undergraduate, Psychology

Group Members: Julian Ortiz, Undergraduate, Psychology; Alondra Faudoa,
Graduate, Psychology

Mentor: Prof. Suejung Han

Authorship: Andie Baker, Julian Ortiz, Alondra Faudoa

Purpose: The COVID-19 pandemic resulted in rapid changes, including financial difficulties, food insecurity and increased levels of stress and emotional distress (Twenge & Joiner, 2020). These stressors contributed to increased disordered eating behaviors such as unhealthy weight control behaviors (UWCBs, e.g., Simone et al., 2020) and binge eating symptoms (e.g., Cummings et al., 2021) during the early phase of the pandemic. With the continued pandemic along with the partial recovery of daily activities, this study aims to examine (a) the current levels of Covid-19 related stress (i.e., financial difficulty, food insecurity, perceived stress, depressive symptoms) and disordered eating behaviors (i.e., UWCBs, binge eating, and eating to cope with stress) and (b) their associations. First, with limited previous research, we did not establish a hypothesis about the direction of changes; people may have adjusted to the pandemic and recovered their previous level of functioning (i.e., decreased stress and disordered eating consistent with hedonic treadmill hypothesis; Diener et al., 2006) or may have been exhausted psychologically due to the chronicity and continued uncertainty of the pandemic (i.e., increased stress and disordered eating consistent with the detrimental impact of chronic stress; Boonstra, 2013). Second, consistent with numerous studies that demonstrate disordered eating as dysfunctional coping with distress (e.g., Han & Pistole, 2014), we hypothesized that covidrelated stress would predict disordered eating behaviors.

Procedure: College students were recruited for psychology research participation credits. The study was approved by the university IRB and data collection is under way (n=51). We used the same measures as Simone et al. (2020)'s compare their mean scores on covid-related stressors and disordered eating obtained in the early stage of the pandemic with the mean scores obtained from this study. The measures include UWCBs questions, two binge eating questions, a coping subscale of the Motivations to Eat scale (Jackson et al., 2003), two items on stress, Kandel and Davies Depressive Mood Scale (Kandel & Davies, 1982), and three questions about food insecurity and financial difficulties.

Independent samples t-tests will be conducted to compare mean scores on the study variables reported in Simone et al. (2020) and obtained in our study. Multiple regression analyses will be conducted to examine associations between covid-related stressors and disordered eating behaviors.

Implications: The study findings will elucidate continued impact of the current pandemic and inform professionals who work with college students with disordered eating of the importance of addressing the role of the pandemic.

DEVELOPMENTAL IMPROVEMENTS IN CARDINAL, ORDINAL, AND SPATIAL LANGUAGE IN EARLY CHILDHOOD

Group Leader: Colwell, Alexis
Graduate, Psychology

Group Members: Michaela Hayes, Graduate, Psychology; Aaron Herr,
Undergraduate, Psychology; Sarah Jacobsen, Undergraduate,

Psychology; Olivia Mangini, Undergraduate, Communication Sciences and Disorders; Emily Monroe, Undergraduate, Psychology; Jadira Goss, Undergraduate, Psychology

Mentor: Prof. Alycia Hund

Authorship: Alexis Colwell, Michaela Hayes, Aaron Herr, Sarah Jacobsen, Olivia Mangini, Emily Monroe, Jadira Goss

Language is an important aspect of child development. Cardinal number words such as one, two, and three emerge before ordinal number words such as first, second, and third, though both increase with age in early childhood (Colomé & Noel, 2012). When children are less familiar with ordinal labels, it can negatively impact problem solving (Miller, Marcovitch, Boseovski, & Lewowicz, 2015). Similarly, spatial language improves from 3 to 5 years and helps with problem solving (Hund, Bianchi, Winner, & Hesson-Mcinnis, 2017; Simms & Genter, 2019). One recent study compared ordinal and spatial language, finding that 3- and 4-year-old children were significantly less successful at a search task using ordinal labels than one using color labels, and their performance with spatial labels was intermediate (Hund et al., 2021). Our goal was to investigate cardinal, ordinal, and spatial language comprehension and production in one study to specify the developmental trajectory from 3 to 5 years. Thus far, 71 3-, 4-, and 5-year-old children were tested using cardinal (one, three, five), ordinal (first, third, fifth), and spatial (front, middle, back) labels, presented in counterbalanced order. Children were randomly assigned to either the Give Me or Tell Me condition and viewed a row of toy cars. In the Give Me condition, children were asked to place the appropriate car(s) into a toy garage based on the label provided by the researcher to test language comprehension, whereas in the Tell Me condition, children were asked to produce the correct label for the car(s) specified by the researcher to test language production. Analyses revealed significant developmental improvement from ages 3 to 4 years and 4 to 5 years. Children were significantly more accurate in the Give Me condition than the Tell Me condition suggesting comprehension is easier than production. Children were significantly more accurate on trials involving cardinal labels than those involving spatial labels and significantly more accurate with spatial labels than with ordinal labels. These findings are useful because cardinal, ordinal, and spatial language is important for many developmental domains, including academic success.

ASSESSING A WORKSHOP SERIES' IMPACT ON STUDENTS' ATTITUDES ABOUT RACISM

Presenter: Concepción Cabán, Lourdes
Graduate, Psychology

Mentor: Prof. Gregory Braswell

Co-Mentor: Prof. Suejung Han

Authorship: Gregory Braswell, Suejung Han, Lourdes Concepción Cabán

Racial conflicts have plagued the United States from its very beginnings, particularly racial prejudice (Henry & Sears, 2002). Racism is a system of advantages based on race that is created and maintained by an interplay between psychological factors (i.e., biased thoughts, feelings, and actions) and sociopolitical factors (i.e., biased laws, policies, and institutions) (Robert & Rizzo, 2021). College students and members of the workforce report daily racist experiences that make them feel angry and uncomfortable (Ashburn-Nardo et al., 2008). These experiences make targets feel like they do not belong and, to the extent that they feel socially isolated, their performance suffers (Ashburn-Nardo et al., 2008). Thus, racism is a continuing problem in America. The following study argues that antiracism involves antiracist attitude and behavioral changes. Hence, people are at different places/stages in their readiness to make such changes, and effective interventions should be tailored for such differences. This study adopted the transtheoretical model for change (TTM; Prochaska & DiClemente, 1997) that proposes six different stages for readiness for behavioral change. Thus, a series of panel presentations/discussions for undergraduates were designed, targeting audiences at various stages in terms of their attitudes and behaviors towards racism/antiracism. Before and after each panel, participants fill out the Symbolic Racism Scale, Miniville-Guzman Universality-Diversity Scale, and other measures to analyze fluctuations in their attitudes. As a result, five stages are being implemented with

the hope that participants will become culturally aware and culturally responsive in their daily activities.

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EXAMINING THE TEMPORAL RELATIONS OF SOCIAL DOMINANCE ORIENTATION, RIGHT-WING AUTHORITARIANISM, MORAL DISENGAGEMENT, AND BULLYING

Presenter: Donnelly, Megan
Graduate, Psychology

Mentor: Prof. Dan Lannin

Authorship: Megan Donnelly, Dan Lannin, Laura Finan, Chang Su-Russell, Eric Wesselmann

Bullying, a complex phenomenon impacting virtually every school, can be damaging both in the short term and long term (Nansel et al., 2001; Solomontos-Kountouri et al., 2017; Wolke et al., 2013). Troublingly, ideology-driven violence is on the rise, and bullying may be akin to such violence as school-based bullying has recently increased (Huang & Cornell, 2019; Southern Poverty Law Center, 2016). Bullying has been linked to ideologies such as rightwing authoritarianism and social dominance orientation (Donnelly, 2020; Goodboy et al., 2016) as well as cognitive processes such as moral disengagement (Bussey et al., 2014; Pornari & Wood, 2010; Robson & Witenberg, 2013). Although such relations have been examined more extensively using cross-sectional designs, more research is needed to disentangle the temporal relations among the variables of interest. Thus, the current study examines the temporal relations among social dominance orientation, right-wing authoritarianism, moral disengagement, and bullying behaviors across two waves of data collection. In particular, the current study examines these variables about one month apart among a sample of undergraduate students enrolled in Illinois State University's SONA system. To examine the temporal relationships between the target variables, the present study will utilize a 2-wave cross-lagged panel design. Findings will inform theoretical understanding of the link between ideologies and bullying behavior as well as assist with creating and implementing evidence-based anti-bullying supports.

YOU'RE GONNA NEED A BIGGER BOAT: FEELING A 'FISH' AT THE END OF A 'FISHING LINE'

Presenter: Duffrin, Tyler
Graduate, Psychology

Mentor: Prof. Jeffrey Wagman

Authorship: Tyler Duffrin, Jeffrey B. Wagman

People can perceive numerous properties of an unseen object by exploring that object with a haptic probe. For example, fly fishers anecdotally report that they can feel the size of an unseen fish that they have hooked at the end of the fishing line. We investigated a similar ability – whether people could perceive the length of an unseen 'fish' (a wooden rod) attached to a 'fishing pole' (another wooden

rod) by a 'fishing line' (a length of string). In particular, we investigated whether participants could differentiate among different fish lengths and whether perceived fish length was influenced by the mass and mass distribution of the fish. In the first experiment, we found that people could differentiate among five different lengths of fish, ranging from 15 to 55 cm. In the second experiment, we found that perceived fish length increased with both fish length and fish mass (the addition of a small weight). A third experiment investigated whether perceived fish length increased as the mass distribution of the fish was shifted farther from the attached line. The results will be discussed in the context of the nature of the stimulation patterns relevant to perceiving by touch and the nature of the tissues that register such patterns.

PREDICTORS OF CROSS-RACIAL SHARING BEHAVIOR IN EARLY CHILDHOOD

Presenter: Ellis, Miranda
Graduate, Psychology
Mentor: Prof. Alycia Hund
Co-Mentor: Prof. Corinne Zimmerman
Authorship: Miranda Ellis, Alycia Hund, Corinne Zimmerman

Purpose: Prosociality, or behavior that benefits others, is largely influenced by social evaluations of others and ingroup biases. Implicit racial bias and preference for similar others can be detected early in childhood (Dunham et al., 2008; Renno & Shutts, 2015), necessitating a search for factors that may reduce bias in young children. The purpose of the present study was to examine the relation between parent-reported prosociality, inhibitory control, and exposure to people of color on young children's cross-racial prosocial sharing behavior.

Procedure: Eighty-four 4- to 5-year-old children were recruited through schools, preschools, and daycare centers in Illinois. One parent per child completed a questionnaire to provide measures of prosociality, inhibitory control, and exposure to people of color. While viewing Black-White pairings of photos gender-matched to the participant, children participated in a sticker-sharing task to measure cross-racial sharing behavior, a preference task to measure racial preference, and an expectation of prosociality task to measure expectations of helping behaviors from Black and White others. I hypothesized that White children would give more stickers to White others than Black others. I also expected children's inhibitory control and exposure to people of color would predict cross-racial sharing. Finally, I hypothesized that preferences and expectations would predict cross-racial sharing.

Results: White children shared significantly more stickers than they kept but did not share more with White others than Black others, indicating that the perceived division occurred between sharing and keeping instead of Black and White. Preferences for Black others and expectations of help from Black others significantly predicted cross-racial sharing scores. Inhibitory control was correlated with prosociality, but not with sticker sharing behavior. Exposure to people of color was positively correlated with preferences for Black others when controlling for age, and preferences for Black others significantly positively predicted the number of stickers shared with a Black other.

Conclusions: Preferences for Black others and expectations of help from Black others significantly predicted cross-racial sharing, although the data suggests that higher levels of preference and lower levels of expectations of help may produce higher levels of sharing. These findings provide important details about cross-racial sharing during the preschool years.

ALCOHOL AND CANNABIS CO-USE AND INTERNALIZING SYMPTOMS AMONG COLLEGE STUDENTS

Group Leader: Fay, Ali
Undergraduate, Psychology

Group Members: Jake Solka, Graduate, Psychology; Miranda Ellis, Graduate, Psychology; Nathan Beltran, Undergraduate, Psychology

Mentor: Prof. Laura Finan

Authorship: Jake Solka, Ali Fay, Sydney Tonkin, Miranda Ellis, Nathaniel Beltran, Aleena Mangold, Laura Finan

Purpose: With depressive and anxiety symptoms rising among undergraduate college students (Lee et al., 2021), it is imperative to understand the risk and protective factors associated with the emotional well-being of this population. One such risk factor may be use of alcohol and cannabis. Indeed, previous research suggests that both alcohol and cannabis use are independently related to symptoms of depression and anxiety (Geisner et al., 2012; Schry & White, 2013; Troup et al., 2016). Alarming, alcohol use is exceedingly common among college students (SAMHSA, 2019) and recent data suggest cannabis use has dramatically increased within this population (NIDA, 2019). The ways alcohol and cannabis co-use contribute to internalizing symptoms, however, remains uncertain. Therefore, in this study, we examined relationships between college students' alcohol and cannabis co-use and symptoms of anxiety and depression.

Methods: Participants comprised undergraduate college students from a large, Midwestern university (N = 416; 75% female; Mage = 20.23, SD = 1.52; 10% Hispanic, 83% White). Using a cross-sectional design, participants responded to surveys about their past-month alcohol and cannabis frequency. In addition, the 20-item Center for Epidemiological Studies Depression Scale was used to assess past week depressive symptoms ($\alpha = .90$; Lewinsohn, 1997) and the 7-item Generalized Anxiety Scale was used to assess past two-week anxiety symptoms ($\alpha = .94$; Spitzer et al., 2006). Controls included participant impulsivity, as assessed by the 8-item Brief Barrett Impulsiveness Scale ($\alpha = .83$; Steinberg et al., 2012), age, gender, and race.

Results: Over 80% of participants reported past month alcohol use, 42% past month cannabis use, and 39% past month alcohol and cannabis co-use. Structural equation modeling was used to conduct path analysis to examine associations between alcohol and cannabis co-use and depressive and anxiety symptoms. Results indicated that after controlling for sociodemographic characteristics and impulsivity, alcohol and cannabis co-use frequency was associated with both greater depressive symptoms ($b = 3.46, p < .01$) and anxiety symptoms ($b = 1.66, p < .05$).

Conclusion: Findings from this study highlight that targeting potential alcohol and cannabis co-use as facilitators of depressive and anxiety symptoms may prove beneficial in therapeutic services and prevention activities for young people, particularly in university settings. This indicates a step forward towards an awareness of the implications of co-use, which could lead to a foundation for intervention programs and public health resources in academic settings.

THE EFFECTS OF QUIZLET ON LEARNING AND CONTENT RETENTION

Presenter: Hepp, Delaney
Undergraduate, Psychology
Mentor: Prof. Dawn McBride

With the ever-growing presence of technology in the classroom, it is important that students are provided with effective online tools. The current study was conducted to evaluate the effects of Quizlet on learning and retention. Quizlet is an online learning platform equipped with interactive tools and games to aid studying. The participants of the study were students enrolled in a psychology research methods course. Participants were encouraged to create a Quizlet study set of relevant course information/topics and use the interactive features of the site to further study the material. All participants completed a course-relevant pre-test before using the online tool, and a post-test following their engagement. It was hypothesized that the interactive, online studying would be not only preferred over other study techniques but would also improve posttest scores for those who actively engaged with their Quizlet set.

SOCIAL MEDIA, MICROAGGRESSIONS, AND ADOLESCENT EFFORTS TO INTERVENE

Presenter: Hynes, Keeley
Graduate, Psychology
Mentor: Prof. Brea Banks

High school students experience microaggressions, or subtle identity-based slights, although little is known about online microaggressions (Banks & Cicciarelli, 2020; Sue, 2010). Data was collected from 134 adolescents. We used a multiple regression analysis to examine our hypothesis that school connectedness, knowledge about school policy, and social media rumination will significantly predict participants' likelihood to intervene when witnessing a microaggression on social media. Results indicated that perceived offensiveness of the posts was the only significant predictor of adolescents intervening.

ADOLESCENT STRATEGIES TO INTERVENE ON MICROAGGRESSIVE SOCIAL MEDIA POSTS

Group Leader: Hynes, Keeley
Graduate, Psychology
Group Members: Michelle Santana, Graduate, Psychology; Hailey Storm,
Graduate, Psychology
Mentor: Prof. Brea Banks

Microaggressions are a form of racism that Solórzano and Huber (2020) argue are understood and evaluated using the basic tenets of Critical Race Theory. Research suggests that high school students experience race- and sexuality-based microaggressions, although little is known how microaggressive encounters that occur online impact adolescents. Research suggests that college-age individuals are unlikely to intervene in response to microaggressive situations, but there do not exist any studies that highlight high schoolers' responses to these transgressions. Although, there is evidence adolescents experience online victimization based on their race (Tynes et al., 2008). The researcher recruited adolescents from public high schools to assess adolescents' intervention strategies when witnessing a microaggression towards a peer on social

media. Adolescents were exposed to microaggressive social media posts written by a hypothetical peer and were prompted to discuss intervention strategies they might use. These data were analyzed qualitatively.

RELATIONSHIP BETWEEN SNAPCHAT USAGE AND ANXIETY AMONG COLLEGE FRESHMEN

Group Leader: Jasinski, Luke
Graduate, Psychology
Group Member: Casey Grage, Graduate, Psychology
Mentor: Prof. Gary Cates
Authorship: Luke Jasinski, Casey Grage, Gary Cates

This study investigates the relationship between Snapchat usage and anxiety among college freshmen. Specifically, college freshmen were asked to provide their data related to total number of snaps, rate of snap, and their snaps send/receive ratio. In addition, these students were asked to complete an anxiety measure. Correlations between the above variables were calculated. Results and discussion focus on implications of understanding the relationship between social media usage and mental health. Discussion also focuses on directions for future research.

EVALUATING THE EFFECTIVENESS OF SUPPORTIVE SERVICES FOR HEAD START STAFF

Presenter: Johnson, Cierra
Undergraduate, Psychology
Mentor: Prof. Adena Meyers

This study involves evaluating the effectiveness of a stress reduction program provided to Head Start Staff. Mindfulness-Based Stress Reduction (MBSR; Kabat-Zinn, 2013) is a program designed to reduce stress, anxiety, and chronic pain. Staff members attended eight weekly classes for approximately two hours in addition to engaging in 60 minutes of mindfulness home practice each day and attending an all-day retreat between weeks five and six. Common mindfulness practices for the MBSR program include body scan, sitting meditation, lying down yoga, and bringing awareness to the present moment. The purpose of the program was to provide Head Start staff with skills and attitudes that may help reduce stress and burnout and increase self-compassion and wellbeing. Effectiveness of the MBSR program for Head Start Staff will be measured through a descriptive interpretive methodology employed by semi-structured interviews. Specifically, the interview is designed to examine whether attending the MBSR class affected the educators' job satisfaction, self-compassion, or overall experience as a school-based professional.

MUSIC, MOOD AND MEMORY: THE INTERACTION BETWEEN MOOD-INDUCING STIMULI AND SHORT-TERM FALSE MEMORIES

Group Leader: Martin, Amanda
Graduate, Psychology
Group Member: Maria Corea Dubón, Graduate, Psychology
Mentor: Prof. Dawn McBride
Authorship: Maria Corea Dubón

Prior research has investigated the effects of positive vs. negative mood on the production of false memories through the DRM paradigm, a procedure in which participants study list items related to a theme item resulting in false memories for the theme they did not study. Past research has shown that long-term memory false alarms are produced at greater levels among individuals in positive moods than those in negative moods. In the current experiment, we are investigating how mood, induced through music, may influence the production of short-term false memories and whether these false memories are produced at a greater rate in semantically or phonologically related lists. To examine this, participants will be randomly assigned to either a positive or negative mood-induced group. All participants will then study four-item lists of words that are semantically (meaning-based) related or phonologically (lexical-based) related. A single test item will then follow each list and will either be a studied item, unstudied item or a lure item related to all the words in the list. We hypothesize that the results will show that individuals within the positive mood group will produce higher rates of false alarms than the negative mood group; phonological lists will also produce higher levels of false alarms compared to semantic lists, especially in the positive mood condition. Sad mood should create more item specific processing, which reduces false memories for the lures. These results have implications for how negative and positive moods affect false memory.

THE COVID-19 OUTBREAK AND DISORDERED EATING AMONG COLLEGE STUDENTS: MODERATING ROLES OF ATTACHMENT INSECURITY, EMOTION REGULATION DIFFICULTIES, NEGATIVE EMOTIONS AND PSYCHOLOGICAL NEEDS THWART

Group Leader: Ortiz, Julian
Undergraduate, Psychology
Group Members: Andie Baker, Undergraduate, Psychology; Alondra Faudoa,
Graduate, Psychology
Mentor: Prof. Suejung Han
Authorship: Julian Ortiz, Andie Baker, Alondra Faudoa

Purpose: The purpose of this study is to examine the continued effect of the covid-19 outbreak on people's perceived change in eating behaviors. Research has shown an increase in disordered eating behaviors (e.g., fasting, binge eating, purging) among college students to a significant degree (e.g., up to 70%) during the covid-19 outbreak (e.g., Coulthard et al., 2021; Zhou & Wade, 2021). We will examine whether the increase in disordered eating continues as the pandemic persists, despite some recovery of daily activities. Also, previous studies have established relational and emotional risk factors for disordered eating including attachment insecurity (e.g., Tasca et al., 2009), emotion regulation difficulties (e.g., Han & Pistole, 2014), negative emotions (e.g., Polivy & Herman, 1985), and psychological needs thwart (e.g., Han & Lee, 2017). Those may exacerbate the impact on stress caused by the covid-19 pandemic, resulting in increased dysfunctional coping behaviors such as disordered eating. Therefore, we hypothesize that students will report an increase in levels of disordered eating (i.e., dieting, binge eating, compensatory behaviors, & eating to cope with stress) compared to pre-pandemic levels of

disordered eating. We also hypothesize the aforementioned risk factors will moderate such that those with the increased level of risk factors will report a much higher amount of disordered eating symptoms.

Procedure: A sample of college students at a Midwestern university was recruited to participate in an online survey of this study for a research participation/extra credit. This study has been approved by the IRB and data collection is under way (n=30). The measures included experiences in Close Relationship-Short Form (Wei et al., 2007), Difficulties in Emotion Regulation Scale-Short Form (Kaufman et al., 2015), PANAS (Watson et al., 1988), Psychological Needs Thwart Scale (Bartholomew et al., 2011), Eating Disorder Diagnostic Scale (Stice et al., 2000), Motivation to Eat Scale (Jackson et al., 2003), and a demographic form. Participants were asked to rate each item based on their perceptions of experiences before and after the outbreak of covid-19. One sample ttests will be conducted with pre and post-pandemic scores on disordered eating measures. Multiple regression analyses will be conducted using the changed scores in disordered eating as DVs and risk factors as IVs.

NARCISSISM AND ALCOHOL OUTCOMES: THE ROLE OF DRINKING MOTIVES

Presenter: Solka, Jake
Graduate, Psychology
Mentor: Prof. Laura Finan
Authorship: Jake Solka, Laura J. Finan

Purpose: With rising subclinical narcissistic personality traits amongst college populations (Dingfelder, 2011) it is important to understand risk factors associated with student emotional well-being. Given that young adults have the highest prevalence rates of excessive drinking and associated adverse outcomes (CDC, 2019), it is important to examine factors that contribute to this health risk behavior. Previous research suggests that subclinical grandiose narcissistic traits as well as all four drinking motives (Cooper et al., 1994) are independently related to alcohol use and associated outcomes (Kuntsche et al., 2005; Kramer et al., 2019). However, it is unclear how these personality and motivational factors work together to contribute to student alcohol use and problems. Therefore, this study examined the moderating role of drinking motives on the relationship between subclinical grandiose narcissistic traits and past-month alcohol use, of heavy episodic drinking (HED), and negative alcohol-related outcomes.

Methods: Participants were undergraduate and graduate college students from a large, Midwestern university (N=406; 81% female; Mage=20.13, SD=1.69; 10% Hispanic, 85% White). Using a cross-sectional design, participants responded to surveys about their past-month alcohol use and HED frequency. The Brief Young Adult Alcohol Consequences Questionnaire ($\alpha=.93$; Kahler et al., 2005) was used to assess negative alcohol-related outcomes. The Five Factor Narcissism Inventory–Short Form; was used to assess narcissism subtype personality traits, including grandiose narcissism ($\alpha=.87$; Lynam et al., 2014). Finally, the 20-item Drinking Motives Questionnaire-Revised was used to assess drinking motives ($\alpha = .81-.94$; Cooper, 1994). Controls included gender, age, and ethnicity.

Results: Poisson regression analyses were conducted to examine associations between grandiose narcissism, drinking motives, and alcohol outcomes. After controlling for sociodemographic characteristics, enhancement, conformity, and social motives independently moderated the relationships between subclinical grandiose traits with past-month use ($b=.20, p<.01$; $b=.18, p<.01$; $b=.24, p<.01$, respectively), as did enhancement and social motives with HED frequency ($b=.02, p<.01$; $b=.02, p<.01$, respectively).

Conclusions: Findings illustrate that targeting motivations for alcohol use as well as addressing narcissistic personality traits may prove beneficial in therapeutic services and substance use prevention activities for young people, particularly in academic settings.

A FORMATIVE EVALUATION OF RTI/MTSS IN A MIDWESTERN HIGH SCHOOL

Presenter: Tomasson, Lauren
Graduate, Psychology
Mentor: Prof. Mark Swerdlik
Authorship: Lauren Tomasson, Mark Swerdlik

A comprehensive program evaluation of a Multi-Tiered System of Supports/ Response to Intervention program (MTSS/RtI) was implemented at a high school. A formative evaluation approach was used to assess the effectiveness of the MTSS/RtI programs. This evaluation had to be modified from its original plan due to COVID-19. Data collection included interviews with stakeholders, interviews with model secondary MTSS programs from Florida, observations of problem-solving meetings, and a parent survey. Recommendations based on researcher conclusions from data sources were provided to stakeholders at the high school.

STUDENT PERCEPTIONS OF DIVERSITY COURSES ACROSS THE COVID-19 PANDEMIC

Group Leader: Vasquez, Shania
Undergraduate, Psychology
Group Members: Rachel Meister, Undergraduate, Psychology; Mishell Morales, Undergraduate, Social Work; Felipe Hernandez, Undergraduate, Psychology
Mentor: Prof. Jordan Arellanes
Authorship: Shania Vasquez, Jordan Arellanes, Rachel Meister, Mishell Morales, Felipe Hernandez,

The issues the Latinx community face remains to persist while attending a predominately white college environment (Garriott & Flores, 2013). The impact of the pandemic may have been magnified for students of color (Chirikov et al., 2020; Liu et al., 2020). COVID-19 lead to several issues including a lack of student and teacher engagement within online learning, continuous challenges in student life, and an overall disconnect between students and the university. Our data did not initially intend on collecting data about COVID-19, instead we intended to look at how to create more inclusive classroom pedagogical considerations for students, and particularly Latinx students. By chance, we gained student perceptions before, during, and throughout the pandemic. In this study, we identify how teaching considerations impact student perceptions by semester.

This qualitative study details the experiences of forty-two students (Latinx = 21/Non-Latinx = 21). Participants were identified through their involvement in psychology and/or policy and government classes, which focused on the unique experiences of Latinx families in society. From Fall 2019 to Spring 2021, two focus groups were conducted in each of the five classes: those who self-identify as Latinx and those who do not. Longitudinal qualitative analysis tracked the impact of pedagogical considerations towards DEI in classrooms throughout COVID-19. Coding was structured to identify changes in student perceptions based on pedagogical and university experiences by semester.

The findings from this study highlight the changes in student perception of the classroom by semester. We summarize key themes presented in each semester and detail how each subsequent semesters' classes were altered based on student perceptions. We then detail the impact of the changes. In sum, nearly all students felt a disengagement or disconnection to the university during the pandemic when transitioning to online learning. Both Latinx and Non-Latinx students detailed that Latinx students faced increased challenges as compared to Non-Latinx students while attending a predominantly White college setting during the pandemic.

Our work reflects on course pedagogical considerations during the pandemic and provides recommendations for educators and administrators for best practices moving forward. Suggestions and strategies to support Latinx students are provided for the faculty, department, and university to consider moving forward. As we begin to come back together in person, we can reflect on what has separated us. Our work supports a future with a sense of community where Latinx students feel their voices are heard and accepted on a college campus.

Social Work

THE IMPACT OF COVID-19

Presenter: Appiah, Sarah
Graduate, Social Work
Mentor: Prof. Kate Sheridan

The purpose of this proposed study is to explore and describe the impact of COVID-19 among healthcare workers at the Carle Bromenn Medical Center. Participants are adults aged 18 years of age or older who are employed at the Carle Bromenn Medical Center. Participants are invited to complete an electronic survey. Findings from this study will inform the development and improvement of supports for employees.

RELATIONSHIPS BETWEEN DISORDERED SUBSTANCE USE, DEPRESSION, ANXIETY AND EATING DISORDERS AMONG ILLINOIS STATE UNIVERSITY STUDENTS

Presenter: Asante, Philippa
Graduate, Social Work
Mentor: Prof. Karen Stipp

Substance use among college students is a major, growing problem associated with lower academic performance, higher rates of physical, social, emotional problems, and development of chronic mental health disorders. Though previous studies have focused on the general college population in the US, this study has a purpose to examine the correlation between alcohol and other drug use among Illinois State University (ISU) students and mental health issues such as depression, anxiety, and multiple comorbidities that students face which has been understudied over the years. A quantitative method used to examine 22 undergraduate students of ISU [females (5) 22.7%, males (16) 72.7 % & bisexual student (1) 4.5 %], referred by the Student Conduct and Conflict Resolutions (SCCR), between ages 18 to 23. The study used a collection of already existing data of students who visit the Student Health Services for behavior health services provided by the Alcohol and Other Drug Intervention Team. This study uses the scores of depression, anxiety and eating disorders, alcohol use disorders screening, cannabis use disorder screening instruments using the PHQ-4, AUDIT, CUDIT-R and the SCOFF, respectively. Quantitative data is grouped into 6 categories which include the three (3) mental health

categories (depression, anxiety, eating disorders and their corresponding screening scores), alcohol use disorder score, cannabis use disorder score and student gender using Microsoft Excel group command options.

SUBSTANCE USE DISORDERS BEHIND BARS

Presenter: Beattie, Grace
Graduate, Social Work
Mentor: Prof. Kate Sheridan

The aim of this study is to explore and describe the drug use among inmates at the McLean County Detention Facility (MCDF). There are no human subjects included within this study, rather the sources of data comes from preexisting surveys and social history's previously administrated at the detention center. The researcher made prearrangements with administration to redact all identifiable information, prior to obtaining and analyzing the data. The data set consists of two 21 month periods, including March 2018-December 2019 and March 2020- December 2021. This time period was chosen with the intention to compare and contrast the impact COVID-19 had on those with substance use disorders and criminal activity. The key variables from the instrument include age, gender, race, education level, employment status, mental health diagnosis, and substance use history. Data analysis will demonstrate the relationship between the need for treatment for substance use within the MCDF (independent variable) and the number of individuals in custody dealing with a substance use disorder (dependent variable). The findings from this study will be written as a report for graduate course SWK445 and will be shared with interested parties at the McLean County Detention Facility. The research results will be used to highlight the overrepresentation of inmates at the MCDF with substance use disorders and the need for enhanced treatment services for those with substance use and other mental health disorders while in custody.

EMPLOYEE RETENTION: STAY OR LEAVE?

Presenter: Beavers, Laura
Graduate, Social Work
Mentor: Prof. Kate Sheridan

Employee turnover is greater in child welfare settings compared to other professions. This study aims to explore and describe employee retention in the Family Community Services (FCS) Department at The Baby Fold in Normal, Illinois. The first aim will be to identify the turnover rate within the FCS Department during the past three years. The FCS Department is predominately comprised of social workers and humans service professionals who provide child welfare services such as foster care, intact family services, and intensive community based services. The second aim is to understand the causes and antecedents of employee turnover. A quantitative and qualitative analysis of existing employee surveys and employee exit interviews will be conducted to explore reasons employees "stay" and "leave". It is anticipated that once factors can be identified and explored, strategies to retain employees in the FCS Department can be developed.

PERCEPTIONS & EFFECTIVENESS REGARDING SUPPORT SERVICES REFERRALS AT URBANA HIGH SCHOOL AMONG TEACHERS AND PARAPROFESSIONAL STAFF

Presenter: Carrillo, Juana
Graduate, Social Work
Mentor: Prof. Kate Sheridan

The aim of this study is to describe teacher and paraprofessional staff members' perceptions about referring students for support services at Urbana High School and to investigate the effectiveness of the current support services referral process at Urbana High School. Participants were teachers and paraprofessional staff employed at Urbana High School during the time of the study aged 18 years or older. Methods of data collection included a survey consisting of 15 items. The researcher assessed the perceptions of the current system for referring students to support services, and the frequency of completing student referrals. These findings will be used to inform the development of the referral process and improve the communication between the support services team.

OFFICE REFFERRALS AT BLOOMINGTON HIGHSCHOOL AFTER A LIFE ALTERING PANDEMIC SHUTDOWN.

Presenter: Collins, Nichelle
Graduate, Social Work
Mentor: Prof. Karen Stipp

There has never been a pandemic in the history of the United States that has shut down the school system for an entire year and a half. There is not much research that supports events that can cause uproar and alter behaviors and mental health in the capacity that it has since the start of COVID-19's virus spread and national shutdown. Because of the lack of research and information, the world was not prepared or equipped to deal with the repercussions from the shutdown especially in big businesses and educational institutions such as schools. In an attempt to understand the things that transpired upon returning to schools after being physically gone for a year and a half, the inquiry relied on qualitative and quantitative information in Bloomington High School's databases that reflected office referrals and behaviors from the student population. The information was compared from 2019 before the pandemic shutdown to 2021 when students physically returned to the learning environment at full capacity. The information was collected anonymously, data was uploaded by educators and office personnel. Data analysis will include number and type of referrals, year in school, gender, sexual orientation and race/ethnic identity.

MENTAL ILLNESS IMPLICIT BIAS WITHIN EMERGENCY ROOM STAFF

Presenter: Conover, Kimberlee
Graduate, Social Work
Mentor: Prof. Karen Stipp

In the United States, 51.5 million adults struggle with a mental illness each year. The life expectancy of an individual with both a serious mental illness and a medical condition, is on average, 25 years less than those who only have a medical condition. There are many barriers that can impact one's ability to access health care services; attitudes and perceptions of providers and other medical staff can be one of them. This research examines medical staff mental health implicit bias within an emergency care setting. A convenience sample of medical staff working within the UnityPoint Health Methodist Emergency Department was used. Participants were recruited via emails and staff meetings.

Participants were asked to complete a confidential Implicit Association Test. This test asks participants to sort various words (such as dangerous, healthy, friendly) and medical conditions into categories, with each word appearing one at a time to measure the participants' implicit bias. In addition, secondary data retrieved from electronic medical records including wait times within the Emergency Department, race, and gender were analyzed. Data was analyzed using SPSS.

MCLEAN COUNTY CENTER FOR HUMAN SERVICES: RECOVERY-ORIENTED CARE

Presenter: Davis, Lucas
Graduate, Social Work
Mentor: Prof. Karen Stipp

Recovery-oriented care aims to prioritize personal recovery, which includes person-centered, clientled treatment planning and interventions. The goal of recovery-oriented care is to address a disconnect between providers and consumers. Over the past two decades, recovery-oriented care has emerged as the primary model for mental health care. This inquiry aims to compare the perceived levels of recovery orientation and outcomes of personal recovery by providers, with perceptions by consumers, all within the same agency. This qualitative study includes semi-structured interviews of two chief supervisors of the Recovery Program at the McLean County Center for Human Services regarding their recovery-oriented framework. It also includes semi-structured interviews of a convenience sample of five clients who are part of the Recovery Program regarding the program's delivery of services and their own perspectives on personal recovery. Results are unavailable at this time as data collection is ongoing. The goal of this research is to inform the agency on the status of its recovery-oriented framework in terms of its outcomes, fidelity to its model, and overall its success in achieving its goals as a recovery-oriented program.

SPIRITUALITY AND DRUG COURT

Presenter: Elliott, Jordan
Graduate, Social Work
Mentor: Prof. Kate Sheridan

This study researches the relationship between spirituality and drug court participants in McLean County. The aim of this paper is to find a better understanding of drug court participant's experience of spirituality. Research participants completed a 25-question survey designed to elucidate the participants experience of spirituality. The results of this study are presently still being calculated.

SFL IMPACT ON STUDENTS WITH AUTISM

Presenter: Folk, Robyn
Graduate, Social Work
Mentor: Prof. Karen Stipp

Autism spectrum disorder now affects 1 in 68 children. Boys are nearly 5 times more likely than girls to be diagnosed with ASD. Many students with autism spectrum disorder have benefit from participation in classroom interventions to help with communication, social skills, life skills, and selfcare. In the high school setting these benefits can be seen in once-a-month support groups or one on one sessions, however, there needs to be interventions that may be more beneficial to students in a more frequent manner. The benefits of Strategies for Learning support group for students with the disability label of autism has been acknowledged frequently by support staff and instructors in the learning environment. However, despite staff recognition there is the question if the students feel as though having this class

has made the impact in areas of self-care and social skills as it can relate back to the idea of the whole child. Data was collected from a sample of high school students with autism spectrum disorder as their disability label from HLR high school. A google form survey was given to the students that have Strategies for Learning support group in their school schedule. The survey asks students open-ended questions about what was beneficial from being enrolled in this class, and whether they see any improvements in the areas of social skills and self-care as it relates to inside and outside the learning environment. We then ask students what they feel was beneficial from being enrolled in this class and do they see any improvements in the areas of social skills and self-care as it relates to inside and outside the learning environment. Qualitative data will be coded and analyzed in order to inform future program planning.

COVID-19 IMPACTS ON LIVINGSTON COUNTY SPECIAL SERVICES UNIT'S SPECIAL EDUCATION SERVICES

Presenter: Hopwood, Emily
Graduate, Social Work
Mentor: Prof. Kate Sheridan

The aim of this study is to explore and describe the various ways COVID-19 has impacted services at Livingston County Special Services Unit. Participants aged 18 years of age or older and employed at Livingston County Special Services Unit as an occupational therapist, speech therapist, physical therapist, social worker, or school psychologist were invited to participate in an electronic survey. The participants' survey responses provided information on how COVID-19 impacted themselves, their clients, and the services they were providing. The findings of this study will tell us how Livingston County Special Service Unit service providers delivered remote special education services and the difficulties these service providers faced. This data is vital for Livingston County Special Services to have so we can learn from it and improve our reaction to a sudden shift to remote services in the event that it is warranted in the future. The research will also give insight to how Livingston County Special Services Unit can support their service providers. The proposed research will build on and further the knowledge base of what Livingston County Special Service Unit has learned throughout the span of the pandemic.

ADULT ADOPTEES & OPENNESS: CULTURAL IDENTITY DEVELOPMENT AND CONNECTIONS WITH BIRTH FAMILIES

Presenter: Iverson, Brien
Graduate, Social Work
Mentor: Prof. Karen Stipp

Introduction & Significance: As transracial and open adoptions are on the rise in the U.S., it is important to examine whether adoptees struggle with cultural identity development, and whether the openness of adoptions supports cultural identity development.

Methodology: A qualitative research study through a phenomenological approach was conducted to understand the lived experiences of adult adoptees. A diverse sample was asked about various adoption-related topics through a recorded guided interview. Data was then analyzed by transcribing participants' interviews verbatim and finding common themes within each.

Conclusion: The intent of this research is to help adoption professionals and adoptive parents to better support adoptee development of secure cultural identity by embracing the spirit of openness.

EXAMINATION OF CAREGIVER KNOWLEDGE, RECOGNITION, AND PERCEPTION OF TRAUMA RESPONSES IN CHILDREN EXPOSED TO VIOLENCE

Presenter: Lesser, Margaret
Graduate, Social Work
Mentor: Prof. Kate Sheridan

The aim of this study is to explore the experience that children with trauma history are having in their homes as perceived by their parents, as well as to examine these parent's understanding of their child's behavior from a developmental perspective. Safe caregivers aged 18 years of age or older, of children who have been exposed to violence and are now receiving services from The Butterfly Project at Children's Home & Aid in Central Illinois will be the participants of this study. Findings from this study will be used to inform improvements to programming at the Butterfly Project at Children's Home and Aid.

DIRECT SUPPORT PROFESSIONAL'S PERCEPTIONS OF STRESSORS AND SUPPORTS AT TAZEVELL COUNTY RESOURCE CENTER DURING THE COVID-19 PANDEMIC

Presenter: Lewis, Emmalee
Graduate, Social Work
Mentor: Prof. Karen Stipp

The adverse effects of the COVID-19 pandemic have immensely impacted and challenged society in various ways. Stress and burnout frequently occur among staff who work with individuals within the Intellectual or Developmental Disabilities (IDD) population. However, as a result of this pandemic, additional pressures and anxiety have been added to the jobs performed by these professionals. Therefore, it is critical to consider these unpredictable times of the COVID-19 pandemic and its potential consequences on the mental health of those providing services to the IDD population and better prepare for the future repercussions of this pandemic. The research examined the effects of the pandemic on the mental health of Direct Support Professionals (DSP), who work with individuals with intellectual and developmental disabilities. This research utilized a mixed-methods methodology using a convenience sample of Direct Support Professionals working at Tazewell County Resource Center (TCRC) during the COVID-19 pandemic. Participants were recruited through email provided by the agency and asked to complete a voluntary and confidential survey that determined what work-related stressors they endured, what support provided by the agency was practical, and what further support could have been beneficial.

IN WHAT WAYS DO RESTORATIVE PRACTICES IMPACT DISCIPLINARY OUTCOMES AND SCHOOL CLIMATE AT BJHS?

Presenter: Owens, Jordan
Graduate, Social Work
Mentor: Prof. Karen Stipp

Research with Restorative Practices promotes a collaborative environment and provides student support that works well alongside with other school services. This qualitative research examines the impact Restorative Practices has on disciplinary outcomes and school climate at BJHS. The participants include teachers from each team (15) at BJHS who will complete a 30-45-minute guided interview (two per week). This study also includes existing data regarding students who have taken part in restorative

mediations at BJHS. Currently results are unavailable as data collection is ongoing. The results of this study could support and enhance the use of restorative practices as a responsive rather than reactive approach to addressing disciplinary procedures and promoting a more positive school culture.

THE EFFECTIVENESS OF MCLEAN COUNTY SCREENING, ASSESSMENT, AND SUPPORT COUNSELING SERVICES

Presenter: Pecoraro, Calista
Graduate, Social Work

Mentor: Prof. Kate Sheridan

The purpose of the proposed study is to explore and describe the effectiveness of follow-up counseling services within the Screening, Assessment, and Support Services (SASS) program at the Center for Youth and Family Solutions. The question I have developed for this study is: What effect does follow-up counseling services, provided within the Screening, Assessment, and Support Services (SASS) program at the Center for Youth and Family Solutions, have on clients? Participants will be adults aged 18 years of age or older. Participants will be invited to complete an electronic survey via Qualtrics, or paper survey. Findings from this study will be used to inform improvements to SASS crisis intervention and therapeutic services.

INTERGENERATIONAL TRAUMA

Presenter: Perkins, Tyla
Graduate, Social Work

Mentor: Prof. Kate Sheridan

The aim of this study is to describe the relationship between intergenerational trauma and childhood exposure to violence. Prior research has shown the correlation between maternal mental health and the mental health of their children, as well as the likelihood of children exposed to violence becoming a batterer or victim. This study proposes that intergenerational trauma is a cause of a child's own trauma, and it can be said through the findings of this study that caregivers receive mental health services alongside or before beginning the healing journey of their children. Sources of data include existing ACE surveys administered at Children's Home & Aid as well as client intake records. The data sources were completed between January 1, 2021, through December 31, 2021. Participants and intake were completed by adult caregivers aged 18 years of age and older who have children receiving mental health services through The Butterfly Project.

THE USE OF BIBLIOTHERAPY IN ELEMENTARY SCHOOL CLASSROOMS

Presenter: Pruett, Allie
Graduate, Social Work

Mentor: Prof. Karen Stipp

Research emphasizes the importance of social emotional learning in the education setting. It is the responsibility of educators and school personnel to provide instruction and support in this area so that students can develop adequate skills necessary to self-regulate and maintain healthy relationships with others. Bibliotherapy is an engaging and understandable approach to teach social emotional learning to school-aged children. This research examines a current practice of bibliotherapy as a form of Tier-1 social emotional intervention and its usefulness in supporting the social emotional awareness of elementary-aged students. A sample of seven elementary classes ranging from first to third grade receive weekly lessons using Bibliotherapy. A pre-test/post-test measure was administered to gather self-reported data on whether the specific intervention approach yielded an increase in overall social emotional awareness. Quantitative data will be used to determine whether Bibliotherapy led to an

increase in students' ability to identify feelings in themselves and others, know appropriate strategies to use, feel comfortable sharing emotions, and feel like they are in control of their emotions. Descriptive statistics will be used to indicate students' overall understanding of the specific curriculum used for the duration of this study.

SUPPORT GROUP RESEARCH

Presenter: Schultz, Jaime
Graduate, Social Work
Mentor: Prof. Kate Sheridan

The purpose of this study is to gather information about support groups for children of divorce and to create and implement a curriculum using the study results. The participants include parents, teachers, physicians, and community members who are invited to complete an electronic survey. Using the data collected, a curriculum will be developed and implemented at Carle Behavioral Health.

RECOGNITION OF TRAUMA IN FOSTER CARE YOUTH

Presenter: Vance, Savanna
Graduate, Social Work
Mentor: Prof. Karen Stipp

In the United States, there are nearly half a million children in the foster care system. Research regarding youth in foster care has found that the majority of children in care have experienced multiple traumas including primary attachments disrupted by removal from the care of biological parents. Because of their experienced traumas, these youth are at an increased risk for mental health issues. This research examines how child welfare professionals including caseworkers, mental health counselors, judges, attorneys, and guardians ad litem understand trauma in youth, the impact trauma has on youth, and how their understanding of trauma impacts their decisionmaking on behalf of these youth. This research used mixed methods. It utilized a convenience sample of child welfare professionals recruited from email addresses available to Lutheran Social Services of Illinois. Participants were asked to complete a confidential survey regarding what trauma-informed training they have received, in what ways they recognize and assess trauma in youth in care, and what they take into consideration regarding trauma when making professional decisions on behalf of youth in care.

CHILD WELFARE TURNOVER AND YOUTH OUTCOMES

Presenter: Wilson, Jallah
Graduate, Social Work
Mentor: Prof. Karen Stipp

Employee turnover is prevalent in the private and public child welfare system. This is concerning because of the unintentional impact turnover may have on foster care youth, who have experienced the trauma of removal from their primary attachment figure. Foster care youth are incredibly vulnerable to the transition of caseworkers in the child welfare workforce because caseworkers play an integral role in the lives of the youth. Caseworkers are tasked with the responsibility of maintaining the stability, safety, well-being, and permanency of foster care youth. This study explores the influence of employee turnover on youth in care outcomes from the caseworker's perspective. At the time of the study, participants were employed with the Springfield Department of Children and Family Services as child welfare specialists/caseworkers. Existing quantitative data from two DCFS agency reports, the

Permanency Headcount and Caseload report and the Permanency Caseload Threshold Details report, were analyzed for frequency of caseworker turnover. Qualitative data was gathered using semi-structured interviews conducted with 10 participants, to gather participant experiences with case transitions and give an anecdotal account of how youth in care responded to the changes in workers.

Sociology/Anthropology

UNIVERSAL CITIZENSHIP IN ECUADOR: A SUBSTANTIVE POLICY MODEL FOR MITIGATING THE VENEZUELAN REFUGEE CRISIS

Presenter: Eckhardt, Kiera
Graduate, Sociology/Anthropology
Mentor: Prof. Michael Hendricks

The Universal Citizenship Clause (UCC) included in Ecuador's ratified 2008 Constitution under Rafael Correa's administration (2007-2017) offers a model for progressive policy that can be used in the regional, South American efforts to mitigate the Venezuelan refugee crisis, while also promoting sustainable, inclusive development. Since the UCC's implementation, an increase in the number of Venezuelan refugees entering Ecuadorian communities has left Ecuadorian citizens with mixed feelings about the UCC as policy. This paper outlines the UCC policy and its alignment with the United Nations 2021-2023 Global Compact Strategy to paint the picture of how the UCC politically and socially benefits both Venezuelan refugees and Ecuadorian citizens. Data from refugee integration research and interviews with Ecuadorian Refugee Service Providers also offers perspective on how Venezuelan refugees are being professionally received and integrated into Ecuadorian communities. Keywords: Universal Citizenship Clause, Venezuelan refugees, Ecuador, United Nations, United Nations 2021-2023 Global Compact Strategy

THE CRIMINAL JUSTICE SYSTEM WORKS PERFECTLY

Presenter: Maranville, Ryan
Graduate, Sociology/Anthropology
Mentor: Prof. Michael Hendricks

Does race impact one's treatment in the criminal justice system of McLean County, IL? If so, does that signify that the criminal justice system is broken? Using arrest data from McLean County, IL, the researcher presents findings of statistically significant racial disparity among non-white populations across several variables, including, but not limited to, bond amount, length of stay in jail, the total number of charges, and the total number of convictions. This research fills empirical gaps within existing literature by presenting and discussing a statistical analysis of arrest data in a semi-urban area in Central Illinois. Additionally, this research applies a theoretical extension of social theories in discussing the statistical findings. Using a historical approach, the researcher combines theory and data to argue for a more *multi-dimensional* strategy to the administration of criminal justice in the United States.

HOW WE SEE OURSELVES: SELF-ESTEEM, PERCEIVED PHYSICAL ATTRACTIVENESS AND PERCEPTIONS OF BEING OVERWEIGHT

Group Leader: Odeh, Yasmin
Undergraduate, Sociology/Anthropology

Group Members: Taylor Kanuk, Undergraduate, Sociology/Anthropology; Melissa Douglas, Undergraduate, Sociology/Anthropology; Lily Hoveke, Undergraduate, Sociology/Anthropology

Mentor: Prof. Susan Sprecher

We are a nation that emphasizes healthy self-esteem, and research indicates that there are many benefits of having a high self-esteem, including confidence, good physical and mental health, and better relationships (Seok & Park, 2021). Not everyone, however, has high self-esteem. There are many factors that contribute to having a high self-esteem, including early family experiences, acceptance from peers, and accomplishments (Cast & Burke, 2002; Schwalbe & Staples, 1991). While some of these factors contributing to self-esteem may be under people's control, other factors that affect self-esteem are not. Research has shown that one's physical attractiveness (which can be argued is somewhat out of one's control) contributes to self-esteem, with people who are more physically attractive reporting higher self-esteem (Seok & Park, 2021). Our research team (working under the direction of Dr. Susan Sprecher) is conducting secondary analyses of a few items from a large data set ($N = 8493$) collected over many years at ISU. Included in the survey distributed to the same sociology class over many years were two items on overall self-esteem (from the Rosenberg [1965] self-esteem scale), two items on self-reported physical attractiveness (e.g., "I am a physically attractive person"), and one item asking about whether one was overweight. We first extend a prior publication from these data (Sprecher, Brooks, & Avogo, 2013) but with more data collected, to examine gender and race differences in overall self-esteem, self-perceived physical attractiveness, and perceptions of being overweight. Second, and as a new contribution, we examine the association between self-esteem and self-ratings of physical attractiveness in the total sample as well as in different groups. Preliminary results indicated that men rated themselves higher on physical attractiveness than did women ($t = 7.45$; $p < .001$). Furthermore, men were less likely than women to view themselves as overweight ($t = 11.17$; $p < .001$) and men reported higher self-esteem than women ($t = 8.29$; $p < .001$). In preliminary analyses concerning race, African Americans scored higher on self-esteem ($t = 9.51$; $p < .001$) and on self-perception of physical attractiveness ($t = 13.85$; $p < .001$) than did Whites. Self-esteem was highly correlated with self-reported physical attractiveness for the total sample ($r = .65$; $p < .001$). However, perceived physical attractiveness was more highly correlated with self-esteem for women ($r = .68$; $p < .001$) than for men ($r = .59$; $p < .001$). Other results will be presented in the poster.

Special Education

WHO'S CONNECTED TO WHOM AND HOW DO WE MEASURE IT? A SCOPING REVIEW OF SOCIAL NETWORKS OF PEOPLE WITH INTELLECTUAL AND DEVELOPMENTAL DISABILITIES

Group Leader: Hodges, LT
Undergraduate, Special Education

Group Member: Sarah Gibbons, Undergraduate, Special Education

Mentor: Prof. Kim Fisher

Authorship: LT Hodges, Sarah Gibbons, Kim Fisher, Clarie Stelter

Recent research indicates understanding adults with intellectual and developmental disabilities (IDD) access to social capital through social networks is important to understanding social inclusion, community participation, employment, and overall quality of life. However, it is not well understood how researchers measure social networks and to what extent they use a social capital framework to do so. Using Scrivens and Smith's (2013) social capital measurement theoretical framework and concepts of social network methodology, we conducted a scoping review of the literature on social network measurement for adults with IDD to analyze the extent to which the field uses social network data collection and analysis methods for both social network structure and social network support. In addition, we examined in which quality of life domains researchers used social networks. In total, thirty-six articles were identified. In total, 4715 adults with IDD social networks were measured. Most articles were published in Scandinavian countries, the UK, or Australia. Demographic data was limited and included only male/female genders and rarely collected data on race or ethnicity. When examining the social network structure, most researchers examined network size and composition. Fewer explored the frequency or mode of network connections and rarely examined how adults with IDD felt about their connections. For social network support, most researchers explored types of support exchanged and from whom the support originated. Rarely did researchers explore how adults with IDD felt about the support exchanged. Across all studies, only two used social network methods to collect and analyze the data and few asked adults with IDD themselves about their networks. Most studies explored social networks within interpersonal relationships or emotional well-being dimensions, not for personal development, rights, or self-determination. Recommendations include (a) presuming competence when collecting social network data, (b) using social capital dimensions and social network methodology to collect and analyze different type of social network data, and (c) using social network methods to explore other quality of life domains.

Keywords: *social network; intellectual and developmental disabilities*

Technology

BENCHMARKING QUALITY 4.0 TO A PROCESS IN AN AUTOMOTIVE COMPANY

Presenter: Cabrera Cervantes, Jose de Jesus
Graduate, Technology
Mentor: Prof. Jaby Mohammed

We are immersed in a digital age; living the 4th industrial revolution; the transition from the computer production system to the production of a digital-based system is our new reality. Companies are adopting digital technology to simplify their processes. However, they do not advance in this matter as required, at least not for quality management activities. The importance of adopting digital technology to develop quality management activities (Quality 4.0) is paramount. Quality Management Systems (QMS) must transition to digitally managed Quality Systems 4.0. Although industries apply digital technologies in quality management activities, they tend to implement them as independent projects, either to solve a problem or as part of a specific improvement action; but not as a strategic integral plan that encompasses all their quality management processes. The object of this research is to know how digital technology is usually implemented in a quality management process specifically in the automotive industries and why it is difficult for them to adopt the concept of quality 4.0 throughout the organization's quality system.

A case study has been selected as a strategy for this research. An automotive company that has already implemented at least one 4.0 digital technology in at least one of its quality management processes is to be selected. The objective of this research is to analyze the process under study and determine if the use of such technology follows the application of the quality 4.0 concept or not. Three main phases integrate the methodology of this work. In the first stage, the process to be studied is identified and selected. Secondly, the current degree of implementation of the quality 4.0 concept in the selected process is determined via an interview protocol instrument 2 with the person in charge of the quality system of the company and the people involved in the process selected. Thirdly, an analysis of the impact of the use of technology 4.0 in the organization is developed, such analysis is executed in two edges; the first is to determine the contribution of technology 4.0 to the organization's related KPIs, and the second is to determine its contribution to compliance with regulatory and/or quality requirements. Throughout this exploratory study, it is expected that automotive organizations can visualize how they can address and be encouraged to adopt the concept of quality 4.0 as a competitive advantage strategy for their companies.

USE OF GEOPOLYMERS IN CONCRETE

Presenter: Kamineni, Aditya Rao
Graduate, Technology
Mentor: Prof. Pranshoo Solanki
Co-Mentor: Prof. Guang Jin

Geopolymer concrete is an innovative and eco-friendly construction material that can be used as an alternative to Portland cement concrete. It reduces the demand of Portland cement which is mainly responsible for high CO₂ emissions. Compared to cement concrete, geopolymer concrete has lower carbon footprint and made without cement. It is made by mixing aluminosilicate source and alkaline activator solution. This mix act as a binder and can be used for making geopolymer concrete. The use of geopolymer concrete helps to reduce the stock of wastes and also reduces the carbon emission. The main objective of this on-going research study is to: 1) conduct literature review; 2) prepare

geopolymer concrete activators by dissolving recycled waste glass in sodium hydroxide solutions and recycled glass; 3) prepare geopolymer concrete specimens (1 inch x 1 inch x 1 inch cubes) and test for compressive strength; and 4) determine the quantitative relationship between the compressive strength of geopolymer concrete and percentage fly ash and recycled glass used in preparing activators. Preliminary results are encouraging and will be included in the poster presentation.

Afternoon Session Abstracts by Department/School

Biological Sciences

MUTATIONS IN LAMIN GENE AND HOW IT CAUSES MULTIPLE TISSUE-SPECIFIC DISORDERS

Presenter: Acquah, Bismark
Graduate, Biological Sciences
Mentor: Prof. Alysia Vrailas-Mortimer
Authorship: Bismark Acquah, Alysia Vrailas-Mortimer

Mutations in the LMNA gene result in at least 15 distinct disorders ranging from muscular dystrophies to neurological disorders to lipodystrophies. These disorders are collectively called laminopathies. Lamins are fibrous proteins in type V intermediate filaments, providing structural function and transcriptional regulation in the cell nucleus.

One outstanding question is how mutations in the Lamin genes result in such different disorders, as these proteins play a critical role in nuclear shape and are expressed in most cell types. Interestingly, mutant forms of lamin proteins aggregate, which may be toxic to the cells. Studies on the fruit fly *Drosophila melanogaster* has been instrumental in our understanding of lamin functions. Flies have two lamin genes, LamC and Lam Dm0, that evolved from a single ancestral gene and are homologous to both the LamA/C and LamB genes in humans. Many of the disease causing mutations in LMNA are conserved in both LamC and Lam Dm0. Furthermore, while LamC is not expressed in neurons, Lam Dm0 is expressed in both muscle and neurons suggesting that Lam Dm0 in muscles and neurons has both A- and B-type lamin activities.

Therefore, we hypothesize that certain tissues are susceptible to specific lamin mutations due to the inability of tissue specific quality control mechanisms to degrade those mutant forms, leading to protein aggregation and cellular toxicity. We have found that the p38Kb interacts with the CASA complex in flies to regulate the degradation of Lam Dm0. However, we will be testing if different lamin mutations aggregates in muscles and neurons.

UNIVERSITY STUDENTS' TRUST IN SCIENTISTS AND THE CDC WHEN EVALUATING INFORMATION ABOUT THE COVID-19 PANDEMIC

Group Leader: Allen, Tae'lor
Undergraduate, Biological Sciences
Group Member: Kendy Reyes-Cruz, Undergraduate, Biological Sciences
Mentor: Prof. Rebekka Darner
Authorship: Tae'lor Allen, Kendy Reyes-Cruz

COVID-19 is an infectious disease caused by the SARS-Cov-2 virus, which likely emerged through a spillover from a viral reservoir bat population in China in late 2019. Since that time, COVID-19 has caused more than 5.22 million deaths worldwide. The SARS-Cov-2 causes respiratory illness and is especially serious for those with chronic illness, including cardiovascular disease and diabetes. Despite evidence that masking, vaccination, and social distancing prevent illness, such measures are controversial among some ideologies. We embarked on this study to better understand how college/university students evaluate scientific information related to the pandemic in this contentious context. College/university students are of particular interest because they are emerging adults, undergoing substantial identity development as they differentiate their unique identities from that of parents and other influential adults. Through semi-structured clinical interviews, we investigate college/university students' self-reported social-distancing behaviors, opinions about the pandemic, dis/trust in scientists and the Centers for Disease Control and Prevention (CDC), and reasoning patterns when evaluating information related to the pandemic. The first two presenters, student near-peers, conducted the interviews of five college/university students. Interviews were transcribed and qualitatively coded by both presenters and their mentor. Emergent codes included politicization of the pandemic, dis/trust in the CDC, dis/trust of scientists, pandemic-related conflict with family/friends, and issues of identity. A cluster analysis among between codes will reveal associations and patterns among these codes, thereby allowing evidence-based hypotheses to explain how social expectations related to the pandemic influence college/university student identity development.

ASSESSING THE SENSITIVITY OF BIOTIC INTERACTION TO TEMPERATURE INDUCED CLIMATE CHANGE

Presenter: Avella, Philip
Graduate, Biological Sciences
Mentor: Prof. Lise Comte
Authorship: Philip Avella, Lise Comte

The effects of climate change on species and biological communities have been far reaching, and will likely continue to worsen in the coming decades. Freshwater fish are believed to be particularly vulnerable to the direct physiological effects of temperature increases and evidence suggests that they may also be indirectly affected through changes in their predator-prey interactions. Previous studies assessing the vulnerability of freshwater fish often focused on physiological risk only, and we still know little about the potential consequences of altered biotic interactions. My research seeks to fill this knowledge gap by assessing the sensitivity of biotic interactions to climate change in freshwater fish food-webs across the state of Illinois. To do so, the first step is to reconstruct the meta-food-web among for the freshwater fish of Illinois. This is accomplished by compiling information from the scientific literature of stomach or gut content analyses,

which allow us to infer feeding interactions that would be otherwise difficult to observe visually. Having the ability to infer local food webs will then aid us in evaluating the potential for direct physiological effects to cascade up or down the food web. This will be accomplished by comparing the critical thermal maxima (CT_{max}), a commonly used measure of upper thermal tolerance limit, between pairs of interacting species as well as across food webs. This research aims to improve our ability to predict future changes in biodiversity in aquatic environments.

SENSORY RESPONSE TO TOUCH OF CAENORHABDITIS ELEGANS AMPHID SHEATH IS DEPENDENT ON THE EXPRESSION OF MEC-12 GENE

Presenter: Awe, 'Tope
Graduate, Biological Sciences

Mentor: Prof. Andrés Vidal-Gadea

Authorship: 'Tope Awe, Jessica Adams, Dayton Oblinge Hammond, Andrés Vidal-Gadea

Glia are typically considered to be supporting cells for development of neurons and synaptic transmission. The supportive role in sensory and synaptic transmission have been thought to be through the maintenance of the morphology of neurons. However, recent studies are showing that glia can respond to sensory stimuli in a cell-autonomous manner, suggesting them to be active partakers in the modulation and integration of sensory stimuli.

In *C. elegans*, the amphid sheath glia (AMsh) has been shown to respond to hard touch and aversive odorants independent of the putative ASH neuron that senses these stimuli. While the receptor that senses odorants has been identified, the receptor responsible for the detection of the hard touch stimulus in AMsh remains unidentified.

Here we used reverse genetics and calcium ratiometric imaging techniques to show that *mec-12* is required for normal response of AMsh to harsh touch. Global RNAi knockdown of *mec-12* gene resulted in attenuated response of AMsh to touch stimulus on the nose. This result was also observed in *mec-12* mutants, establishing the necessity of *mec-12* in the response of AMsh glial cells to harsh touch stimulation.

THE IMPACT OF NUTRITION ON FECAL ODORS AND INTRASPECIFIC OLFACTORY COMMUNICATION IN GROMPHADORINA PORTENTOSA

Presenter: Donald, Samone
Undergraduate, Biological Sciences

Mentor: Prof. Steven Juliano

Co-Mentor: Prof. Kate Evans

Authorship: Samone Donald, Steven Juliano, Kate Evans

Studies have shown some species of Blattodea (roaches and termites) are capable of distinguishing olfactory cues from fecal matter from conspecifics. This order includes species ranging from gregarious to fully eusocial, and olfactory cues play a large role in aggregation and social communication. This study tests whether fecal olfactory cues influence *Gromphadorina portentosa*, the Madagascar Hissing Cockroach, aggregation preferences, and whether those preferences are related to quality of food consumed, or to familiarity of food consumed by conspecifics. A four-choice behavioral assay in a colony of *G. portentosa* suggests they can identify differences in the scent of fecal matter from conspecifics that have consumed food of greater vs. lesser nutritional value, as well as distinguishing between odors of feces from conspecifics that have consumed familiar vs. unfamiliar foods. Results indicate that *G. portentosa* are attracted to fecal olfactory cues from roaches feeding on a diet of the greatest relative nutritional value, and to fecal olfactory cues from roaches feeding on familiar vs. unfamiliar foods. The study also tested for effects of sex and stage of the

producing individual on fecal olfactory preferences. The results did not indicate any significant effect of male vs. female nor of juvenile (3rd instar) vs. adult on preferences. This study suggests further research into the role of gut bacteria associated with the diet is needed to determine the impact they may have on intraspecific communication in among these gregarious Blattodea.

DECREASING SEED GLUCOSINOLATE CONTENT IN THE OILSEED PLANT PENNYCRESS

Presenter: Gautam, Liza
Graduate, Biological Sciences
Mentor: Prof. John Sedbrook
Authorship: Liza Gautam, Brice Jarvis, Dalton Williams, Kaya Sloman, Alex Hafner, Ashlyn McWilliams, Ryan Bayliss, John Sedbrook

Pennycress (*Thlaspi arvense*) is a Brassica species related to rapeseed and canola that is being domesticated into an oilseed-producing winter cover crop called Covercress to be grown between corn and soybeans in the U.S. Midwest. Pennycress seeds, like in other Brassicaceae, accumulate high levels of glucosinolates - over 100 μmol glucosinolate per gram seed weight. Glucosinolates act as deterrents to herbivory due to their bitter taste and conversion to toxic isothiocyanates by the enzyme, myrosinase. As with the domestication of rapeseed to canola, we aim to decrease pennycress seed glucosinolate content to less than 30 $\mu\text{mol}/\text{gm}$ to make the seed oil and meal suitable for animal and human feed and food uses. To that end, we have targeted loss-of-function mutations in the pennycress MYC3 transcription factor gene, identifying a decrease in seed glucosinolate content to about 75 $\mu\text{mol}/\text{gm}$ without affecting plant growth. We also generated partial loss-of-function mutations in the HAG1 and HAG3 transcription factor genes, which reduced glucosinolates a similar amount as *myc3* knockout. We will present these findings and discuss our efforts in attaining target reductions in pennycress seed glucosinolate content.

EFFECTS OF DEPTH AND COVER CROP ON THE FUNCTIONING AND DIVERSITY OF SOIL MICROBIAL COMMUNITIES

Presenter: Hansen, Emily
Graduate, Biological Sciences
Mentor: Prof. Victoria Borowicz
Authorship: Emily Hansen, Victoria Borowicz

Global agriculture is strained by the unpredictable effects of climate change, as well as flooding, drought, erosion, and decreases in soil fertility. To meet these challenges, global agricultural systems must develop new techniques while promoting sustainable intensification practices. Cover crops can provide farmers with an off-season cash crop, while also positively impacting the soil and reducing reliance on less sustainable conventional farming practices. The objective of this research is to evaluate the impact of different cover crops on soil microbial communities at varying depths. Soils were sampled in October from plots that had pennycress; cereal rye; pea, clover, radish, oat mix; or fallow soil the previous winter. EcoPlates were used to conduct community-level physiological profiling and test the hypothesis that cover crop type and soil depth are strong determinants of microbial community diversity and functioning in an agricultural field. I predict: (a) that the physiological profile of the microbial community, as measured by the rate and ability to metabolize a variety of carbon sources, will change across depths and differ among cover crop types, and (b) that the overall functional diversity of the microbial community will be greater under cover crop treatment than without. Initial findings indicate that depth significantly affects soil microbial community diversity. However, cover crops, which were terminated in the spring before my fall sampling, did not produce significant effects. This spring I will re-sample these fields to determine whether cover crops have affected the soil microbial community by the time the next cash crop is planted.

RELATIONSHIPS BETWEEN SOCIAL IDENTITY AND ENGAGEMENT IN PERSONAL ACTION TO REDUCE HUMAN IMPACTS ON WILDLIFE

Presenter: Hayes, Alyssa
Undergraduate, Biological Sciences
Mentor: Prof. Rebekka Darner
Authorship: Alyssa Hayes, Rebekka Darner

Some visitors to nature centers and wildlife rehabilitation facilities express unscientific ideas about how to accomplish wildlife protection. Despite attempts to develop mechanistic knowledge about how wildlife rehabilitation occurs through brochures and internet materials, unscientific ideas about how wildlife rehabilitation should occur continues to persist. This is problematic because everyday citizens hold much power in their personal actions or inactions for preventing the need for wildlife rehabilitation. The purpose of this study is to investigate how social identity factors, such as political ideology and science identity, are related to engagement in personal actions that would prevent the need for wildlife rehabilitation. We surveyed visitors to nature centers, wildlife rehabilitation centers, and zoos, as well as through MTurk during February of 2022. We then performed multiple regression analyses to elucidate relationships between social identity factors and personal actions. Findings can potentially improve pre-existing modes of information dispersal, as well as develop new and accessible ways of relaying information to the public.

INTERROGATING AND GENETICALLY IMPROVING DROUGHT TOLERANCE IN THE WINTER OILSEED CROP PENNYCRESS

Presenter: Kiam Assato, Carol
Graduate, Biological Sciences
Mentor: Prof. John Sedbrook
Authorship: Carol Kiam Assato, Liza Gautam, Heba Hamdy Abouseadaa, John Sedbrook

Drought damage to crops is a major threat to food security and is becoming a growing problem due to climate change. Amongst all abiotic stresses, drought is believed to be the most impactful on soil biota and crop productivity. According to the National Integrated Drought Information System (NIDIS), in 2020, 40% of the United States was under drought, and it is predicted that this number will continue to rise in the forthcoming years. Pennycress (*Thlaspi arvense* L.) is a member of the Brassicaceae family related to canola and Arabidopsis that is being rapidly developed as an oilseed-producing winter cover crop for the U.S. Midwest and other temperate growing regions. As part of our efforts in domesticating this new crop, we are focusing on identifying genetic changes to pennycress that can improve drought tolerance without negatively impacting plant growth and seed yields. Auxin is a phytohormone that plays a vital role in the regulation of plant growth and development in response to abiotic stressors. Auxin responses involve so-called auxin response factor proteins which negatively regulate auxin-response signaling and related gene expression. In Arabidopsis, AUXIN RESPONSE FACTOR (ARF) genes been shown to function redundantly in repressing abiotic stress genes; combined loss of function mutations result in improved Arabidopsis drought tolerance. Our hypothesis is that putative ARF orthologues function similarly in pennycress without impacting plant health. To test out hypothesis, we have successfully employed CRISPR genome editing to knockout gene function, targeting single genes and gene combinations. We are in the process of performing phenotypic analysis on those. This poster will detail those efforts.

CHARACTERIZING THE ROLE OF P38KB AND GARS IN CHARCOT-MARIE-TOOTH DISEASE

Group Leader: Klos, Piotr
Graduate, Biological Sciences

Group Members: MacKenna Duncan, Undergraduate, Biological Sciences;
Megan Cross, Undergraduate, Biological Sciences

Mentor: Prof. Alysia Vrailas-Mortimer

Authorship: Piotr Klos, MacKenna Duncan, Megan Cross, Alysia Vrailas-Mortimer

Many age-related and degenerative diseases, such as Charcot-Marie-Tooth disease (CMT), are the result of irregular protein aggregations. One mechanism by which protein aggregation is regulated in mammalian systems is the BAG-3 Mediated Selective Autophagy pathway, known as the Chaperone-Assisted Selective Autophagy (CASA complex) in flies. We have recently found that the CMT protein lamin is a target of p38Kb and the CASA complex member, starvin (*stv*), for degradation during aging. CMT is caused by mutations in over 90 different genes, and we have found that the CMT protein YARS may also be a target of p38Kb and the CASA complex. The YARS mutations play a role in the development and severity of CMT. CMT is a group of inherited disorders that causes axonal degeneration and demyelination of the peripheral motor and sensory neurons. Symptoms include progressive motor impairment, distal muscle weakness, sensory loss, reduced tendon reflexes, and foot deformities. Expression of mutant forms of YARS in drosophila have several hallmarks of the human disease including a progressive deficit in motor performance, evidence of nerve dysfunction, and signs of axonal degeneration. We have found that YARS mutations coupled with p38Kb mutations and overexpression can negatively affect fly locomotive behaviors. Next, we will test if p38Kb and *stv* regulate the degradation of wildtype and CMT mutant forms of YARS. In addition, we are currently performing further studies to determine the exact binding site between p38Kb and *stv*.

THE PRE-FLEDGE EDGE: INVESTIGATING THE EFFECTS OF NATURAL VARIATION IN ECTOPARASITE LOAD IN EUROPEAN STARLING NESTLINGS

Presenter: Lusk, Elliot
Graduate, Biological Sciences

Mentor: Prof. Joseph Casto

Authorship: Elliot Lusk, Noah Price, Joseph Casto

Ectoparasitism in nestling birds can have long-lasting effects on their growth and development by inducing trade-offs. These trade-offs have been detected as decreases in measures of physical development, hematocrit and hemoglobin production, and bacteria killing ability, and increases in blood glucose, interleukin-6, and corticosterone levels. Previous research in our lab has focused on the effects of experimental manipulation of ectoparasite load to study trade-offs but has typically relied on the addition or reduction of the blood-feeding Northern fowl mite

(*Ornithonyssus sylviarum*) and has yet to directly examine unmanipulated levels of ectoparasitism. Surveying unmanipulated mite loads in nestling birds may give us a clearer picture of the prevalence and severity of ectoparasitism and its associated trade-offs. In this study, we examined natural Northern fowl mite burdens and their relationship with the growth and development of European starling (*Sturnus vulgaris*) nestlings. Nests were scouted for egg laying across four different nest box colonies over 3 months, and once nestlings hatched, they were followed throughout their early development. At 10 and 20 days of age, nestlings were examined for ectoparasites, assessed for physical growth, and blood was collected to determine parameters of hematological development and corticosterone levels. On day 20, one day prior to when starlings typically leave the nest, the nestlings were sexed and their brains were collected and, 24 hours later, nests were sampled for Northern fowl mite abundance. Mites were present in varying amounts in our nests and nestlings

exposed to high mite levels exhibited trade-offs similar to those found previously in response to experimentally enhanced mite loads. Nestlings from high mite nests had lower day 10 and 20 hematocrit and brain weight than those from low mite nests. Female chicks from nests with high mite loads had shorter tarsus and wing length on day 20, and lower mass on day 10 and 20 when compared to male chicks in the same high mite nests. Testing immunological titers, such as the pro-inflammatory cytokine IL-6, may add support for a sex-specific growth-immunity trade-off.

LEURS-I: A BLACK SHEEP SYNTHETASE

Presenter: Oliver, Ethan
Undergraduate, Biological Sciences
Mentor: Prof. Chris Weitzel
Authorship: Ethan Oliver, Evan Strandquist, Jonathan Brewster, Nick Bretz, Christopher S. Weitzel

Aminoacyl-tRNA synthetases (aaRSs) are an ancient and ubiquitous set of enzymes vital for protein synthesis. They catalyze the addition of an amino acid (aa) to the 3'-end of their cognate tRNA in a process called aminoacylation or charging. The aa-tRNA conjugate is transported to the ribosome where the aa is incorporated into the growing polypeptide chain. We recently identified a conserved duplication of leucyl-tRNA synthetase (leuRS) within each member of the Sulfolobaceae family in the domain Archaea referred to as leuRS-F and leuRS-I. While leuRS-F was previously found to be essential for *Sulfolobus islandicus* and performs canonical activities associated with leuRS family enzymes. LeuRS-I was found to be deficient in its ability to charge tRNA^{Leu}-UAG yet it activates leucine and binds this tRNA substrate with affinities similar to LeuRS-F. Despite this, leuRS-I is vital for optimal growth and viability of *S. islandicus*. We postulate that leuRS-I may have evolved selectivity toward 1) a specific tRNA^{Leu} isoacceptor, 2) a tRNA substrate other than tRNA^{Leu}, or 3) tRNA substrates harboring endogenous post-transcriptional modifications. First, to confirm that leuRS-I is not a pseudo-gene, a *S. islandicus* strain was engineered expressing a chromosomally encoded leuRS-I bearing a C-terminal hemagglutinin (HA) tag. This tag was used as a handle to probe for the presence of leuRS-I and to preliminarily gauge expression levels as a function of *S. islandicus* growth. Subsequently, the five *S. islandicus* tRNA^{Leu} isoacceptors and a tRNA^{Leu} pseudogene were cloned, transcribed in vitro, and tested for their ability to stimulate leuRS-I activity. Methods for isolating endogenous, total tRNA were also developed. We report here the expression profiles, and the results of aminoacylation assays using each of these tRNA substrates with both leuRS-I and leuRS-F.

COULD INVASIVE SPECIES REDUCE THE RISK OF PARASITISM FOR NATIVE SPECIES? TESTING THE DILUTION EFFECT ON Aedes triseriatus AND Aedes albopictus

Presenter: Roden, Emerson
Undergraduate, Biological Sciences
Mentor: Prof. Steven Juliano
Authorship: Emerson Roden, Steven Juliano

The **dilution effect hypothesis** postulates that greater biodiversity of potential hosts can reduce parasite prevalence and abundance. **Encounter reduction** could occur if invasive species, or noncompetent hosts, remove parasites from the environment and reduce infections of competent hosts. An alternative mechanism is **host-host competition** which may occur if invasives compete with the native host, reducing its resource acquisition and its ability to support parasites. Alternatively, host-host competition may amplify infection if competition reduces host immune defenses. We tested for the dilution effect, and the possible mechanisms, using the North American tree hole mosquito *Aedes triseriatus* and its protozoan parasite *Ascogregarina barretti*, with *Aedes albopictus* as the invasive species.

We collected contents of 6 water-filled tree holes from a site where *A. triseriatus* and *A. barretti* are abundant. In the lab, we removed resident larvae and halved water and sediment of each tree hole. Both halves received a standard number of 1st instar *A. triseriatus* larvae. One of the halves was a control, while the other received the same number of 1st instar *A. albopictus* larvae. We dissected *A. triseriatus* 4th instar larvae and pupae from each treatment/tree hole.

ANOVA revealed no significant effects of treatment (**control, albopictus**) on infection for both *A. triseriatus* larvae and pupae. These results do not demonstrate dilution. Means for parasite numbers in both larvae and pupae are lower in the **albopictus** treatment than in the control treatment. This trend suggests that an experiment using more tree holes may be a useful follow-up to this study.

UNDERSTANDING THE REGULATION OF A NOVEL HOCL-STRESS RESPONSE SYSTEM IN UROPATHOGENIC ESCHERICHIA COLI

Presenter: Roseberry, Brendan
Undergraduate, Biological Sciences
Mentor: Prof. Jan Dahl
Authorship: Brendan Roseberry

Uropathogenic Escherichia coli (UPEC) is the most common causative agent of urinary tract infections. They reside harmless as commensals in the gut but turn into serious pathogens upon entry of the urinary tract. UPEC has an unusually high ability to successfully colonize despite the harsh environment of the urinary tract. Neutrophils are phagocytic cells of the innate immune system that engulf foreign pathogens and kill them through the production of reactive oxygen and chlorine species (RO/CS) species. RO/CS damage essential macromolecular structures within pathogens, leading to their death. Previous work in our lab demonstrated that, in comparison to other non-pathogenic *E. coli* strains, UPEC was significantly less susceptible to hypochlorous acid (HOCl), one of the most potent RO/CS produced by neutrophils. Additionally, we found that HOCl-stressed UPEC upregulate a UPEC-specific gene cluster, suggesting it may play a role in UPEC's resistance to RO/CS. Further experimentation elucidated the function of several genes within the operon and their relationship to one another. The expression of one particular gene was found to be essential for UPEC's resistance to HOCl as deletion of this gene rendered UPEC substantially more susceptible to HOCl comparable to non-pathogenic *E. coli*. The goal of this research project was to investigate impact of additional physiologically relevant RO/CS on the expression of these genes. I performed quantitative real-time PCR to quantify changes in the expression of these genes in HOCl-stressed UPEC. My data contributed to our now full picture of signals that activate the expression of these genes and the role they play in UPEC's response to stress from RO/CS. The ability to withstand the chemical stressors of the innate immune system is essential to UPEC's ability to successfully colonize the urinary tract. Understanding the precise mechanism and genes involved in UPEC's response to this stress could uncover potential candidates for drug targets and UPEC-specific treatment options.

BIOLOGICAL FUNCTION AND MOLECULAR FEATURES OF KIF3A/KIF3B/KAP AUTOINHIBITION

Presenter: Sawe, Caleb
Graduate, Biological Sciences
Mentor: Prof. Martin Engelke
Authorship: Caleb Sawe, Ayoola Fasawe, Alex Murarus, Jessica Adams, Martin Engelke

Heterodimeric kinesin-2 (KIF3A/KIF3B) motor proteins drive intracellular transport and the formation of cilia, which are found in most eukaryotic cells. Mutations in this motor have been shown to affect cilia formation and have been linked to human disease. However, little is known about how its activity is regulated.

Generally, the activity of many kinesin motors is regulated by autoinhibition. To delineate the autoinhibition mechanism of this motor, we express a series of chimeric and truncated constructs in *Kif3a/Kif3b* double-knockout 3T3 cells.

We find that motor constructs in which the stalk and tail domains of KIF3A and KIF3B have been swapped strongly accumulate in the periphery of the cell, indicating loss of autoinhibition. Interestingly, these motor constructs also do not make cilia demonstrating that autoinhibition is indispensable for the KIF3A/KIF3B motor to drive ciliogenesis. Expression of further chimeric motors suggests that one or both tails, as well as the coiled-coiled domains, are critical features for regulating autoinhibition. Finally, we find that a short stretch of amino acids (593-619) in the tail domain of KIF3B is necessary to inhibit motor activity.

Thus, our data suggest that the autoinhibition mechanism of KIF3A/KIF3B may resemble the single tail inhibition mechanism of KIF5; or the intercalation of the coiled-coil regions between the motor domains as seen in KIF17; or both. These findings provide the groundwork for unraveling the molecular basis for KIF3A/KIF3B autoinhibition in cells and how this motor is regulated for intracellular transport and ciliogenesis.

CHARACTERIZING THE INTERACTION BETWEEN P38KB AND REF(2)P IN PROTEIN HOMEOSTASIS.

Presenter: Shosanya, Teni
Undergraduate, Biological Sciences
Mentor: Prof. Alysia Vrailas-Mortimer
Authorship: Teni Shosanya, Alysia Vrailas-Mortimer

As organisms age they accumulate misfolded and damaged protein that can lead to protein aggregation, which can be toxic and lead to a diseased state and eventual death of the cell. We have recently found that the p38 MAP Kinase (p38Kb) plays a major role in regulating protein aggregation in *Drosophila melanogaster* through its interaction with the Chaperone Assisted Selective Autophagy (CASA) complex. The CASA complex is a pathway that helps with the degradation of the misfolded and damaged proteins to prevent protein aggregation. The chaperone proteins in the complex refold the proteins. The proteins that cannot be refolded are polyubiquitinated and are handed over to a protein called ref(2)p for degradation. We hypothesize that p38Kb binds to ref(2)p to help facilitate the handoff of the target protein for degradation. We have identified several regions in ref(2)p that p38Kb may bind to or phosphorylate. To understand the role that p38Kb plays in regulating the CASA complex and ref(2)p mediated protein degradation, we have made transgenic flies in which these different p38Kb sites are mutated in ref(2)p. The effects of these mutations in ref(2)p were analyzed using a western blot to see if the mutations could change the stability of ref(2)p. We find that certain mutations in ref(2)p affect the detection and stability of the protein. In future studies we will use Co-immunoprecipitation experiments to test if these regions are important for binding between p38Kb and ref(2)p.

DETERMINING ION-TRANSPORT MECHANISMS INVOLVED IN BRINE SHRIMP ADAPTATION TO HIGH OSMOLARITY ENVIRONMENTS: A CURE EXPERIENCE.

Group Leader: Strandquist, Evan
Graduate, Biological Sciences

Group Members: Annamarie Hyer, Undergraduate, Biological Sciences; Hannah Brozenec, Undergraduate, Biological Sciences; Mayra Hernandez, Undergraduate, Biological Sciences; Amanda Johnson, Undergraduate, Biological Sciences; Erica Evans, Undergraduate, Biological Sciences; Emily Kreger, Undergraduate, Biological Sciences; Caroline Maciej, Undergraduate, Biological Sciences; Devin Whitworth, Undergraduate, Biological Sciences

Mentor: Prof. Craig Gatto

Authorship: Evan Strandquist, Annamarie Hyer, Hannah Brozenec, Mayra Hernandez, Amanda Johnson, Erica Evans, Caroline Maciej, Emily

Brine shrimp and brine fly larvae are the only animals known to survive in high-salinity inland lakes. Adaptation of these osmoregulators involves mechanisms of water retention together with changes in proteins that transport ions across membranes, to fight enormous osmotic and ionic gradients. However, the ion transport mechanisms that enable adaptation to extreme salinities remain largely unknown. The goal of this Course-based Undergraduate Research Experience

(CURE course) was to identify such ion-transporters and uncover their role and cooperation to allow these animals to thrive in an environment where most animals die.

Previous investigations from the Gatto & Artigas laboratories show that one of the high-salinity upregulated transporters is a Na^+, K^+ -ATPase isoform that exports 2 Na^+ in exchange for 1 K^+ , per ATP hydrolyzed, instead of the established 3 Na^+ :2 K^+ :1 ATP stoichiometry observed in every NKA isoform studied to date. The lower ion:ATP ratio allows these NKAs to build a larger Na^+ gradient, which may underlie some of these animals' abilities to adapt to extreme salinities.

Our data generated in this CURE course show that: 1) Brine shrimp adapted to high salinity increase expression of several ion transporters and that pharmacological inhibition of many of them block adaptation to high salinity. In particular, utilizing specific inhibitors of the Na^+, K^+ -ATPase (NKA), Na^+, K^+ , 2Cl⁻ Co-transporter (NKCC), the Cystic Fibrosis Transmembrane Conductance Regulator (CFTR) Cl⁻ conductance, and a blocker of the paracellular Na^+ flux, we demonstrated that all of these ion transport pathways are collectively utilized by Brine Shrimp to survive in high salinities.

Educational Impact: This course was designed to: 1) instill the foundations of scientific discovery and inspire undergraduates by offering a discovery-based research experience in the classroom, 2) provide a path for them to develop the necessary skills and attitude for a successful scientific career, and 3) establish a setting where graduate students learn to succeed as scientists and mentors. Thus, this CURE course accomplished a multilevel training experience that reinforced scientific skills at both the undergraduate and graduate levels, while providing training to graduate students as future mentors.

INTERACTIONS BETWEEN YARS AND P38KB AND THE CASA COMPLEX IN CHARCOT-MARIE-TOOTH DISEASE

Group Leader: Virola-Iarussi, Alyssa
Undergraduate, Biological Sciences

Group Members: Lauren Naeger, Undergraduate, Biological Sciences; Shira Archie,
Undergraduate, Biological Sciences

Mentor: Prof. Alysia Vrailas-Mortimer

Authorship: Alyssa Virola-Iarussi, Lauren Naeger, Shira Archie, Alysia Vrailas-Mortimer

Many age-related and degenerative diseases, such as Charcot-Marie-Tooth disease (CMT), are the result of irregular protein aggregations. One mechanism by which protein aggregation is regulated in mammalian systems is the BAG-3 Mediated Selective Autophagy pathway, known as the Chaperone-Assisted Selective Autophagy (CASA complex) in flies. We have recently found that the CMT protein lamin is a target of p38Kb and the CASA complex member, starvin (*stv*), for degradation during aging. CMT is caused by mutations in over 90 different genes, and we have found that the CMT protein YARS may also be a target of p38Kb and the CASA complex. The YARS mutations play a role in the development and severity of CMT. CMT is a group of inherited disorders that causes axonal degeneration and demyelination of the peripheral motor and sensory neurons. Symptoms include progressive motor impairment, distal muscle weakness, sensory loss, reduced tendon reflexes, and foot deformities. Expression of mutant forms of YARS in drosophila have several hallmarks of the human disease including a progressive deficit in motor performance, evidence of nerve dysfunction, and signs of axonal degeneration. We have found that YARS mutations coupled with p38Kb mutations and overexpression can negatively affect fly locomotive behaviors. Next, we will test if p38Kb and *stv* regulate the degradation of wildtype and CMT mutant forms of YARS. In addition, we are currently performing further studies to determine the exact binding site between p38Kb and *stv*.

Chemistry

APPLICATIONS OF [5+2] CYCLOADDITIONS TOWARD CLEAVABLE TETHERS

Presenter: Angles, Susanna
Undergraduate, Chemistry

Mentor: Prof. Andrew Mitchell

Authorship: Andy Mitchell, John Goodell

Oxidopyrylium-alkene based [5+2] cycloadditions are a convenient intramolecular method of synthesizing complex polycyclic and biologically relevant molecules. Moreover, these molecules can serve as key intermediates, providing a framework upon which additional functionality can be added. Recent unpublished work by the Mitchell group utilized silyloxypyryrone substrates that yielded cycloadduct at room temperature. It was found that the presence of both electron withdrawing and electron donating groups on the alkene produced increased reactivity in comparison with the terminal olefin, and the mechanistic implications of altering the functional groups on the tethered alkene are being studied. Additionally, we are interested in the development of a tether which could be easily cleaved following cycloaddition, providing an indirect way to

achieve net intermolecular [5+2] cycloadditions. Attempting an intermolecular route would likely result in a complex mixture of compounds due to issues with entropy, stereospecificity, and regioselectivity making the intramolecular variant an attractive alternative towards these cycloadducts.

USING PROTEIN-PROTEIN INTERACTIONS TO BETTER UNDERSTAND LEURS-I FUNCTION IN SULFOLOBUS ISLANDICUS

Presenter: Brewster, Jonathan
Graduate, Chemistry
Mentor: Prof. Chris Weitzel
Authorship: Jonathan Brewster, Evan Strandquist, Christopher S. Weitzel

Aminoacyl-tRNA synthetases (aaRSs) are essential proteins required in all domains of life. Their canonical function is to catalyze the attachment of amino acids to a cognate tRNA in a process referred to as aminoacylation, or charging. The organism *Sulfolobus islandicus* contains two aaRSs for the amino acid leucine. One leucyl-tRNA synthetase (LeuRS), LeuRS-F, has been shown to faithfully aminoacylate tRNA^{Leu}, and this protein's organismal importance is further underscored by the inability to remove its gene from the chromosome of *S. islandicus*. A LeuRS-F paralog, LeuRS-I, shows negligible charging activity. Despite this, it is required for the organism's optimal growth. This project focuses on determining the function of LeuRS-I. Preliminary work to quantify the charging ability of both LeuRS-F and LeuRS-I via aminoacylation assays using novel tRNA^{Leu} substrates and tritiated leucine supports previous experimentation, revealing that LeuRS-F charges tRNA, but LeuRS-I does not. This assay has been replicated with extracted total endogenous *S. islandicus* tRNA with similar results. Hypothesizing that LeuRS-I might regulate LeuRS-F, a mixing assay using both LeuRS-F and LeuRS-I was performed. Contrary to expectations, results showed an increase in total charging in samples containing both LeuRS paralogs relative to those with LeuRS-F only.

In addition to further exploring mixing assays, experiments are now underway to investigate possible protein-protein interactions (PPI) these LeuRS paralogs might have with each other or with other endogenous proteins. One proposed location for a PPI is the C-terminal domains (CTDs) of LeuRS-F and LeuRS-I. These duplicated LeuRSs contain CTDs predicted to carry opposite net charges under the intracellular pH of *S. islandicus*. A *S. islandicus* strain containing a LeuRS-I shuttle vector with a C-terminal His₆-tag (His-I) behind its endogenous promoter has been generated allowing for the purification of endogenous levels of tagged LeuRS-I via nickel affinity column along with any interacting protein partners. Still, the non-covalent, potentially transient, and infrequent nature of PPIs makes detecting them challenging. Future work will utilize mass spectrometry to circumvent these challenges.

[5+2] CYCLOADDITIONS UTILIZING A BORON-NITROGEN BASED TETHER AND DISCOVERY OF A MILD PROTOBORONATION METHOD

Presenter: Corrie, Seth
Undergraduate, Chemistry
Mentor: Prof. Andrew Mitchell
Authorship: Seth Corrie, Andy Mitchell

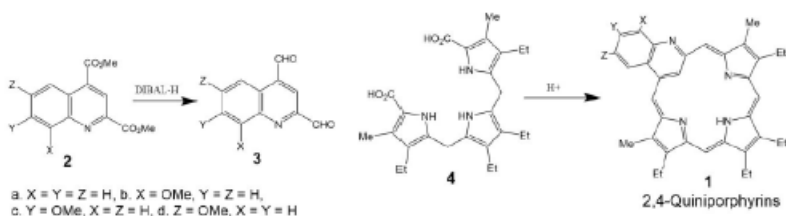
The Mitchell group's recent research has centered on the production and optimization of [5+2] cycloadditions utilizing maltol as a substrate. This is often achieved through the use of a tethered olefin attached to maltol at the 2 position. The use of a tether reduces the entropic requirements necessary for a [5+2] cycloaddition. Unfortunately, a tether could limit the utility of [5+2] cycloadditions. One option to overcome this downside is to employ the use of a temporary tether that can be severed after the [5+2] reaction, which are colloquially referred to as "snap tethers" by the Mitchell group. A pyrone possessing an amino diol, that could be used as

a tether, was synthesized. The diol can chelate to a vinyl boronic acid through the loss of two water molecules resulting in a caged three-point binding tether that reduces the entropic requirements of a [5+2] cycloaddition. These cycloadducts can have their tethers severed after they have been formed allowing for a greater level of utility in the tether region of the molecule. It was found that this reaction can also be utilized on vinyl pinacol boronates and vinyl MIDA esters. MIDA esters yielded surprisingly high yields often surpassing the yields of boronic acids. By attempting to utilize a single chelating tether with a vinylboronic acid to generate a [5+2] cycloadduct, it was discovered that protodeboronation can result instead of the desired reaction. This was initially viewed as a hurdle to cycloaddition; however, it is a promising reaction for intentional protodeboronation, a reaction that typically requires harsh conditions or metal catalysts. The Mitchell Group has begun to investigate Deanol (dimethylaminoethanol) motifs as it appears that they can cause protodeboronation of boronic acids, pinacol boronates, and MIDA esters. Parallel studies on amide tether cycloadditions have led to the possibility of single-point binding cycloadditions using both a protonated amine and a boronic acid that will allow for tethered cycloadditions that can “snap” apart during a workup.

UTILIZATION OF THE "3+1" METHODOLOGY TO SYNTHESIZE 2,4-QUINIPORPHYRINS

Presenter: Graybeal, Alexis
 Undergraduate, Chemistry Mentor:
 Prof. Timothy Lash
 Authorship: Alexis Graybeal, Timothy Lash

Carbaporphyrins are a derivation of a traditional porphyrin in that one or more internal nitrogen atom in the porphyrin are replaced with carbon atoms. Carbaporphyrins and related systems have been well studied, and many retain aromatic character while modifying the electronic absorption spectra. In this project, a series of quinoline subunits have been incorporated into carbaporphyrinoid systems and have been further investigated. Utilization of the quinoline subunit allows the reintroduction of a nitrogen, but at the periphery of the structure. A series of quinoline diesters **2** have been prepared and reduction with diisobutylaluminum hydride at -70 °C afforded the related dialdehydes **3**. In addition, a tripyrrolic intermediate **4** (tripyrane) has been synthesized so that the new porphyrin analogues can be generated using a “3+1” methodology. Investigations into the properties of these quiniporphyrins **1** are currently in progress.



PURIFICATION OF SECRETED ACID PHOSPHATASE FROM TARENTOLAE

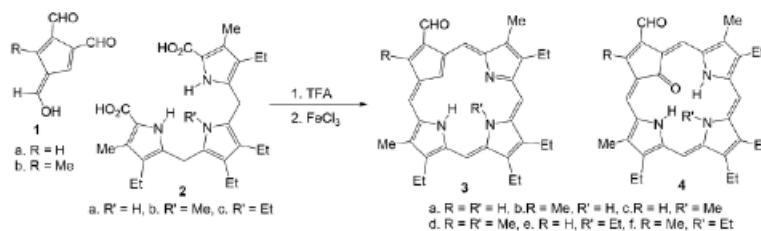
Presenter: Lai, Quyen
Undergraduate, Chemistry
Mentor: Prof. Marjorie Jones
Authorship: Quyen, Lai

Leishmaniasis is an infectious disease caused by parasitic protozoans of the genus *Leishmania*. A potential target for drug design and treatment development for leishmaniasis is the enzyme Secreted Acid Phosphatase (SAP). This undergraduate research attempted to partially purify SAP from *Leishmania tarentolae* using ion exchange chromatography (Whatman DE51 and CM- Sephadex) and affinity chromatography (Con-A Sepharose 4B). The effectiveness of purification was evaluated via UV/Vis spectroscopy and polyacrylamide gel electrophoresis (PAGE) was used to estimate the molecular weight of SAP. The enzyme activity presented in each column fraction was detected by using p-nitrophenylphosphate (pNPP) as artificial substrate and monitoring product formed at 405 nm. At this time, only a little enzyme activity was retained in the columns. Adjusting the column length, the concentration and the pH of the elution solution might increase the amount of enzyme being retained. Analyzing the column flow-through fractions by PAGE resulted in two protein bands at approximately 28 and 62.5 kDa. However, a Brain Heart Infusion (BHI) medium control must be analyzed to confirm whether these protein bands were of the medium background or of SAP.

SYNTHESIS AND METALATION OF N-ALKYLCARBAPORPHYRIN ALDEHYDES

Presenter: Le, Kimberly
Undergraduate, Chemistry
Mentor: Prof. Timothy Lash
Authorship: Kimberly Le, Timothy Lash

Carbaporphyrins are porphyrin analogues where one or more of the nitrogens have been replaced with carbon atoms. Previously, trialdehydes **1a** and **1b**, derived from cyclopentadiene or methylcyclopentadiene, have been shown to react with tripyrranes such as **2a** under acidic conditions to give low yields of carbaporphyrin aldehydes **3a** and **3b**. In this study, N-alkyltripyranses **2b** and **2c** were reacted with trialdehydes **1a** and **1b** and following oxidation with ferric chloride, N-N-alkylcarbaporphyrins **3c-f** were isolated in comparatively high yields (20-25%). In addition, minor byproducts **4c-f** corresponding to internally oxidized derivatives were also identified. The presence of an internal alkyl substituent alters the carbaporphyrin nucleus from being a trianionic ligand to a dianionic ligand. Metalation of these porphyrinoids with palladium(II) and nickel(II) acetate is currently under investigation.



DEVELOPMENT OF AN IN VIVO PLATING ASSAY TO DECIPHER THE IMPORTANCE OF A *SULFOLOBUS ISLANDICUS* LEUCYL-TRNA SYNTHETASE PARALOG FOR ORGANISMAL VIABILITY

Group Leader: Nguyen, Trang
Undergraduate, Chemistry

Group Member: Amy Le, Undergraduate, Chemistry

Mentor: Prof. Chris Weitzel

Authorship: Amy Le, Trang Nguyen, Christopher S. Weitzel

Protein synthesis is an essential process that occurs in all organisms and its accuracy is dependent on the faithful actions of the aminoacyl-tRNA synthetases (aaRSs). These enzymes play the critical role of coordinating tRNAs with their cognate amino acids, which allows for the translation of mRNA codons into proteins. As such, the genes that encode for these proteins are indispensable for cellular viability. Notably, in some organisms, such as all species comprising the Archaeal *Sulfolobaceae* family, which includes *Sulfolobus islandicus*, there exists duplications of select synthetase genes whose functions are not entirely known. A paralog of Leucyl-tRNA synthetase

(LeuRS) in *S. islandicus*, namely LeuRS-I, is the focus of this investigation into the possible noncanonical functions that synthetase-like encoding genes hold. To distinguish phenotypes of a leuRS-I knockout, this strain was used alongside a wildtype strain in a series of plating assays, treated under various conditions meant to simulate environmental stressors. A careful comparison of results has given insight into the role that the duplicate gene plays in the viability of *S. islandicus*.

EFFECTS OF A NOVEL AMIDE GROUP ON SILYLOXYPYRONE-BASED [5+2] CYCLOADDITIONS

Presenter: Pauley, Kenneth
Undergraduate, Chemistry

Mentor: Prof. Andrew Mitchell

Authorship: Andy Mitchell, John Goodell

Cycloadditions are a foundational reaction toward construction of heterocycles. These ring systems exist in all living beings, and major examples of heterocycles are the four common nucleic acids of DNA that make up the genetic code¹. The Mitchell group studies the reactions of silyloxypyrone-based [5+2] cycloadditions and has found contributing factors that influence cyclization. The rate of reaction is heavily influenced by the silyl transfer group with the large t-butyl-diphenylsilyl group accelerating the cycloaddition. Proximity of the olefin containing tether group to the transfer group also was found to influence cyclization with significantly more product observed from maltol-derived substrates. Lastly α,β -unsaturated esters were found to be more reactive than their terminal olefin counterparts². The specific focus of this presentation will be on the effects of the amide-based tethers and their effects on cyclization. The relationship between proximity and steric hindrance of a particular amide group (i.e., t-butyl amine) and the transfer group has given exciting results of cycloadditions proceeding at room temperature. The influence of this novel tether will be deduced from comparing a variety of substitution patterns of the alkene appended to the amide.

Reference List:

- 1) "Nucleic Acid." Genome.gov, <https://www.genome.gov/genetics-glossary/Nucleic-Acid>.
- 2) Jacob J. Bulandr, Jacob P. Grabowski, Chunyin M. Law, Jessica L. Shaw, John R. Goodell, and T. Andrew Mitchell. The Journal of Organic Chemistry 2019 84 (16), 10306-10320. DOI:10.1021/acs.joc.9b01479

INVESTIGATING THE EDITING MECHANISM OF AN ARCHAEL LEUCYL TRNA SYNTHETASE

Presenter: Strandquist, Evan
Graduate, Chemistry

Mentor: Prof. Chris Weitzel

Authorship: Evan Strandquist, Ethan Oliver, Jonathan Brewster, Christopher S. Weitzel

Aminoacyl-tRNA synthetases (aaRSs) are an ancient class of hyper-specific enzymes that catalyze the esterification of the appropriate amino acid to the 3'-end of their cognate tRNAs, fulfilling a pivotal role in RNA translation. Faithful protein synthesis requires aaRSs to discriminate against chemically similar, non-cognate amino acids. In the case of aaRSs utilizing hydrophobic amino acids, this fidelity involves robust editing mechanisms targeting either misactivated amino acid adenylates (pretransfer editing) and/or mischarged amino acid-tRNAs (post-transfer editing). The archaea *Sulfolobus islandicus* expresses two copies of leucyl-tRNA synthetase (LeuRS) where one, designated LeuRS-I, contains key amino acid substitutions within its connective polypeptide 1 (CP1) editing domain that would be expected to severely disrupt post-transfer editing and introduce substantial variation to the proteome via mistranslation. Another copy, LeuRS-F, contains the canonical active and editing sites. Further investigation of these paralogs supports the hypothesis that LeuRS-F, but not LeuRS-I, is involved in the accurate charging of leucine to tRNA^{Leu} for protein synthesis. To further probe the editing proficiency of LeuRS-F and the potential activity of LeuRS-I, point mutations were introduced at key amino acid residues in the CP1 domain of LeuRS-F that mimic those found in LeuRS-I. These residues include the universal aspartic acid at position 315, threonine at 221, and valine at 308. Aminoacylation assays were performed to probe any changed activity relative to wild-type protein. Pyrophosphate exchange assays were also performed to probe the ability of LeuRS-F, LeuRS-I, and a triple-point mutant LeuRS-F to adenylate non-cognate amino acids. This work shows that key mutations in the editing domain of LeuRSF does not reduce the enzymes fidelity as would be expected. Additionally, pyrophosphate exchange assays involving non-cognate amino acids such as isoleucine, valine, and cysteine may show that these mutations lead to a greater specificity for leucine relative to these non-cognates. These data demonstrate the vigorous editing power of LeuRS-F, suggest a potential non-canonical function of LeuRS-I, and may show the unexpected retention of editing capability of a mutated, class 1a aaRS in this archaeal model

Communication

THE ROLE OF COMMUNITY RELATIONS IN CREATING A POSITIVE IMAGE: AN EXPLORATORY STUDY OF UNIVERSITY MARKETING AND COMMUNICATIONS

Presenter: Sam-Paintsil, Benjamin
Graduate, Communication

Mentor: Prof. John Baldwin

Authorship: Benjamin Sam-Paintsil

Community relations is a valuable tool to the success of every organization. Even nonprofit organizations like universities may struggle to thrive if there are little or no relations between the organization and its community. However, Bruning et al. (2006) argue that instead of creating mutually beneficial relations, many universities have viewed the community as a “client” and “focused their efforts on fulfilling contractual responsibilities to ensure the flow of federal dollars” (p. 126). Kim et al. (2006) stress that the relationship between a university and its local community should go beyond the point where students simply “get along well with” community members. Therefore, this study aims to explore the activities that a University Marketing and Communications (UMC) office in a mid-Western university in the United States engages in to create a positive image for the school. It also examines the strategies the UMC adopts to manage crises with the university’s local communities. Using a narrative design, I recruited and interviewed six participants for approximately 30 minutes each, asking about their community relations activities and the strategies their office adopts in managing crises between the university and its local communities. I followed Braun and Clarke’s (2006) six phases of thematic analysis to code the data into themes. The study showed that the UMC engages in four types of activities to create a positive image for their university. These activities include campus-related activities, community-related activities, alumni-related activities, and social intervention activities. Each activity has its own target audience, but the general goal is to engage the local communities. In managing crises between the university and its local communities, the UMC follows five of the guidelines discussed in Seeger’s (2006) “Best Practice in Crisis Communication” framework: (1) Pre-event planning, (2) Partnerships with the public, (3) Listen to the public’s concerns and understand the audience, (4) Honesty, candor, and openness, and (5) Collaborate and coordinate with credible sources. The UMC also follows two other guidelines that are not captured in Seeger’s framework: (1) Respond in a timely fashion and (2) Address social media complaints as a real-world crisis. Limitations include that the study was conducted at only one university in the Midwest in the United States. It would be helpful to replicate the study in more than one university in different States. Second, the study examined community relations from the perspective of a university. Future studies should explore university-community relation from community members’ perspective. Finally, the results of this study rely on the experience of only six participants. Future research may recruit more participants.

EXPLORING THE CRISIS RESPONSE OF LOCAL NONPROFIT ORGANIZATIONS DURING THE COVID-19 PANDEMIC

Presenter: Thomas, Hunter
Graduate, Communication

Mentor: Prof. John Baldwin

Authorship: Hunter Thomas

By classifying the COVID-19 pandemic as a victim crisis that effects all organizations, this study explores the crisis response of local nonprofit organizations in a small midwestern town and finds that these organizations have held a greater focus on priorities other than reputation repair and maintenance during the COVID-19 pandemic.

When an organization faces a crisis — any phenomenon that challenges their reputation — their response is important to repair or maintain that reputation and thus their ability to profit, operate, or survive. Existing literature provides strategies for responding to a crisis based on its severity, attribution of responsibility, and an organization's past reputation. However, the COVID-19 pandemic is a crisis unlike many organizations have faced before, given its global reach and associated health and safety guidelines that have regularly changed and often led to an organization's inability to engage with stakeholders in-person.

The COVID-19 pandemic is also different than many crises given its classification as a victim crisis — a particular type of crisis for which an organization is not directly responsible. That is, in this study, organizations were not directly responsible for causing the pandemic.

In preparation for crises, organizations often proactively develop crisis response plans. However, no one could have predicted the COVID-19 pandemic. And literature suggests that, even when plans are in place, organizations may not always follow them in the moment. Plausibly, this would especially be the case during a crisis never faced before.

Findings from a constant comparative analysis of eight semi-structured interviews with leaders of local nonprofit organizations suggest that these organizations have held a greater focus on informing, engaging, reflecting on, and collaborating with stakeholders and other organizations during the COVID-19 pandemic rather than reputation repair or maintenance. In turn, local leaders consider the outcomes of their responses to be successful overall.

The implications of this study include useful suggestions for future crisis response planning — for example, for organizations to establish multiple channels of communication with their stakeholders and foster inter-organizational relationships.

Communication Sciences and Disorders

AUDIOMETRIC HEARING SCREENINGS ACROSS THE LIFESPAN IN AMERICA: POPULATION HEARING-HEALTH SCREENING PROJECT

Group Leader: Clay, Taylor
Undergraduate, Communication Sciences and Disorders

Group Members: Julia Kleinfall, Undergraduate, Communication Sciences and Disorders;
Molly Whitcomb, Undergraduate, Communication Sciences and
Disorders; Daniel Mast, Graduate, Communication Sciences and
Disorders

Mentor: Prof. Antony Joseph.

Authorship: Taylor Clay, Julia Kleinfall, Molly Whitcomb, Daniel Mast, Antony Joseph

The primary aim of this project was to determine whether hearing screenings are available to infants, children, adults, and older populations in the US. For the birth-to-five population, universal newborn hearing screenings have been mandated in the US for several decades, and early childhood hearing outreach programs may be accessed by families with children in prekindergarten school. For children age five through 18, audiometric hearing screenings are administered by most school programs, although some states do not mandate hearing testing of school children. For adults age 19 and above, no hearing-health programs were identified that specified delivery of hearing screenings. Hearing is critical for proper development of speech, language, educational, and social skills, thus, access to hearing screenings for the infant and child populations is an important benefit for our citizens. Hearing health is also important for adults because they may be learning in college, working or navigating their career, or in the retirement stages of their lives; therefore, communication and hearing are critical aspects of adults in the US. We searched the literature for scholarly articles and policy reports on hearing screening requirements for each age group. Our findings were categorized and analyzed in order to determine if hearing screenings were mandated for delivery across the lifespan, specifically using the literature to compare the number of scientific reports on hearing screenings in each of the four age groups. From our investigation, it appears that audiometric screening is satisfactory for infants and school children, but is inadequate for adults, both young and old; therefore, access to hearing-health services may be problematic for adult populations. Hearing-health services should be accessible across the lifespan.

SHORTAGE OF ADULT AND GERIATRIC DIDACTIC TRAINING IN DOCTOR OF AUDIOLOGY (AUD) PROGRAMS: POPULATION HEARING-HEALTH SCREENING PROJECT

Group Leader: Kleinfall, Julia
Undergraduate, Communication Sciences and Disorders

Group Members: Molly Whitcomb, Undergraduate, Communication Sciences and Disorders; Taylor Clay, Undergraduate, Communication Sciences and Disorders; Abigayle Larsen, Undergraduate, Communication Sciences and Disorders; Daniel Mast, Communication Sciences and Disorders; Krista Franklin, Graduate, Communication Sciences and Disorders

Mentor: Prof. Antony Joseph

Authorship: Julia Kleinfall, Molly Whitcomb, Taylor Clay, Abigayle Larsen, Daniel Mast, Krista Franklin, Antony Joseph

It is well known in the United States that hearing difficulty increases with age; however, it appears that most of our clinical and research assets are afforded to younger populations. In America, evidence demonstrates that infants and children have far more favorable access to hearing screening services than adults and older populations. Federal and state hearing-health regulation and policy is supportive of young members of American society; whereas adults, who make up the largest proportion of hearing-impaired people, have no documented hearing-health policy, which results in minimal provider awareness, an absence of integration with medical care, and no registry. Using data from the National Health and Nutrition Examination Survey (from 2001-10), Johns Hopkins University estimated that nearly 39-million people in the United States have hearing loss. Overall, less than 1% of infants (birth to 5 years) and children (5-19 years) have mild to moderate hearing loss. By contrast, 6.5% of 40-49-year-olds and 13.3% of 50-59-year-olds have mild to moderate hearing loss. This rate of mild to moderate hearing loss increases to 26.8% for 60-69-year-olds, 54.6% for 70-79-year-olds, and 81.5% for individuals equal to or greater than 80 years. Although screening and diagnostic pediatric audiology require a highly complex level of clinical knowledge, there are far less children than adults and seniors with hearing loss. As such, this project aimed to describe the disparity between adult populations, policy and literature on audiometric hearing screenings, and the extent to which Doctor of Audiology (AuD) programs are delivering courses on topics, such as, adult and geriatric audiology. Our data revealed that substantially more pediatric didactic coursework is required by AuD programs in the United States, which may bolster the disparity of pediatric and adult hearing-health services. We believe it is critical to provide equitable training for AuD students on adult and older adult populations to improve their awareness of this public health problem.

SHORT-TERM FOLLOW-UP OF SWALLOWING SAFETY IN POST-STROKE SURVIVORS

Presenter: Schuck, Morgan
Undergraduate, Communication Sciences and Disorders

Mentor: Prof. Taeok Park

Authorship: Morgan Schuck

Dysphagia is a prevalent disorder among stroke survivors. A common concern for these individuals is aspiration, or the passage of foreign material into the airway. This study was conducted in order to determine the progress of swallow safety through the analysis of videofluoroscopic swallowing exams (VFSE) of three different boluses: 2 mL of thin liquid, 5 mL of thin liquid, and 5 mL of puree. Twelve stroke survivors resulting from unilateral middle cerebral artery infarction, unilateral corona radiata infarction, or unilateral basal ganglia intracerebral hemorrhage participated in this study. VFSE data was collected at Seoul National University Hospital. All participants were in the acute or subacute stage of stroke at their initial evaluation. After conducting their initial evaluation, participants were involved in thirty-minute therapy sessions until their followup evaluation 3-5 weeks later. Penetration-Aspiration (PA)

scale scores of the two evaluations were compared between participants to determine if any improvement had occurred. The PA scale was used to score their swallows on a scale of 1 to 8. Lower scores are considered least severe, while higher scores are considered more severe. A score of 1 indicates a normal swallow, 2-5 marks penetration, and 6-8 reveals aspiration. Analysis of these scores shows no significant change in mean PA scale score for any of the volumes or consistencies between the initial and follow-up examinations. Examination of the initial and follow-up evaluations show that only three of the twelve participants showed a decreased PA score. In addition, five of the twelve dysphagia patients showed no change. One participant showed an increased PA score, but it was between two different volumes. However, it was found that puree consistency did result in a slightly lower mean PA score (5 mL Initial: 1.47, Follow-up: 1.62) than thin liquids (5 mL Initial: 2, Follow-up: 2.35). Puree consistency was shown to have the lowest mean PA score of the three. Most participants in this study scored a one or two on the PA scale at the initial evaluation, with one individual showing silent aspiration (PA score of 8) in the follow-up evaluation. This mild presentation could be a factor in why so few participants showed progress. In addition, this study demonstrates that the PA scale can be a tool to quantify the changes of swallowing safety for patients. Future studies should include a larger sample size, various measurements, and to evaluate participants for 1 longer periods of time.

Creative Technologies

MATUSARAGATÍ SI VIVÉ !

Presenter: Hernandez-Ramos, Catalina
Undergraduate, Creative Technologies
Mentor: Prof. Kristin Carlson
Authorship: Catalina Hernandez-Ramos, Kristin Carlson, Lucy Gill

I am presenting research about the Matusaragatí wetlands in the Darién region of Panama. This environmental research has been crafted into a children's book for education and awareness. The main focus of this research is to give children and adults an insight into their environment through another environment in Panama. The children's book is formatted to teach young children about their senses and emotions as well as inspiration to treasure nature. Our future generations will be stepping into an uninhabitable world that won't be enjoyable as a result of what our past and current generations have been abusing. Particularly in the rainforests of Panama, where preservation of natural areas is political and frequently intersects with the indigenous stewards of the land, which is cancerous to our evolution. Matusaragatí is a wetland that is in need of nourishment, love, and protection. As a Creative Technologies team, we have gathered research on the local histories of the Darién region, and how those histories engage with current people, animals, plants, and environments. We are compiling this information into a children's book in order to raise awareness of the importance of restoring the Matusaragatí wetlands. In previous research, we have gained the understanding that Matusaragatí is dealing with corruption from property title registrations in protected wildlife areas. The consideration of the land as currency is a disease to this wetland and many other parts of Darién and Panama. Deforestation and violation of lagoons, forests may bring revenue in the short term, but have devastating effects on the region as a whole over time. This includes the health of all waterways and oceans surrounding the area, and the accompanying wildlife that residents rely on for their own survival. By listening to the need for awareness, I decided to approach our future generations. I am making a children's book that entails the truth, beauty, and power of wetlands like Matusaragatí to the world. Throughout the book, I provide details of how vital Matusaragatí's life is for all of its inhabitants. Matusaragatí is alive and deserves to be treated as a life that needs protection and love. Together we must not ignore what's happening and still strive to better the situation. As one, we can evolve and create a biodeversity of health and abundance.

SPECULATIVE OBJECTS FOR A SUSTAINABLE FUTURE: ZERO WASTE VIRTUAL FASHION

Presenter: Pereira Gloor, Rochele
Graduate, Creative Technologies
Mentor: Prof. Kristin Carlson
Authorship: Rochelle Pereira Gloor

If any of us analyze the extent of the current climate crisis, we would stop wearing clothes made of plastic and would start wearing clothes made of computer data. Not that plastic is the sole proprietor of environmental and humanitarian devastation, but it is also a byproduct that surpasses cultural identity and sets us in the 4th industrial revolution timeline.

This creative research speculates the future of fashion by drawing speculative objects created with current and promising design software. These virtual and digital artifacts are intended to provoke new ideas about garment production and imagine preferable futures. Understanding how to design products virtually and visualize them before being produced brings new alternatives to the global business models. The tool I utilize is a 3D design software, called Clo, which was implemented for creating "true-to-life" garment simulations in virtual spaces before physical sampling and production, therefore, diminishing the use of natural and human resources. The sustainable fashion design method is zero waste pattern making, a holistic approach that doesn't generate textile residues. Lastly, the speculative design method utilized was STEEP scanning, focused on digital fashion technologies, sustainable practices, and global financial systems. During the first weeks of the research, I got acquainted with the user interface and tools of Clo while following pertaining tutorials and, after that, I followed a free artistic practice within the software. This practice resulted in speculating the boundaries between the continuation of our species and the embodiment of the physical garment, and how to find balance within these. Thus, a possible zero-waste future to work in favor of fashion design software. Foremost, the limitless artistic expression impersonated within this technology transported me to a future place. A place where humans are responsible and the only waste is computer data.

THE SIMS FRANCHISE, A RETROSPECTIVE OF RACIAL REPRESENTATION AND SKIN TONES

Presenter: Stipp, Lauren
Undergraduate, Creative Technologies
Mentor: Prof. Sercan Şengün
Authorship: Lauren Stipp, Sercan Şengün

The Sims video game franchise is a staple of life simulation games. Ever since the first game was released on February 4, 2000, the franchise has been extremely popular (Nutt and Railton, 2003). The game started out with presets of clothing and shoes, three skin tones, five personality traits, two ages, and two genders. The first game in the series did not allow for much representation for gamers to express their individuality. As Albrechtslund (2007) puts it: "a successful life in The Sims [is] tied to a certain way of living both in gameplay and game representation." In this work, we trace the changes of identity representation in The Sims franchise over the years, specifically from the lenses of racial representation and skin tones.

Criminal Justice Sciences

WHAT GOES ON AFTER PRISON: A QUALITATIVE ANALYSIS

Presenter: Boron, Davida
Graduate, Criminal Justice Sciences
Mentor: Prof. Charles Bell
Authorship: Davida Boron

My research project will focus on the initiatives and resources or the lack thereof that formerly incarcerated individuals are provided once they are released. Once released, most inmates tend to recidivate due to the lack of resources provided for them for reentry. A part of my project would be looking into the data that surrounds this topic to highlight what initiatives and resources are working and how we could implement them better into our systems. I will conduct ten interviews of the participants to gain more knowledge of their experiences once released. This will gauge what kind of assistance they received once released. What programs or initiatives were beneficial, and document what steps should be taken to combat the negative outcomes. My focus is non-violent offenders because they tend to have shorter sentences and are released more often. My age of participants will range from 18 to about 45 years of age just so that I have participants who are aware of everything going on. My recruitment strategy will have the snowball effect, a recruitment flyer, and resources from my supervisor.

A COMPARATIVE ANALYSIS OF LEGAL FRAMEWORKS FOR ADDRESSING ENVIRONMENTAL CRIMES IN BANGLADESH, NIGERIA, AND UNITED STATES

Presenter: Hussain, Md Lokman
Graduate, Criminal Justice Sciences
Mentor: Prof. Ashley Farmer
Authorship: Md Lokman Hussain

Environmental crimes developed mostly after the second half of the 20th century. Environmental movements and international environmental treaties played an important role in policy formulations of the environmental harms. Though many of the aspects of environmental justice – or eco justice – are regulatory in nature, criminalization of environmental harms is also significant and ever increasing in implementation. From this backdrop, this paper explores the environmental criminal laws of three different countries that share the legacy of common law tradition in their legal systems. The comparative analysis of their legal frameworks consists of making laws in criminalization of environmental harms, types of environmental crimes, punishments for those crimes, enforcement mechanism for environmental criminal law, role of judiciary in advancing the environmental criminal law through cases, and measures for addressing corporate environmental crimes in particular. The theoretical propositions of green criminology are applied in the analysis. While the study presumes that environmental problems and environmental criminal laws are similar across societies, it is important to map out the areas of differences so that the policies for addressing environmental harms become more informed.

Economics

MEASURING THE IMPACT OF THE 2010 EARTHQUAKE IN HAITI ON GDP PER CAPITA USING SYNTHETIC CONTROL METHOD.

Presenter: Jean-Louis, Benael
Graduate, Economics
Mentor: Prof. Bibek Adhikari
Authorship: Benael Jean-Louis

On January 12, 2010, Haiti was struck by a magnitude 7.3 earthquake on the Richter scale, killing more than 300,000 people and causing damage estimated at several billion dollars. Yet more than 10 years later, little is known about the causal impact of this shock on the Haitian economy. This paper aims to close this gap to some extent by answering the following question: what is the impact of the 2010 earthquake on Haiti's per capita GDP? To answer this question, I used the Synthetic Control Method (SCM), a research design recently developed in Abadie et al. (2010). This methodology provides a natural approach for evaluating the effects of an exogenous treatment that affects only some units while many other units are unaffected. I collected data for 40 developing countries that constitute the donor pool from which the counterfactual scenario is created. The causal impact is estimated by comparing the GDP per capita of this counterfactual scenario called synthetic unit with the actual GDP per capita of Haiti. The results indicate that the earthquake had a negative impact on Haiti's per capita GDP in the short run as well as in the long run. Particularly, for the 10 years following the earthquake, the magnitude of the impact is estimated at a \$3,811 decrease in Haiti's per capita GDP.

EFFECTS OF THE COVID-19 PANDEMIC ON UNEMPLOYMENT AND WAGES IN THE FOOD SERVICE INDUSTRY

Presenter: Kostrub, Kate
Undergraduate, Economics
Mentor: Prof. Eric Lenz
Authorship: Kate Kostrub ,

This presentation explores the effects of the government-mandated lockdowns of the COVID-19 pandemic on unemployment and wages in the food industry. Using monthly estimates from the U.S. Bureau of Labor Statistics for unemployment rates and hourly wages from 2011 to 2021, I analyze the changes in each variable before and after March of 2020. I regress the unemployment rates and wages on a binomial lockdown variable to determine a quantifiable relationship. To conclude, I show how wage increases are distributed over wage percentiles in both the food industry and all occupations by comparing the change in average hourly wages from before and at the height of the pandemic.

Family and Consumer Sciences

IDENTIFICATION OF INFLUENCING FACTORS OF AGING IN PLACE LIFESTYLES

Presenter: Galewsky, Isaac
Undergraduate, Family and Consumer Sciences
Mentor: Prof. Sally Xie
Authorship: Isaac Galewsky

This research project will explore and identify the influencing factors of Aging-in-Place lifestyles and focus on the range of applications of smart home automation technology. We believe this topic is worth investigating in order to try and find out what instances the technologies are best applied in and how their application can best help a now aging American population comfortably and sustainably so that they remain independent for as long as they would like to. The research questions are (1) How to design and simulate the living conditions and interior/exterior environments of AIP? (2) What do people consider when they choose the AIP lifestyles? With the rapid pace of technological development, smart environments (SE) have significant potential to help AIP stakeholders (e.g., construction companies and healthcare providers) to explore new ways and keep up with the growth of the aging population in the US and worldwide. In this research project, the student will study and implement Building Information Modeling (BIM) and augmented reality (AR) technologies for the "Missing Middle" in the 21 Century.

"WITH PENCIL ON PAPER IT HAS TO BE PERFECT":INTERIOR DESIGN STUDENTS' SKETCH INHIBITION

Presenter: Gwin, Haley
Undergraduate, Family and Consumer Sciences
Mentor: Prof. Elke Altenburger
Authorship: Haley Gwin, Elke Altenburger

Topic

This is a study of instructional strategies, intended to help interior design students overcome sketch inhibition. Many design students are reluctant to engage in sketching. They insist that they cannot work in the studio, and leave sessions when sketching is required. At the end of their design education, many of my peers still lack confidence and skill. Design education continues to struggle to address this problem. (Thurlow et al., 2019).

Context

Sketching supports design thinking, helping to externalize, see, and store thoughts in a different way. It is quick, and supports problem solving (Bilda et al., 2006). Sketching is a way to methodically explore, test, and develop ideas (Leblanc, 2016). Sketching enables designers to investigate multiple paths, while drawing software tends to inspire attention to detail. Overreliance on digital tools encourages premature solutions, developed in a linear process (Cross, 2001). Sketches create a record of the creative process, while digital tools may render that process invisible (Goldschmidt, 2003).

Methods

We developed three interventions: (1) we explained the benefits of sketching more explicitly than in previous semesters, (2) we incentivized producing more sketches, and (3) we engaged students in playful sketch exercises on whiteboard surfaces. We determined a baseline for how (un)comfortable students initially were with sketching. We attended all relevant studio sessions, wrote

ethnographic fieldnotes, took photos and maintained a research journal for reflection. Afterwards, we conducted semi-structured interviews with five sketch-inhibited participants and collected short responses to our questions from all enrolled students. The analysis of the transcripts consisted of open and focused coding, followed by the investigation of co-code occurrences and theme development.

Conclusions

The analysis revealed that initially, many students thought that the sole purpose of sketching was to persuade clients of a design solution, which led them to unrealistic expectations of the necessary quality. These students tended to either spend unreasonable amounts of time on sketch assignments or avoid sketching altogether. Students who expanded their understanding of sketching and its usefulness for ideation and collaboration, were able to relax, embrace the design process, and increase their productivity. They reported enjoying the whiteboard activities, because they associated the inherently preliminary nature of the marker sketches with lower stakes, compared to the more intimidating, permanent nature of pencil and paper sketches. Researchers and participants observed that the design students appeared more collaboratively engaged while working on the whiteboards, at previously unprecedented levels.

DIVERSITY, EQUITY, AND INCLUSION EFFORTS OF FASHION RETAILERS

Presenter: McCleish, Danielle
Undergraduate, Family and Consumer Sciences

Mentor: Prof. Yoon Jin Ma

Authorship: Danielle McCleish

The purpose of this study is to evaluate various fashion brands on their practices of diversity, equity and inclusion. Diversity, equity and inclusion, or “DEI” practices in fashion brands can be demonstrated through the brands’ overall business practices, marketing and brand representation, company culture and manufacturing and sourcing strategies. Within the last five years, many fashion brands have evaluated their current strategies and updated their business practices to reflect the fast changing and more inclusive world around us.

For the current study, 20 different brands were evaluated. These brands were grouped into four different categories: Luxury Goods, Fast Fashion, Reputably Socially Responsible and Fan Favorites. Luxury brands were chosen based on item value and popularity, including Gucci, Burberry, Stella McCartney, Balenciaga and Louis Vuitton. Fast Fashion brands were chosen based off of the most popular low value but high design volume retailers, and include Shein, H&M, Forever 21, Zara and Uniqlo. The socially responsible brands were chosen based on their reputation of social responsibility, including Patagonia, Girlfriend Collective, Everlane, ABLE, and Outdoor Voices. Finally, the Fan Favorites were selected because they are all everyday retailers found in local shopping malls, and include American Eagle Outfitters, Nike, Victoria’s Secret, Gap Inc., and Urban Outfitters.

The data collection was completed via web search and the data were coded based on how the company fit into the given criteria, the answer to the question being presented, where the information was found and finally the number of clicks to find the information needed to answer the question. First, each brands’ company profile and brand demographics were evaluated through the brands’ mission/vision statement, their product distinction, target audience, number of retail stores, target audience, founding date and location, number of employees and finally their current revenue. Next, DEI were then broken up into three categories with questions respective to each term. In diversity, each brand was evaluated with questions under the subcategories of workplace leadership and workplace culture. In equity, transparency and environmental sustainability were evaluated, while in inclusion, company culture, marketing and brand representation and product line were examined. According to the findings, it was apparent that little to no of the brands met the criteria for all categories. The study shows that while many brands are headed in the right direction in terms of DEI, as an industry we still have a very long way to come.

Geography, Geology, and the Environment

DETRITAL APATITE THERMOCHRONOLOGY OF THE GRAND TETON MOUNTAIN RANGE

Presenter: Chambers, Connor
Undergraduate, Geography, Geology, and the Environment
Mentor: Prof. Lisa Tranel
Authorship: Connor Chambers, Lisa Tranel

This research is to assess the apatite grains gathered from sediment in the Grand Teton Mountain Range to help answer the question of where the Tetons are eroding by measuring the amount of helium trapped in the crystal grain, with a process called detrital apatite (U-Th/He) thermochronology. We have data from Glacier Gulch, Avalanche Canyon, and Paintbrush Canyon with 17, 15, and 29 samples taken that are within the margin of error. As a part of this project, we will be adding sample data to Avalanche Canyon. Sample processing includes carefully processing sediments through sieving, hand magnet separation, wifely table processing, heavy liquid separation, Franz magnetic separator, and lastly hand picking the individual grains to send them off for analysis. So far, the cooling ages we have gotten back on the previous samples are all around 10-20 million years old, with Glacier Gulch showing a large spike at 20 million years old going out to 100. Avalanche Canyon has high numbers of apatite grains at 10 to 20 million years old then decreasing numbers to 60 million years old. Paintbrush Canyon spikes at 20 million years old with some samples at 10 and 30 Ma but also as far back as 60 million years old. All histograms show a high around the 20 Ma mark and a normal distribution out into the older ages of 60 or 100 Ma. The results we have seen so far show that almost all the cooling occurred 10-20 million years ago but there is some sediment from rocks that cooled much earlier, though it's not the majority. Using other sources of data like the relationship between climate, landscape connectivity and sediment export from mountain ranges, (Harries., et al.) we will be able to better understand erosional processes, weathering processes, and cooling process of the Teton Mountains. Future work can include is more data collection and sample processing from other canyons in the range to further our understanding of the cooling ages of the apatite grains across the range, leading to a better understanding of erosion and landscape evolution overall.

ASSESSMENT OF TEMPORAL VARIATIONS IN CHLORIDE CONCENTRATION IN AN AGRICULTURAL TILE-DRAINED AREA IN MCLEAN COUNTY, CENTRAL ILLINOIS.

Presenter: Commander, Okiemute
Graduate, Geography, Geology, and the Environment
Mentor: Prof. Eric Peterson
Authorship: Okiemute Commander

Increase in chloride (Cl-) concentration in surface water and groundwater from anthropogenic sources including deicing salts, agriculture, septic effluents, and wastewater treatment plants is a growing cause for concern all over the world. In non-urban areas where there is less impervious surface cover, agriculture could account for a larger percentage of Cl-source in water systems. One of the major sources of Cl-in non-urban areas is potash (KCl), an agricultural fertilizer used annually to grow soybean and corn throughout the Midwest especially in Illinois. This study is being conducted in a saturated buffer zone (SBZ) adjacent to an agricultural field in McLean County with wells installed to monitor water chemistry. Samples collected from 34 locations on the site over a six-year period will be analyzed (for major ion concentration), with subgroups compared based

upon location and time. Subgroups will be delineated based on location into: deep groundwater (DW), downgradient shallow groundwater (DGSW), upgradient shallow groundwater (UGSW), diversion box (DB), and stream (ST). While the seasons will be divided according to equinoxes and solstices, corresponding with agricultural practices: spring/planting (April - June), summer/growing (July - September), fall/harvesting (October - December), and winter/fallow (January - March). Anion and cation concentrations will be measured using both the Ion Chromatograph (IC) and Inductively Coupled Plasma Optical Emission Spectrometer (ICP-OES) respectively. Results from these analyses will be used to (1) identify the number(s) of contributory population of Cl⁻ using cumulative probability plots calculated with Cl⁻ and K⁺ values and (2) assess seasonal variations in Cl⁻ concentration among the different subgroups using a two-way ANOVA test. Background concentration for Cl⁻ will be established using cumulative percent probability from the analyzed samples. Inflection points representing “thresholds” of background concentration and other contributing population(s) will be determined using the cumulative probability plots of Cl⁻ and K⁺ in the area. Two-way ANOVAs will be used to test Cl⁻ and K⁺ concentration against time (seasons) as well as location (subgroups). It is expected that there will be at least one or more contributing sources of Cl⁻ and K⁺ in the study area and that Cl⁻ and K⁺ concentration would be higher in the DGSW subgroup during the spring (planting) season and highest in the ST subgroup in the winter (fallow) season.

Keywords: Chloride, Potash, Saturated buffer zone, Background concentration, Thresholds, ANOVA.

TRANSPORT OF SUSPENDED SEDIMENT AND PHOSPHOROUS IN AN AGRICULTURAL WATERSHED: A CASE STUDY OF THE MONEY CREEK WATERSHED, CENTRAL ILLINOIS

Presenter: Efobo, Oghenevwede
Graduate, Geography, Geology, and the Environment
Mentor: Prof. Eric Peterson
Authorship: Oghenevwede Efobo

Suspended sediment and phosphorus are a threat to surface waterbodies. Excessive supply of suspended sediment to streams can alter water quality, reduce reservoir storage capacity, and degrade ecological functions including the displacement of aquatic habitats. Phosphorus is a limiting nutrient in freshwater. Excessive phosphorus in streams has led to eutrophication, the development of harmful algal blooms and hypoxic conditions that restrict the water for fisheries, recreation, industry, and drinking. For the City of Bloomington, central Illinois, high nutrient loads and sediment concentrations are a major problem in water reservoirs. The primary sources of suspended sediment and phosphorus in the area are from agriculture, which dominates local landuse. High nutrient loads and sediment concentrations are a major problem in water reservoirs in agricultural regions. To aid our understanding of the transport dynamics between suspended sediment and phosphorus over a five-year period (July 2016-May 2021), two hypotheses were proposed. They are: (1) the mass of total suspended sediment (TSS) will be linearly related to the mass of total phosphorus (TP) for storm events, and (2) there will be both an annual and a seasonal relationship between the mass of total suspended sediment (TSS) and the mass of total phosphorus (TP). For hypothesis 1, a linear regression analysis will be used to evaluate a potential relationship between the independent variable, TSS load and the dependent variable, TP load. For hypothesis 2, an ANOVA ($\sigma = 0.05$) will be used to identify statistical differences among TSS and TP loads throughout the four seasons and annually. If there is a significant difference, a Tukey Test will be conducted to determine which seasons, or years, the differences in TSS and TP were significant. I expect to see a linear relationship between the mass of TSS and the mass of TP for storm events. Since phosphorus is mainly transported with suspended sediment, TP export would increase with increasing TSS transport during storm events. I also expect to see a seasonal and annual

relationship between the mass of TSS and the mass of TP. This is because there are seasonal and annual variations in rainfall patterns that have control on the export of TSS. The findings from this study will add to the existing knowledge and aid decision-makers in the design of management plans for the watershed.

UNDERSTANDING MAGMA FORMATION AT PINGMÚLI VOLCANO, ICELAND BASED ON ZIRCON ANALYSES

Presenter: Essex, Cameron
Undergraduate, Geography, Geology, and the Environment
Mentor: Prof. Tenley Banik
Authorship: Cameron Essex, Tenley Banik

Iceland is one of the few places on Earth where a spreading center and mantle hot spot coincide, leading to abundant magmatism and production of silicic rocks. There are two processes thought to be dominantly responsible for generating silicic magmas in Iceland: fractional crystallization and partial melting of pre-existing crust. Þingmúli (Thingmuli) volcano, an extinct volcano in eastern Iceland, is viewed as an archetype for rhyolite generation via fractional crystallization based on whole rock analyses (Carmichael, 1964, 1967; Charreteur et al., 2013). We present the first zircon-based oxygen (O) isotope compositions and U-Pb ages for Þingmúli. Whole rock samples (n=8) were collected from mapped Þingmúli silicic units and zircon was separated via standard crushing, sieving, and conventional magnetic and density separation methods, followed by hand-picking under a microscope. Oxygen isotope compositions in zircon grains were then analyzed at UCLA and U-Pb geochronology and trace element compositions were measured using the Stanford-USGS SHRIMP-RG. Zircon U-Pb ratios indicate ages ~9–10 Ma. Zircon $\delta_{18}\text{O}$ in seven samples is restricted to ~3.1–3.9‰, suggesting rhyolite petrogenesis at Þingmúli can be dominantly attributed to fractional crystallization of mantle-derived basaltic magmas, which is in line with previous wholerock-based findings. The sample with the oldest U-Pb age has a substantially lower $\delta_{18}\text{O}$ weighted mean (~2.1‰), with grains (n=10) having $\delta_{18}\text{O}$ ranging from ~1.8–2.3‰. Titanium—which is a proxy for crystallization temperature in zircon—ranges from ~8–17 ppm and Hf ranges from ~9,000–16,000 ppm across all samples, both of which are typical for Icelandic zircon. However, the oldest, low $\delta_{18}\text{O}$ unit has an average Ti concentration of ~14 ppm, which is 2–4 ppm higher than the other sample averages. While overall these zircon data provide support prior interpretations for rhyolite petrogenesis at Þingmúli, our data also hint at a warmer, early phase of magmatism in which incorporation of low- $\delta_{18}\text{O}$ material was a significant contributor to these zircons' parent melt.

DO ANIMALS USE STREAMS AS CORRIDORS?

Presenter: Fever, Lacey
Undergraduate, Geography, Geology, and the Environment
Mentor: Prof. Catherine O'Reilly
Authorship: Lacey Fever, Valerie Kurgan, Michael Brown, Catherine O'Reilly

Wildlife are increasingly found in urban environments. However, it is not clear how wildlife move around the urban landscape. The purpose of our project is to determine whether animals use the town's streams as corridors to move through town. I speculated that animals use the town's streams as a corridor to cross into residents' yards. To test this hypothesis, trail cameras were set up alongside the creeks at Hidden Creek Nature Sanctuary, Anderson Park, and Oakdale elementary in Normal, IL. The cameras were used to collect data between September 2021 and May 2022. The footage was reviewed on a weekly basis and the images were routinely uploaded onto Colorado Parks and Wildlife (CPW) Access database. Information identified by visually inspecting the images was then used to create graphs. The input data consisted of the animals' species, location, direction of movement, time of day, and the animals' behavior.

Results from the camera images and our graphs indicated that raccoons and coyotes are often present at Hidden Creek Nature Sanctuary around 3:00am. Raccoons and stray cats were commonly observed near Oakdale elementary around 3:00am. Squirrels and ducks were common at Anderson Park around 12:00pm. The data collected through the trail cameras support our hypothesis; animals do use streams as passageways through town. By inspecting the trail camera footage and noting wildlife location and direction of movement, we observed various native species using the streams to travel through town.

DATA COLLECTION OF ROCK FALLS THROUGHOUT STARVED ROCK MEASURING POROSITY, GRAIN SIZE, AND CEMENTATION

Presenter: Gaeti, Anthony
Undergraduate, Geography, Geology, and the Environment
Mentor: Prof. Lisa Tranel
Authorship: Anthony Gaeti

The canyons of Starved Rock were carved by meandering creeks flowing into the Illinois River and transporting sediments out of the canyons. Rock falls happening all over the park can also contribute to increased erosion. The St. Peter sandstone can be very brittle and the cement between quartz grains is very weak, making the sandstone fall apart quite easily. In areas of higher foot traffic, this can accelerate erosion processes. Canyons like La Salle have seen higher erosion rates (20.68 mm/ky) while also being one of the more popular canyons in the state park. Conversely, trails that see less foot traffic have significantly lower erosion rates like the Illinois Canyon (9.17mm/ky). Our biggest goal of this project is to possibly find a connection between the case hardening of cement on the surface of rocks and the erodibility of the bedrock. Thin sections are used to measure the area of porosity, grain size, and cementation. The thin sections represent samples collected from rock falls from various parts of Starved Rock. The primary piece of data is cementation. Case hardening samples have higher cementation to prevent the rock from eroding as fast as the weaker rock it protects. This possible result could explain why the areas with less foot traffic could have slower erosion rates. More data of the thin sections need to be taken to make a connection with the possibility of case hardening in the St. Petersburg sandstone.

USING AN UNMANNED AERIAL VEHICLE EQUIPPED WITH A MULTISPECTRAL SENSOR TO VISUALLY MAP WATER QUALITY PARAMETERS IN DRINKING WATER RESERVOIRS.

Presenter: Komas, Jerome
Graduate, Geography, Geology, and the Environment
Mentor: Prof. Wondwosen Seyoum
Authorship: Jerome Komas, Wondwosen Seyoum, Catherine O'Reilly, Bill Perry

Surface drinking water infrastructure is an integral part of the development and sustainability of societies around the world. However, these surface freshwater resources have been a challenge to monitor due to the vast number of in-situ samples needed to accurately quantify constituents, expenses of equipment, coordination of personnel, and lab cost. Lake Bloomington and Evergreen Lake (Hudson, Illinois) are two vital surface water features that serve as the drinking water reservoirs for the Bloomington area. Both reservoirs are within agricultural watersheds, with watershed inputs typically being high in turbidity and nitrate.

We utilized an Unmanned Aerial Vehicle (UAV) coupled with a five band multispectral image sensor to monitor two important drinking water parameters in the lakes; turbidity and algae. By using the UAV, along with in-situ data collected the same day as the flight, we aim to answer the following questions: 1.) What are the challenges of remotes sensing over a homogeneous setting (such as a lake) and 2.) Is it

possible to detect change in the water quality at the surface of the lake using one or more spectral image combinations?

Preliminary results show that at nearly 6 cm pixel size can produce greater than 80% coverage at each sample site and regularly above 90% coverage at 3 m resolution. Through several proprietary algorithms, we were able to explain 70% of the variation of Chl-a in the lakes. Although algorithms were created for Turbidity and TSL, both algorithms were only able to explain less than 20% percent of the variation of the observed samples. This poor correlation has to do in part with the low values and concentrations observed for both Turbidity and TSL respectively.

FACTORS DRIVING NUTRIENTS TREND IN THE ILLINOIS RIVER BASIN

Presenter: Oladuji, Olaoluwa
Graduate, Geography, Geology, and the Environment
Mentor: Prof. Wondwosen Seyoum
Co-Mentor: Prof. Eric Peterson
Authorship: Olaoluwa Oladuji, Wondwosen Seyoum

Water is one of the most useful resources available to mankind, as valuable as this resource is to lives, the demand for high quality potable water increases as populations grows. However, one of the major global challenges is related to water quality issues that come from excess presence of nutrients in water bodies. For example, excess nitrate and phosphorus in waterbodies has led to eutrophication and development of harmful algae bloom. This led to an increase in the hypoxia or dead zones in the Gulf of Mexico. The sources of these nutrients into waterbodies are transported mainly from point and non-point sources. The non-point sources are from agricultural activities through fertilizer application, animal waste, and natural atmospheric deposition of nutrients, while the point sources are from industrial and factory discharge, sewers, and wastewater treatment plants. This study seeks to understand the various factors driving nutrients trends in Illinois River basin with focus on nitrate and total phosphorus. The 2019 biannual report from the Illinois Nutrient Loss Reduction Strategies stated that there was about 13% increase in nitrate and 35% increase in total phosphorus across the statewide basins compared to the previous baseline of 1980-1996. To understand these nutrient trends compared to the previous baseline, this study will present trend analysis of nitrate and total phosphorus in the Illinois River basin using historical data. Recent daily timeseries data and statistical technique will be used to detect trends of nutrients loading in the Illinois river basin. The load of nutrients in the basin will be determined using LOADEST (load estimator). A non-parametric Mann Kendall test and Sen's slope will be used to analyze and detect the magnitude of the increasing nutrients with time. Cross correlation analysis will be adopted to understand the effects of watershed characteristics such as climate, hydrology, and landuse to these trends. The results for this study is expected to show a positive trend compared to the baseline, i.e., increase in nutrients trend in the Illinois River basin. The result for this study can help in water quality management and for the nutrient reduction plan by Environmental Protection Agency and Illinois Nutrient Loss Reduction Strategy program.

THE IMPACT OF REVITALIZATION ON ACCESS TO NATURE: ANALYZING GREENSPACE CHANGE IN SOUTH KENSINGTON, PHILADELPHIA.

Presenter: Olson, Alexander
Undergraduate, Geography, Geology, and the Environment
Mentor: Prof. Alec Foster
Authorship: Alexander Olson, Alec Foster

Previous research has shown that greenspaces offer many environmental and social benefits for urban residents. The benefits that urban greenspaces provide improve neighborhood quality of life, and environmental justice concerns arise when they are distributed unevenly across a city's urban fabric. Greenspace access research has primarily focused on formal parks, neglecting informal greenspaces' potential to reduce disparities in access to urban environmental amenities. Our past research yielded insight into the distribution of formal and informal greenspaces (IGS) across the Olde and South Kensington neighborhoods of Philadelphia using high resolution aerial imagery. For this study we analyzed the changes of greenspaces in these neighborhoods over a six-year period, from 2010 to 2016. We documented 351 greenspaces in 2016, totaling almost ten percent of our study area. The vast majority were informal greenspaces, which on average were considerably larger than formal greenspaces. Our results highlight the potential of IGS to increase access to greenspace and address environmental justice concerns. We argue that public resources should support the stabilization of these liminal spaces while allowing local control and management to navigate environmental gentrification threats. Measuring/analyzing greenspace change will show how redevelopment processes impact greenspaces. By using widely accessible tools like Google Earth Pro, we hope to provide a method replicable for community groups and others interested in documenting urban environmental conditions in their neighborhoods. Replicating this study's methods for data acquisition on the distribution and temporal change of greenspaces within the communities of Philadelphia offers the opportunity to address environmental injustices within the city.

A QUANTITATIVE ANALYSIS ON HYPORHEIC FLOW DYNAMICS CONTROLLED BY CONTRADICTION THERMAL REGIMES

Presenter: Riedel, Jake
Graduate, Geography, Geology, and the Environment
Mentor: Prof. Eric Peterson
Authorship: Jake Riedel, Eric Peterson, Wondwosen Seyoum, Toby Dogwiler

Heat is a naturally occurring and cost-effective tracer to study groundwater flow to, from, and throughout the subsurface. Often used for the quantification of groundwater discharge, heat has been used to identify gaining and losing portions of streams and in determining flow parameters such as hydraulic conductivity (K) or velocity. Connecting ground and surface reservoirs is an area known as the hyporheic zone (HZ) where waters from both reservoirs interact. The flux of water throughout the HZ is controlled by stream bedforms, sinuosity, surface water velocity, local water table, seasonality, and sediment K. K is dependent on both the viscosity and density of water, and it is well established that temperature influences both variables. In most studies, these changes have been neglected because of the limited effect either has on K. However, these variations are important to understand because an increase in K will result in an increase in groundwater velocity, having implications relating to residence time and subsurface nutrient processing. To better understand how water temperature effects flow dynamics in the HZ, multiple two-dimensional models will be created using the USGS software VS2DHI to map flow under both warm and cool thermal conditions. Data were collected from a series of varying temperature hydrologic flume trials where the effects of hyporheic flow altering variables like sinuosity, surface water velocity and volume, and bed-forms were controlled. Results verify that

K in the HZ will be greater under warm conditions and lower under cool conditions. Additionally, models indicate a faster speed of frontal movement under warm conditions than cold. Finally, the mapping of resultant Péclet numbers indicate a shallower input extinction depth under cold conditions as opposed to hot. These variable thermal regimes provide much different conditions for flow amongst each other, and applying this, the significant differences in average seasonal water temperatures will introduce a spread of widely varying annual flow dynamics. Understanding these changes could help prepare us for future urban expansion, climate change, and other possibilities that could modify surface and ground water temperatures.

USING A TRACER TEST TO ASSESS THE TRANSPORT AND FATE OF NITRATE WITHIN A SATURATED BUFFER ZONE

Presenter: Sahad, Alhassan
Graduate, Geography, Geology, and the Environment
Mentor: Prof. Eric Peterson
Authorship: Wondwosen Seyoum, Catherine O'reilly

The Upper Mississippi Basin (UMB), which includes Illinois, has highly fertile soils and therefore, experiences intensive agricultural practices. While fertile, the soils do not drain well, resulting in the installation of tile-drainage systems. Agricultural practices within the UMB include the application of nitrogen (N)-rich fertilizers. The tile systems coupled with the application of N have led to the excessive export of nitrates (NO_3^-) from the agricultural fields into surface and subsurface waters through subsurface tile drainage systems. Excess NO_3^- contributes to eutrophication and to development of hypoxic zones in aquatic environments. One method that has exhibited success in lowering nitrate (NO_3^-) concentration is the diversion of tile drained waters from the agricultural fields into a saturated buffer zone (SBZ) before the water enters a stream. A SBZ is an area of perennial vegetation between agricultural fields and water ways where a tile-outlets drain. The SBZ serves as a sink where NO_3^- is reduced through natural processes such as plant uptake, denitrification, and dilution with groundwater. Previous works have shown a reduction in the NO_3^- content in the SBZ, but the extent to which this removal occurs cannot be quantified without knowing the residence time of the water through the SBZ. Our goal was to use sodium bromide (NaBr) and sodium chloride (NaCl) as tracers to determine the residence time of the tile waters in a SBZ at the T3 site in Hudson, Illinois and to quantify the amount of reduction or dilution of the NO_3^- in the SBZ using a mixing model. Results from the tracer test show an average groundwater velocity of 0.36 m/day with a standard deviation of 0.18 m/day, using the arrival time of the chloride tracer and 0.61 m/day with a standard deviation of 0.24 m/day using the arrival times from the bromide tracer. The residence time of the NO_3^- is estimated to be between 40 days to 50 days. The average horizontal hydraulic conductivity from the tracer test was calculated to be 6.62×10^{-5} m/s, which conforms with results obtained from slug tests performed on the site (3.03×10^{-5} m/s). The results from the mixing model showed a significant reduction in NO_3^- of about 80% within the period of 40 to 50 days. This research further reinforces the effectiveness of using SBZ as NO_3^- reduction strategy.

HUMAN IMPACTS ON EROSION RATES IN STARVED ROCK STATE PARK, IL

Presenter: Thielbar, Savannah
Graduate, Geography, Geology, and the Environment
Mentor: Prof. Lisa Tranel
Authorship: Savannah Thielbar

State and national parks are some of the most visited wildlife areas within the United States, allowing the local geology to become more susceptible to human-induced change. As more people visit these parks throughout the year, we see major impacts on wildlife, plant life, and the geological structures

present. Multiple concerns arise from these impacts, including how human activity can cause potential for hazardous conditions in the future. This study will determine if human activity influences erosion rates within Starved Rock State Park. From the data we can assess if the impact could create a potential for mass-wasting events within the park. Mass wasting events can pose a substantial risk for humans in areas where geology is influenced by large relief, including cliffs or mountainous terrains. The sandstone cliffs found within Starved Rock State Park preserve human-created carvings allowing us to obtain specific erosion data. Through natural and artificial erosion, the base of the slope is weathering at a much faster rate than the upper portion of the bedrock outcrop. If any part of this stratigraphic unit becomes unstable due to the undercutting from erosion, we could see rock falls or an entire rockslide that could become hazardous for anyone within the general area. Our objectives are to evaluate the effects of human activity on erosion rates within various canyons. From those results we can determine if those erosion rates could produce a weak spot for possible hillslope deformation, as well as investigate whether seasonal changes can accelerate these processes. By obtaining bi-monthly contour data on specific carvings within selected canyons across the park and using cosmogenic nuclide age dating from fluvial sediment within the streams, we can start to determine if erosion rates have accelerated within recent years due to human activity. Focusing on the factors that drive these erosion rates will provide valuable knowledge that can be used as a tool for education and awareness at other state or national parks.

Health Sciences

COMPARISON OF LARGE AND SMALL HOSPITAL'S IN HEALTHCARE ASSOCIATED INFECTIONS IN ILLINOIS

Group Leader: Buhmann, Grace
Undergraduate, Health Sciences

Group Members: Caroline Wieland, Undergraduate, Health Sciences;
Joclyn Butler, Undergraduate, Health Sciences

Mentor: Prof. Quen VanDermay-Kirkham

Authorship: Grace Buhmann, Caroline Wieland, Joclyn Butler

Healthcare associated infections (HAI) within Illinois were studied. Four different infections, including MRSA, blood, urinary tract, and C. difficile infections were chosen to be measured for the study. The data on these infections was compiled by the organization Leapfrog, which reports different ratings from hospitals. The data found will be based on the year of 2020 and will be compared to see which hospitals had the highest rates for each infection. The purpose of this research is to identify the higher rates in each hospital for each infection chosen and determine if hospital size has any impact on these rates.

For each rating, they are based on the actual infections for each year versus the expected infections for each year, which is calculated based on various factors collected by the CDC. If the rating is below one, that means that the hospital had fewer infections than expected for that year. If the rating is above one, that means that hospital had more infections than expected for that year.

The standard for each infection is based on the Standardized Infection Ratio (SIR) formula. The SIR formula is $SIR = \text{Observed} / \text{Predicted}$. The formula takes the actual amount of the infection and divides it by the predicted amount of infections for a specific hospital. Each hospital's data is based on the standard of actuality divided by the predicted number of infections. The standard for this is 1. This study is designed to determine if there is a correlation between size of the hospital and HAI rates.

AN EXPLORATION INTO COMPUTERIZED MEDICATION SAFETY PRACTICES IN ILLINOIS HOSPITALS AND ITS EFFECTS ON IMPROVING PATIENT OUTCOMES AND DECREASING ADVERSE EVENTS

Group Leader: Wightkin, Jack
Undergraduate, Health Sciences
Group Members: Ryan Kneller, Undergraduate, Health Sciences
Mentor: Prof. Quen VanDermay-Kirkham
Authorship: Jack Wightkin, Ryan Kneller

Medication safety practices are a huge initiative in today's healthcare system. With the integration of electronic entry and tracking systems, there has been a great improvement in medication administration and reconciliation leading to improved patient outcomes and a decrease in adverse events. The use of computerized physician order entry (CPOE) systems helps bring attention to drug-drug interactions and correct doses for each individual patient and their needs. The purpose of this study is to track the compliance of Illinois hospitals with their use of medication safety decision support systems, based on a scoring from the LeapFrog Group hospital safety ratings. The team came up with four quality standards to test for, then collected samples from ten hospitals throughout Illinois. The four quality standards tested include safe medication administration, safe medication ordering, medication reconciliation, and medication documentation for elective outpatient surgery patients. The quality standards tested for each hospital resulted in a score between one (limited achievement) and four (full achievement) for each category standard. After looking at the data, the percentage of facilities that met the benchmark of 3 or higher was found. The findings show both an individual score in each category along with an overall average score on the hospitals reviewed. The team then went on to suggest changes and additions to each facility to be made, based on their compliance with the benchmark standards, that could further improve their medication safety practices. Results from outside studies show that implementing electronic medication support significantly decreases occurrence and severity of errors impacting patient safety. The hospitals that failed to meet the standard score of 3 were offered recommendations to improve operations, based on evidence of computer assisted decision support reducing adverse events in patients.

History

THE SIGNIFICANCE OF THE PARTHENON

Presenter: Fick, William
Undergraduate, History
Mentor: Prof. Kathryn Jasper
Authorship: William Fick

The research conducted for this poster is dedicated to the Parthenon, why it was built, and how it comes to resemble Athenian power in Ancient Greece, the Delian League, and the modern world. Being one of the most iconic structures and temples constructed in all of history, why is the Parthenon so significant when it comes to upholding the institutions of Ancient Athens? The research involves scholarly articles and secondary sources and compares the intricate artwork included on the Parthenon with its overall size, then factors in the speed and quality it was built. Having withstood wars and earthquakes, this poster seeks to understand why the Parthenon is a significant symbol of Athenian institutions even 2,500 years later.

Information Technology

MEASURING BLOOD PRESSURE WITH RADAR AND MACHINE LEARNING

Presenter: Hazzard, Evan
Undergraduate, Information Technology
Mentor: Prof. Shaoen Wu
Co-Mentor: Prof. Noah Ziems
Authorship: Evan Hazzard, Noah Ziems, Shaoen Wu

Blood pressure is an important metric for diagnosing and monitoring a wide range of medical issues including cardiovascular issues, pulmonary issues, and others. Traditional methods using a sphygmomanometer use a cuff around the patients arm, requiring the patient to be stationary. Moreover, this method of measuring blood pressure provides only periodic and instantaneous readings. Radar, which allows for continuous and unrestricted blood pressure readings, is a promising alternative to traditional methods. However, extracting a blood pressure signal from radar has been a significant limitation. Using machine learning, we solve this problem by deriving accurate blood pressure readings from raw radar data, suggesting radar could be a strong alternative to traditional blood pressure measurement methods.

THE PSYCHOLOGY OF COMIC BOOK ADVERTISING GIMMICKS

Presenter: Radtke, Jacob
Undergraduate, Information Technology
Mentor: Prof. Eric Wesselmann
Authorship: Jacob Radtke, Eric Wesselmann

Comic book creators and industry executives, like most entertainment media professionals, have a key goal – to have their product purchased by consumers. As such, they have to make their products attractive so that they stand out among their competitors. Additionally, the growth of the collectors’ market in the 1980s and 90s created an additional goal – create books that people will want to buy multiple copies of and preserve and/or re-sell for increased value. Sometimes comic book professionals approached these goals by providing novel story elements, such as having cross-overs between popular characters or by making major changes to characters and storylines (e.g., the unexpected death of a recognized character). Other approaches may involve novel visual elements such as employing 3-D techniques, collector’s posters, or variant (and limited) cover art. Occasionally, professionals would employ outrageous gimmicks, such as shooting bullet holes through comics, providing a blank cover to encourage fans to “create your own cover,” and even using celebrities’ blood in the inking process! In this research, we will categorizes different types of advertising tactics/gimmicks that have been used in the comic industry and imbed them within the psychological research on attention and persuasion to explore why these tactics/gimmicks can be effective at increasing product purchasing and collecting, and perhaps why some instead fall flat.

Kinesiology & Recreation

INTERMITTENT FASTING: INFLUENCE ON BLOOD BIOMARKERS, AGE, AND SEX

Presenter: Gleeson, Robbie
Graduate, Kinesiology & Recreation
Mentor: Prof. Kelly Laurson
Authorship: Robbie Gleeson, Kelly Laurson

In recent years there has been an increased interest in regard to time restricted eating (intermittent fasting, IMF) and the potential health benefits that may be associated with this dietary approach. IMF has become a popular alternative method to reduce daily caloric intake to aid with weight loss and management. Despite the popularity in the public, IMF is scarcely examined within the literature. This secondary data analysis proposes to examine three different dietary protocols: (protocol 1) daily caloric restriction by 25% (n=18), (protocol 2) alternating between 24 hour cycles of fasting and feeding with 150% of normal intake (n=18) and (protocol 3) alternating between 24 hour cycles of fasting and feeding with 200% of normal intake (n=18). All three of the diet protocols lasted for 20 consecutive days with measurements taken pre- and post-intervention. The aim of this study is to investigate how these three protocols may effect total cholesterol (plus LDL and HDL individually), leptin, adiponectin, pre/post meal glucose, glycerol, insulin, and triglycerides (all 60 min, 120 min, 180 min, 240 min) post energy consumption. Further, we aim to determine how age and sex may influence these biomarkers across the protocols. We expect to see weight reduction in the both protocol one and two, while participants in protocol three stay relatively the same. Improved biomarkers are expected to be seen with all three groups with the most significant changes occurring in the protocol 1 group.

IMPROVING THE HEALTH TRAJECTORIES OF FUTURE GENERATIONS

Group Leader: Goytia, Gabrielle
Undergraduate, Kinesiology & Recreation
Group Member: Jaclyn Middendorf, Undergraduate, Health Sciences
Mentor: Prof. Dale Brown
Authorship: Dale Brown, Tyler Kybartas, Rishi Saripalle, Jaclyn Middendorf, Samantha McDonald, Jordan Wood

Background: Clearly identified in the United States is the prevalence of obesity, not only in adults, but also in children. Obesity in adults is at an all-time high. These changes in obesity over the last 15 years have been dramatic. Thirty percent of adults are now classified as obese with a body mass index (BMI) greater than 30; however, when a BMI of 25 is used, nearly 64% of the U.S. adults are classified as overweight or obese (CDC). The *U.S. Healthy People 2030 Report*, indicates 2 in 5 adults and 1 in 5 children in the U.S. are obese.

While obesity certainly has a significant impact on one's physical health it also has an economic, social, and psychological toll. More concerning are the co-morbidities or other diseases that accompany obesity. Usually accompanying obesity in adults are the co-morbidities of hypertension, blood lipid abnormalities, impaired glucose tolerance, heart disease, stroke and certain types of cancers and other disorders. Creating what is referred to as metabolic syndrome. These co-morbidities had only been seen in adults; however, recently these co-morbidities have started showing up in obese children. CDC data now shows trends for Type 2 diabetes in children that mirror

the childhood obesity pattern from 5 or 10 years ago. This trend re-enforces the notion that as obesity goes so goes the co-morbidities of obesity.

Research by the project's faculty mentor has shown that Bloomington/Normal children have similar obesity rates as those observed nationally. However, what is missing both locally and nationally are statistics on the prevalence of the co-morbidities in childhood and young adults. While there is a strong relationship between adult obesity and its co-morbidities, the extent to which that relationship exists in young adults is not clear nor is it clear as to the extent that the co-morbidities are directly following or related to obesity or other factors. The question then becomes is overweight/obesity really the root of problem or is it, like the other co-morbidities, a symptom of some other underlying problem?

Objective: Therefore, the purpose of this study is to examine the relationship of physical fitness, obesity and the co-morbidities of obesity in young adults. Since the co-morbidities may not be clearly evident additional health indicators, like body mass index, blood lipids, blood glucose, waist circumference, physical fitness scores, etc., will be examined to identify prevalence of co-morbidity risk factors in young adults.

INTER-METHOD AGREEMENT BETWEEN BODY COMPOSITION TECHNIQUES WITHIN ATHLETIC POPULATIONS

Presenter: Harwick, Aaron
Graduate, Kinesiology & Recreation
Mentor: Prof. Kelly Laurson
Co-Mentor: Prof. Dale Brown
Authorship: Aaron Harwick, Dale Brown, Kelly Laurson, Tyler Kybartas

Accurate assessment of body composition within athletic populations is of great importance, given it is common practice for the results to influence decisions regarding the effectiveness and progression of training and nutrition regimens. Additionally, it is common to see different types of body composition analyzers used at different athletic premises. **PURPOSE:** The purpose of this study was to analyze agreement in body composition assessed by Air Displacement Plethysmography, (ADP), four-electrode, and eight-electrode Bioelectrical Impedance Analysis (BIA) in an athletic population.

METHODS: Sixty-one female athletes competing in basketball, volleyball, and soccer, and twenty-one male athletes competing in basketball, (mean \pm SD) [age 20 ± 1.3 yr., height: 175.4 ± 11.8 cm., mass: 72.3 ± 13.1 kg.] underwent height and weight measures in addition to body composition assessment with the three methods mentioned above. All pre-test procedures for fasting, hydration, and resting were followed by the athletes. Pearson correlation coefficients were used to analyze associations between the three measures. Comparisons of the three methods were made using a One-Way Repeated Measures ANOVA.

RESULTS: The Pearson correlation coefficient suggests the three conditions have a significant, strong association with each other, ranging from ($r=.86$ to $.90$), ($p<0.001$). The ANOVA test indicated significant differences in Percent Body Fat (BF%) between ADP (20.6 ± 6.4), 4-electrode BIA system (21.0 ± 7.2), and 8-electrode BIA system (18.1 ± 7.2), ($p=0.014$). Differences between ADP and 4-electrode BIA were not significant ($p=0.271$). However, there were statistically significant differences between 8-electrode BIA compared to both ADP and 4-electrode BIA (both $p<0.001$).

CONCLUSION: The results may suggest some variance between the three body composition methods, with the eight-electrode BIA system showing 2.5-3.5% lower BF% results, on average compared to ADP and 4-electrode BIA analyzers, which were seen to have better overall agreement with a <0.5% mean difference. These results suggest practitioners should be cognizant of these differences in methodologies, which could have implications for athlete tracking over time.

MEASURING THE MARKETING EFFECTIVENESS OF A SPECIAL EVENT - A CASE STUDY OF 2022 ADAPTALOOZA

Presenter: Olivares, Jonathan
Graduate, Kinesiology & Recreation
Mentor: Prof. Nicky Wu
Authorship: Jonathan Olivares, Nicky Wu

The world of marketing is evolving with new technology and more sustainable formats. Getting an event's message to the target audience is challenging because there are many weekly events from athletics, festivals, special events, and club meetings in a university setting. The study examines the 2022 Adaptalooza because it matches the university's core values of diversity and inclusion. Adaptalooza promotes these core values by offering adapted recreation activities, including wheelchair basketball, sitting volleyball, adaptive climbing, and virtual reality (VR). The event was given a \$4,000 marketing budget from the Diversity, Equity, Belongingness, and Inclusion (DEBI) grant. With the grant, the event hired a marketing team of ISU students and employed various marketing strategies such as social media marketing, event promotions on digital screens, flyers, post-card invitations, news articles, emails, and announcements. Four social media formats are Instagram, TikTok, Facebook, and Twitter. The event promotion was posted on digital screens at high-traffic areas such as McCormick Hall, Student Fitness Center, residence halls, dining halls, and the Student Bone Center. The event flyers are posted throughout McCormick Hall, residence halls, and other departments. Postcard invitations are delivered to selected faculty and staff whose job responsibilities are aligned with diversity, equity, belongingness, and inclusion. Lastly, emails/announcements are delivered from professors and advisors to students with possible extra credits offered to encourage participation. The purpose of the study is to examine key indicators of the marketing effectiveness in promoting Adaptalooza. The study will examine several social media marketing performance indicators such as post likes, followers, and interaction. Another measure used is the activity-based costing of these marketing tools. The study will analyze the cost-effectiveness of each tool and cross-examine with the data derived from the post-event survey. Lastly, the marketing tools will cross-examine with the event satisfaction questions such as willing's to recommend and return and overall level of satisfaction in the post-event survey. Through this data, one or more marketing tools will be recommended to various university marketing teams and departments to get their message across to members of Illinois State University, including future Adaptalooza and other events.

Philosophy

DRUNK DRIVERS ARE WASPS

Presenter: White, Leila
Undergraduate, Philosophy
Mentor: Prof. Daniel Breyer
Authorship: Leila White

Moral responsibility is one of many philosophical discussions. It is, at large, what will be discussed here. The more accurate focus of this presentation is moral luck or the moral responsibility of accidental agents who lack control of a situation in which they've acted. Is control required of an agent to ascribe moral responsibility to them? To explore this inquiry, we look at two cases of drivers.

The first is the lorry driver who, to no fault of their own as they are completely sober and alert, hit and kills a child while driving. The lorry driver is regarded as an accidental agent without moral responsibility. The second is the drunk driver who, being intoxicated and not alert, hit and kills a child while driving. Both drivers are generally regarded as matters of moral luck since the only difference between them killing and not killing the child would be a matter of luck or chance. For instance, had the child been elsewhere or either driver been given a ride, left their destination earlier/later, decided to stay in bed that morning, etc., they might not have even been there to hit and kill the child.

Three puzzles stem from these two cases of moral luck which will be solved:

- 1) Why is it that the lorry still feels agent-regret, or guilt?
- 2) Is this feeling appropriate given the lack of fault and moral responsibility?
- 3) Why do those observing the scenario of the lorry driver say that such accidental agents aren't morally responsible and shouldn't feel guilt, yet, condemn them if they don't feel guilt or 'get over' their guilt too quickly?

In solving these puzzles, I intend to prove that the lorry driver is an instance of true moral luck whilst the drunk driver is not. For this reason, among others, the drunk driver ought to be held morally responsible and the lorry driver should not.

Physics

DYNAMICAL SYSTEMS MODELS FOR PLASMA DILUTION

Presenter: Chambers, Dylan
Undergraduate, Physics
Mentor: Prof. Neil Christensen
Authorship: Dylan Chambers, Neil Christensen

Recent experiments provide evidence that diluting the blood plasma restores the plasma environment to a more youthful level at least partially restoring the health of organs and tissues

throughout the body. We propose that a dynamical-systems model representing the plasma constituents could support the optimization process and help determine the appropriate dilution level, frequency and any plasma additions to achieve the most favorable outcome. We use a combination of a gradient descent, a simulated annealing and a genetic algorithm to find a population of models that fit the illustrative data. We analyze the population and present distributions of the model parameters and include a collection of plots of the dilution process for illustrative models. We then consider modifications of the dilution in order to illustrate what predictions might be possible had we more data to disambiguate the model. Among the modifications, we consider enhancing some of the plasma constituents while diluting the rest as an illustration of a dilution coupled with an infusion.

NANOMETER SCALE MATERIAL GROWTH AND PATTERNING

Presenter: Korveziroska, Amelia
Undergraduate, Physics
Mentor: Prof. Mahua Biswas
Authorship: Marcos Perez, Uttam Manna

With the rise in emerging technologies in the field of microelectronics, optoelectronics, sensing and bioengineering exploring different patterning process for inorganic nanomaterial patterns with tunable size and spacing became imperative. In our work we grow nanometer scale inorganic material (such as aluminum oxide (Al_2O_3), titanium oxide (TiO_2), and zinc oxide (ZnO)) patterns using a vapor deposition method called sequential infiltration synthesis (SIS) which utilizes polymer material as a template. SIS enables the control of localized inorganic material growth in polymers which contains active chemical species; which results in nanopatterns of inorganic materials of similar size and spacing as the polymer materials. In our lab we explore new polymers and study the growth mechanism for growing different inorganic materials of different shapes. We evaluate the growth process and the material deposition using scanning electron microscopy and infrared spectroscopy. In this work we show Al_2O_3 nanoparticle growth using SIS and three different polymers as templates, performed at ISU Physics department. We analyze the SIS growth mechanism inside these three different polymers used in the study and resulting nanoparticles shape.

SILICON NANOPARTICLES FOR OPTICAL TWEEZING

Presenter: Perez, Marcos
Undergraduate, Physics
Mentor: Prof. Mahua Biswas
Authorship: Mahua Biswas, Uttam Mann, Marcos Perez

High Refractive Index dielectric (HRI) nanoparticles have arisen as competitive alternatives in nanophotonics research for their low loss compared to plasmonic (gold and silver) particles, and the possibility to generate Mie resonances of both electric and magnetic character, which can yield highly directional light scattering. One of the most celebrated and utilized method in the field of nanophotonics is optical tweezing method which is a contactless manipulation method of microscopic particles. In this regard, magnetic resonance based optical tweezing has not been explored before; hence fabrication and manipulation of Silicon (Si) nanoparticles with wellcontrolled size and shape will provide a novel platform for optical tweezing. In Applied Nanomaterials Lab at Illinois State University, we are using a high temperature fabrication method to obtain perfectly spherical and monodisperse Si nanoparticles of 150-200 nm dimension for tweezing purpose. The fabrication process begins with the high temperature (1500 oC) annealing of silicon monoxide (SiO) to obtain Si nanoparticles embedded in SiO_2 matrix. At the end, the Si nanoparticles are liberated from SiO_2 using hydrofluoric acid (HF) acid. We have imaged the particles using scanning electron microscopy, performed dynamic light scattering measurement to study particle size distribution, UVVIS spectroscopy and single particles spectroscopy to characterize the scattering of the particles. In

the next step, we are planning to perform optical tweezing experiment to trap these nanoparticles using a single beam laser source.

INVESTIGATING THE EFFECTS OF MODIFIED ELECTRIC FIELD REPRESENTATIONS ON STUDENT INTERPRETATION OF ELECTRIC FIELD DIAGRAMS

Group Leader: Satoh, Naomi
Undergraduate, Physics
Group Member: Jack Jordan, Undergraduate, Physics
Mentor: Mr. Raymond Zich
Authorship: Naomi Satoh, Jack Jordan

We report on the results of a study of the effect of visual changes to electric field diagrams. Electric fields are often represented with lines of uniform thickness with integrated arrows. Students must infer the strength of the electric field from the spacing of the lines and the direction of the field from the direction of the arrows. Influenced by work with modifications to equipotential diagrams, this project studied the results from modifying electric field indicators. Based on theories of visual affordances alternative electric field diagrams were designed and implemented to increase the visual salience of the strength and direction of the electric field and of the charge sign. Modified symbols and variations in line thickness were used to indicate the direction and magnitude of the electric field. Student performance on assessments using traditional to modified diagrams showed a statistically significant increase of 10% on overall average scores. Student assessment data collection continues to occur.

Politics and Government

FOOD SECURITY AS A MEANS TO ADEQUATE HOUSING

Presenter: LaPorte, Manda
Graduate, Politics and Government
Mentor: Prof. Michael Hendricks
Authorship: Manda LaPorte

Housing is often referred to as a precondition to proper health, and that food security will follow. Global and U.S. organizations like the World Health Organization (WHO), UN-Habitat, Housing and Urban Development (HUD), United States Department of Agriculture (USDA), etc., have revolved their initiatives around the notion that housing will lead to food security and better health. However, we are still combatting alarming statistics for both food insecurity and housing inadequacy locally and globally. While no one is questioning the importance of either, no one is questioning the methodology linked to solving these issues. The purpose of this research is to do just that, provide a starting point for alternative approaches, research, and solutions to accessing these fundamental human rights. The study will utilize HUD's Housing Affordability Data System and Feed America's Insecurity Map and Data to track the relationship between reliable food security programs and adequate housing within rural America. The goal of this research is to answer the question;

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COMBATting CIVIC DISENGAGEMENT: AN ANALYSIS OF YOUTH CIVIC ENGAGEMENT AND EDUCATION TRENDS IN THE UNITED STATES

Presenter: Northern, Grace
Graduate, Politics and Government
Mentor: Prof. Lori Riverstone-Newell
Authorship: Grace Northern

For democracy to thrive, civic engagement must allow for participation from all of its citizenry. It is widely understood that the more civically engaged an individual is, the more likely they are to vote. Why is it then, that despite higher levels of youth engagement across the United States, there is still a decline in youth voter turnout? This essay seeks to address this paradox, employing a unique data set provided by the Center for Information and Research on Civic Learning and Engagement (CIRCLE). This data set offers insights into youth voter turnout in the United States from 2016-2018, as well as in non-electoral civic engagement activities such as volunteerism, group belonging, and community involvement. Using this data, this paper explores trends in civic engagement and the juxtaposition of high youth civic engagement and low youth voter turnout, and in some cases, vice versa. These results are further explored within the context of civic education standards in selected states. Among other findings, the language used in civic education standards appear to have an effect on youth engagement and voter impact. Finally, this paper advocates for a more diverse and dynamic public school civic engagement curriculum.

Psychology

MEDIA REPRESENTATION (AND LACK OF) AS A FORM OF SOCIAL INCLUSION/EXCLUSION

Presenter: Gallagher, Brett
Undergraduate, Psychology
Mentor: Prof. Eric Wesselmann
Authorship: Brett Gallagher, Eric Wesslemann,

There have been increased discussions both within in U.S. entertainment industry and among cultural commentators about the importance of having diverse representation of characters in media products (e.g., Film and TV shows). Media scholars have focused predominately on the social-psychological effects of positive versus negative depictions of individuals from different identity groups. The prevailing assumption in this literature is that a lack of representation is worse than negative representation, yet this has not been investigated directly. However, this assertion converges with research on interpersonal social exclusion, which demonstrates that negative attention is harmful and to be treated as completely invisible or unworthy of attention in one's personal relationships is even worse. We present data from a preliminary investigation that merges these research areas. Participants first identified an identity category important to their self-concept. Participants were then assigned randomly to one of three groups. One group recalled a time when someone who shared their identity category was represented in media (type of representation purposefully left ambiguous). A second group of participants recalled a time in which a someone who shared their identity category was noticeably absent in media. A third group of participants served as the control condition, writing about an unrelated event (i.e., the last time they ate breakfast). Participants then completed measures of perceived social value, feelings of being ignored and excluded, and of basic psychological need satisfaction (e.g.,

self-esteem). These measures commonly are impacted by interpersonal social inclusion and exclusion. Analyses are still in progress, but we expect that participants in the noticeably absent condition would feel less valued socially, less psychological need satisfaction, and feel more ignored/excluded than participants in the control condition. Because we left the representation condition ambiguous purposefully, we expect participants' experiences to vary by the type of representation recalled. Participants who recalled an instance of positive representation should report positive scores on the outcome measures compared to both the control and absence conditions. Participants who recalled an instance of negative representation should report negative scores on the outcome measures compared to the control condition, but less negative when compared with the absence condition. We will discuss these results' implications for future studies unpacking the complex connections between media representation and feelings of social inclusion/exclusion.

TRAIT ANXIETY, WORKING MEMORY, AND PROSPECTIVE MEMORY IN COLLEGE STUDENTS; THE EFFECTS OF ANXIETY ON THE NERVOUS SYSTEM

Presenter: Henness, Madison
Undergraduate, Psychology
Mentor: Prof. Dawn McBride
Authorship: Madison Henness

Anxiety disorders are one of the most common mental disorders, affecting 18.1 percent of adults in the United States alone. However, there is a lack of research regarding the association between trait anxiety, working memory, and prospective memory as a triad, which is important and must be explored because these cognitive processes are important to everyday tasks. The current study examines the effects of elevated levels of trait anxiety on working memory and prospective memory performance. Participants, 100 college students, will complete the Hospital Anxiety and Depression Scale, to self-report trait anxiety. Then, they will complete two working memory tasks and a long delay prospective memory task to text the researcher after a several hours or a few days. We predict that elevated levels of anxiety will have a negative effect on both working memory and performance in the prospective memory task.

STUDENT'S DISCLOSURE OF MENTAL HEALTH IN THE CLASSROOM WITH FACULTY AND PEERS

Presenter: Herr, Aaron
Undergraduate, Psychology
Mentor: Prof. Jeffrey Kahn
Co-Mentor: Prof. Christopher Gjesfjeld
Authorship: Aaron Herr

Mental health and psychological disorders are common occurrences that college students face throughout their time on and off-campus. Current studies look towards the best way for students to disclose their mental health and psychological disorders on campus with faculty and students. One study has shown that students with non-diagnosed mental health disorders preferred sharing their problems with other peers compared to students with diagnosed mental health problems who preferred sharing their problems with faculty (Budenz et al., 2020). Another study has shown that students with mental health disorders perceived disclosure of information to an instructor as a higher risk compared to students who never disclosed information to the instructor (Meluch et al., 2020). These two studies have shown that students with mental health disorders who disclose information to faculty and peers receive different forms of privacy and advice. Because of that, students may have a favorable choice between who they decide to disclose their

mental health with. The purpose of this study is to see if students are more likely to disclose their mental health with peers compared to faculty (qualitative) along with to what extent they disclose their mental health with peers compared to faculty (quantitative). This study comprised three hundred Illinois State University students who were recruited via a Qualtrics survey. These students received an online survey that asked them questions about their disclosure of mental health and psychological disorders with classmates and professors. The main variable in this study looked at students' qualitative feelings after disclosing mental health to peers and faculty using a Likert scale with 1 Very Little to 7 To A Great Extent. The ten feelings include: proud, authentic, safe, relieved, ashamed, vulnerable, exhausted, sad, anxious, and angry. An additional variable looked at the context (quantitative data) that the student disclosed their mental health with faculty and peers. The results of the study showed that there is no significance between the degree to which students disclosed mental health and psychological disorders to professors compared to students. The poster will report the results of the quantitative data that is collected from this study. The importance of this study will help future researchers and universities understand new and better ways to help students who are experiencing mental health problems disclose to either faculty or peers.

BIPOC ACADEMICS' EXPERIENCES DISCLOSED VIA #BLACKINTHEIVORY

Group Leader: Nagy, Paige
Graduate, Psychology

Group Members: Arielle Flint, Graduate, Psychology; Christopher Melecio, Graduate, Psychology; Berenice Contreras, Graduate, Psychology; Emma Harris, Graduate, Psychology; Gaiye Behrem, Graduate, Psychology

Mentor: Prof. Kimberly Schneider

Authorship: Arielle Flint, Christopher Melecio, Berenice Contreras, Paige Nagy, Emma Harris, Gaiye Behrem

Protein synthesis is an essential process that occurs in all organisms and its accuracy is dependent on the faithful actions of the aminoacyl-tRNA synthetases (aaRSs). These enzymes play the critical role of coordinating tRNAs with their cognate amino acids, which allows for the translation of mRNA codons into proteins. As such, the genes that encode for these proteins are indispensable for cellular viability. Notably, in some organisms, such as all species comprising the Archaeal Sulfolobaceae family, which includes *Sulfolobus islandicus*, there exists duplications of select synthetase genes whose functions are not entirely known. A paralog of Leucyl-tRNA synthetase

(LeuRS) in *S. islandicus*, namely LeuRS-I, is the focus of this investigation into the possible noncanonical functions that synthetase-like encoding genes hold. To distinguish phenotypes of a leuRS-I knockout, this strain was used alongside a wildtype strain in a series of plating assays, treated under various conditions meant to simulate environmental stressors. A careful comparison of results has given insight into the role that the duplicate gene plays in the viability of *S. islandicus*.

THE INFLUENCE OF THE FACETS OF OPENNESS TO EXPERIENCE ON MUSIC PREFERENCE

Presenter: Setti, Fabio
Graduate, Psychology
Mentor: Prof. Jeffrey Kahn
Authorship: Fabio Setti

Listening to music is a widespread and time-consuming activity for many people (IFPI, 2019). Given this, knowing why people prefer certain kinds of music is psychologically meaningful. Trait openness to experience appears to be a reliable predictor of music preference (Dunn et al., 2012; Rentfrow & Gosling, 2003), yet the ability of facets of openness to experience to predict music preference has yet to be explored. We explored the relation between the singular facets of openness to experience and music preference. Additionally, latent profile analysis (LPA) was used to uncover possible latent classes of music preference according to participants' response patterns.

Procedure

College students (N =478) participated in an online study. Facets of openness to experience were measured consistent with the five-factor model (Costa & McCrea, 1990) and the HEXACO model of personality (Lee & Ashton, 2004). Music preference was measured by the Short Test of Music Preference Revised (STOMP-R; Rentfrow et al., 2011) and participants' liking ratings of 20 musical excerpts selected from Rentfrow and colleagues (2011). Both measures should produce five factors of music preference (sophisticated, unpretentious, intense, contemporary, mellow).

Results

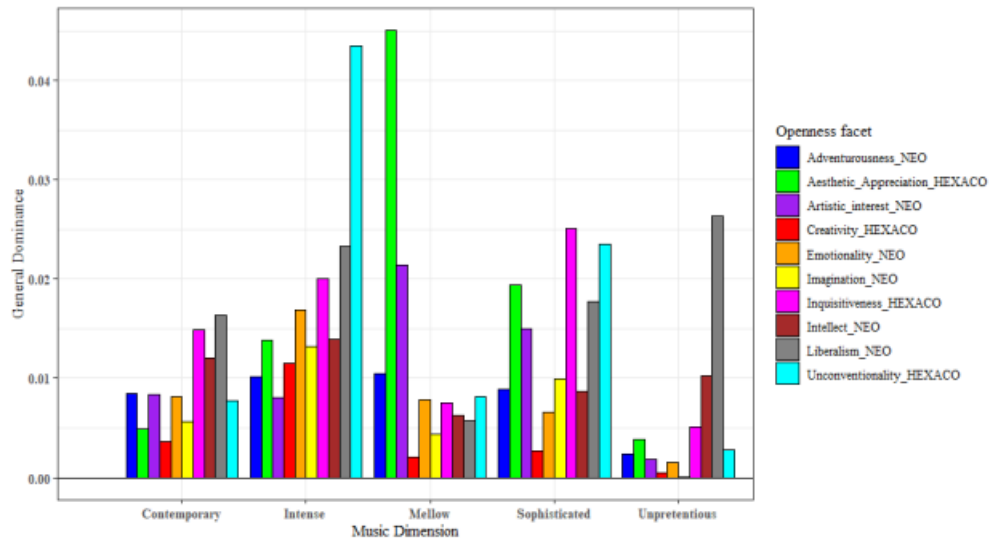
principal axis factoring (PAF) revealed that the STOMP-R did not reproduce the five dimensions of music preference, whereas the five-factors structure of music preference measured by musical excerpts was supported (sophisticated, unpretentious, intense, contemporary, and mellow). Due to multicollinearity among predictors, dominance analysis (Azen and Budescu, 2003) was used to interpret the results (Figure 1). Latent profile analysis (Figure 2) revealed three profiles of music preference among respondents. The 3 profiles were significantly different in mean liking of the 5 music preference; additionally, profile membership was significantly related to ethnicity, (Table 1).

Conclusions and Implications

There is evidence of association between openness facets and music preference. Additionally, it appears that some facets of openness to experience predict music preference better than other. This poster will explicate those results. Moreover, we will discuss the potential advantage of examining the association between personality and latent profiles of music preference as a complement to dimensional measures of music preference.

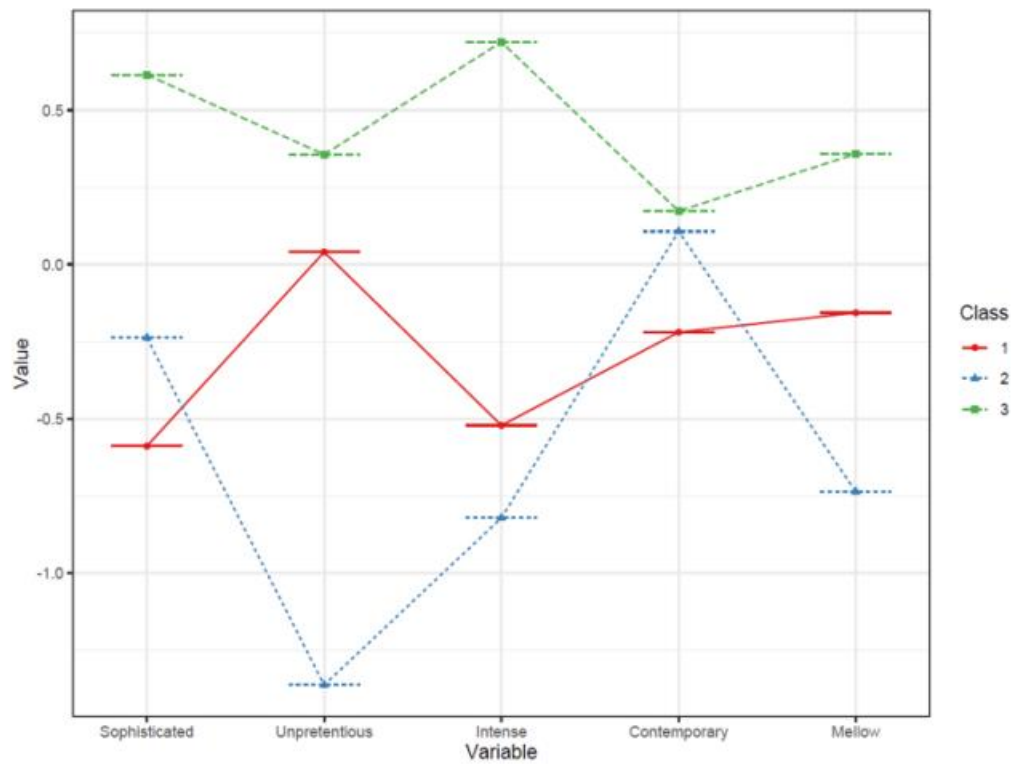
Figure 1

General Dominance Indexes for the 10 Openness Facets Predicting the 5 dimensions of music preference.



note. The x-axis represents the 10 openness to experience facets clustered according to music preference dimensions. The Y-axis represents the general dominance index of each of the openness to experience facets.

Figure 2
Standardized Profiles for a 3 Latent-Profile Solution



Profile 1: 161

Profile 2: 54

Profile 3: 159

Note. Dimensions of music preference are displayed on the X-axis, which is labeled as "Variable". The Standardized preference ratings for each dimension of music preference are displayed on the Y-axis, which is labeled as "Value". The estimated number of participants for each profile is displayed right below the graph.

Table 1
Cross Tabulation of Profile Membership and Ethnicity

Profile	Ethnicity			Total
	White	Hispanic	African American	
1	132 (85.16%)	12 (7.74%)	11 (7.1%)	155
2	20 (40%)	11 (22%)	19 (38%)	50
3	119 (82.64%)	22 (15.28%)	3 (2.08%)	144
Total	271	45	33	349

Note1. Numbers in parentheses represent the percentage of the ethnicity in each profile.

EFFECTS OF GAIN AND LOSS MOTIVATIONAL INFLUENCES ON PROSPECTIVE MEMORY

Presenter: Symonds, Halle
Undergraduate, Psychology
Mentor: Prof. Dawn McBride
Authorship: Halle Symonds

This study investigated the relationship between prospective memory and motivation using a 3x2 design with gain, loss, and control factors using a lexical decision task with focal and nonfocal task cues. I associated a gain-frame with a numerical gift card entry increase and for remembering to respond to cues and a loss-frame with a numerical gift card entry loss for failing to respond to cues and compared these frames to a no-frame control condition with no contingency linked to performance. I hypothesized that frames with gain and loss intentions will show a higher PM performance than frames without value-added intentions. Additionally, I hypothesized that focal tasks will result in a higher PM performance than nonfocal tasks due to the easier extraction of focal cues. Following the experiment, I found an increase in PM performance for the gain-frame and loss-frame conditions relative to the no-frame conditions. There was also an increase in PM performance for the focal cues as compared to the nonfocal cue performance across all frames. These results have implications for how people may be motivated to do everyday tasks in a real world setting when a potential gain or loss is associated with task completion.

Sociology/Anthropology

FREEDOM WITH CONTINGENCIES: OBSTACLES TO LIFE AFTER PRISON

Presenter: Lowe, Megan
Undergraduate, Sociology/Anthropology
Mentor: Prof. Cristina Prestin-Beard
Authorship: Megan Lowe

We all have conceptions of life in prison, but what do inmates experience when they return to society after serving their sentence? Former prisoners face a myriad of obstacles which stand between them and truly returning to life outside of prison.

They lack what they had before incarceration. Familial relations, social networks, job security, and the guarantee of shelter are all liable to have changed in nature or be completely nonexistent after the duration of a prison sentence (Jones, 2021). They can no longer rely on things they had become accustomed to in prison. The structure of prison life can offer crucial support for inmates. In addition, medication and treatment that are provided and regulated in prison can offer stability not easily accessible after reentry into society (Vail, 2017). The world they come back to has changed during the time of their sentence. Technologies have evolved, and released prisoners reenter the world with a criminal record which can make employment difficult to find (Couloute & Kopf, 2018).

The transition back into society for a former prisoner is freedom with contingencies.

Technology

HAPTIC RENDERING IN A VIRTUAL MANUFACTURING ENVIRONMENT FOR PROCEDURAL KNOWLEDGE ACQUISITION

Presenter: Diffor, Alexander
Undergraduate, Technology
Mentor: Prof. Isaac Chang
Authorship: Jake Weihe, Jordan Osborne

Haptic rendering in a virtual environment refers to a system's ability to allow a user to touch, explore, or manipulate virtual objects through a haptic device. With the technological breakthrough, it is possible nowadays to simulate the feel of surface textures on complex geometries under dynamic conditions. In the context of manufacturing training, haptic rendering could provide the learner stimuli needed for the hands-on experience, especially for acquiring procedural knowledge, e.g., know-how. Nevertheless, researchers also reported the concern of overstimulating the user-in-the-loop with unnecessary sensation and thus distracting him or her from picking up the key components of the intended experience. There is a lack of literature suggesting how certain haptic stimuli in a virtual environment might help to construct the target procedural knowledge.

In this presentation, we will report an ongoing research product studying how proper haptic rendering could enhance an individual's performance and experience in learning manual assembly tasks. A conceptual framework on the hand movement patterns will be described and corresponding haptic stimuli will be suggested. To determine the effectiveness of the proposed haptic rendering scheme, the assembly of a virtual TV stand will be used to measure participants' speed and accuracy for completing the assigned task according to the instruction provided. Statistical analysis of quantitative data will be discussed. A self-reported post-test survey on participants' demographic data and experience will be used to help further explain the experimental findings. We will conclude the presentation with the lessons learned.

CONSTRUCTING HAPTIC GLOVES FOR VIRTUAL REALITY-BASED MOTOR SKILL LEARNING

Presenter: Osborne, Jordan
Undergraduate, Technology
Mentor: Prof. Isaac Chang
Authorship: Alex Diffor, Jake Weihe

With the advancement of visual computing technology and its affordability, job training through virtual reality (VR) environments has become a popular topic these days. The immersive experience allows the learners to develop a mental map of their task's execution and enables them to explore and try alternative solutions. Nevertheless, the induction of reported VR-based learning in most cases relies on computer-generated visual and auditory feedback. Consequently, motor skill acquisition through such VR environments is less favorable unless the enabling technology providing the much-needed haptic feedback is presented.

In this presentation, we will discuss an ongoing project investigating the basics of how the sense of touch affects human learning and determining the feedback mechanism, vibrating pattern, and signal strength for haptic gloves to properly support VR-based motor skill learning. Flex sensors mounted on the gloves are used to detect the user's hand gestures, and the signals are processed through Arduino controllers to allow him or her to interact with virtual objects. Haptic feedback will be provided by vibrating mini motor discs located on the glove's fingertip. The touch sensation is presented through actuating these discs independently or in combination. We will also present an experimental design to measure the effectiveness of haptic feedback for learning motor skills in engineering and technology

AUTOMATED CONSTRUCTION PROGRESS MONITORING FOR BRIDGE INSPECTION

Presenter: Vanka, Venkata Sai Vikas
Graduate, Technology
Mentor: Prof. Sally Xie
Authorship: Venkata Sai Vikas Vanka

The costs of bridge maintenance, repair, and rehabilitation (MRR) are enormous every year. One critical element to consider in deciding measures is the condition ratings of the bridges. Hence, accurately examining and evaluating bridge conditions are crucial to reliable planning for bridge MRR activities and estimating the costs. Currently, bridge engineers use visual inspections and deterministic models like a transition probability matrix (TPM) for this purpose. The TPM forecasts future conditions based on a Markov Chain model, which is a stochastic model for a sequence of events. Each event has a probability calculated from the state obtained in its previous event. However, such a model assumes a constant TPM over the entire life of the element, hence having a memory-less behavior (i.e., the future state depends only on the current state but not further earlier states). Additionally, these models rely on collected inspection data to form the TPM for the condition ratings but neglect influential variables such as age and traffic. The overall objective of this research is to automate the collection and analysis process of the element-level inspection data from the national bridge inventory. We will use the 3D scanned point-cloud datasets of ten bridges from an open-source database and the Simultaneous Localization and Mapping (SLAM) technology to estimate bridge damages. Then we will update the deterioration curves of the bridges that are identified as in accelerated delineation. This proposed system will provide the basis for the transportation agencies, such as the Illinois Department of Transportation when making practical and optimized maintenance, rehabilitation, and repair decisions.

THE NEXT GENERATION OF HANDS-ON LEARNING FOR DISTANCE EDUCATION

Presenter: Weihe, Jake
Undergraduate, Technology
Mentor: Prof. Isaac Chang
Authorship: Jordan Osborne, Alex Diffor, Isaac Chang

Engineering Technology (ET) is a well-established undergraduate technology major. Students of this discipline are equipped with engineering design and analysis skillsets and hands-on abilities to operate and trouble-shooting different equipment in the field. The ET graduates bridge the engineers and operators throughout the product life cycle and help realize the successful delivery of products and services. During the recent pandemic, many universities moved the majority of their courses to the online format. Although the faculty members at ET were able to deliver most of the content remotely via multisensory pedagogies, the muscle memory from physically operating equipment was missing: Some students struggled with comprehending

process knowledge when some others felt bored and lost motivation. Being part of the community, we ask ourselves: Can we help improve students' remote learning by offering a sense of touch?

In this presentation, we will present a research project studying the effectiveness of different human-computer interfaces (HCI) on supporting haptic feedback in an immersive virtual environment. Participants of this study will use three different input devices, namely, a VR headset controller, an infrared motion sensor, and a haptic glove to complete the assigned tasks. The individual's learning performance will be measured by his or her speed and accuracy for task completion. Statistical analysis of experimental results will be discussed. A self-reported post-test survey will be used to determine the individual's learning experience and preferences to help explain the experimental findings. We will conclude the presentation with recommendations in the context of distance education.

Theatre and Dance

"TRAGIC POPULISM OR ESTRANGEMENT?: CONTRASTING VISIONS FOR A REVOLUTIONARY POLITICAL THEATRE"

Presenter: Brown, Thomas
Graduate, Theatre and Dance
Mentor: Prof. Kee-Yoon Nahm
Authorship: Thomas Brown

The Western theatre's historical relationship with Marxist sociopolitical thought throughout the twentieth century is quite rich and varied; while some Marxist theatre practitioners remained confident in the power of rationalism to ignite revolutionary action, others felt the need to solicit other moral energies through drama to bring about social change. If the desired ends of these thinkers were largely the same, why did they opt to take different routes? In my analysis, I position Brecht's Epic Theatre against the realism of the American and Russian stages and argue that the aesthetic differences between them are in fact ideological ones as well. In a bout of genealogy, I try to trace the origins of "socialist realism" from earlier aesthetic and intellectual sources, particularly the bourgeois tragedy. Pulling from the work of these thinkers, as well as more recent scholars such as Georg Lukacs, Walter Benjamin, Raymond Williams, Terry Eagleton, Christopher Lasch, and Ilka Saal, I relabel the theory and drama of the realists "Tragic Populism" and show their commitment to the notion of revolutionary empathy. On the opposite hand, I link Brecht's anti-Aristotelean approach to the residual of positivism in Marx's work. The task of us historically removed from these debates is not to select one thread of thought over the other; rather, we should take it as an opportunity to consider what either one has to offer us in the twenty-first century in our continued search for a revolutionary political theatre.

TECHNOLOGY, SOCIAL MEDIA, AND THE GEN Z THEATRE

Presenter: Farias, María Amenábar
Graduate, Theatre and Dance
Mentor: Prof. Kee-Yoon Nahm
Authorship: María Amenábar Farias

In this presentation I will discuss how a technological revolution has led to a revolution in communication, both inside and outside of the theater, a topic I explored through my production of

the play *Good Kids* by Naomi Iizuka. History has proven that the survival of theatre as an art form relies heavily on its ability to adapt to the needs of its current society. As society evolves, the topics theatre focuses on and the storytelling methods it uses must evolve as well. The introduction of new technologies has not only inspired playwrights into incorporating that technology into their stories, but has also inspired directors like myself to use social media and other technological advances as a part of the fabric of the storytelling of a production. Gen Z audiences relate to plays that communicate in the same way they do, plays in which the characters use technology as a communication method and productions that use technology to communicate with the audiences directly. This is why with *Good Kids* our team used social media, projections and interactive dramaturgical devices to not only mirror the use of social media in the play, but to also connect with our Gen Z audience.

GLOBALIZING LEFTY: MAKING CLIFFORD ODETS SPEAK TO THE PRESENT

Presenter: Meateanuwat, Sanhawich
Graduate, Theatre and Dance
Mentor: Prof. Kee-Yoon Nahm
Authorship: Sanhawich Meateanuwat

I directed Clifford Odets's *Waiting for Lefty* at Illinois State University in fall 2021. As international director from Thailand, I found numerous connections between my voice and that of Odets, drawing parallels between this classic American labor play and the political issues and marches occurring in my home country right now. In this presentation, I will discuss ways my production team and I approached this play (written 86 years ago) through the themes of universality, placelessness, and timelessness to emphasize that these issues did not happen only in the past and in the U.S. but are currently happening all over the world. I will also describe ways we used presentational design elements to demonstrate a broken that needs desperately to be fixed. Ultimately, I want to discuss how we showed care and respect to the original story of the down-trodden workers while using theatrical devices (such as globally inspired sound transitions) to create a powerful argument for its global relevance. We sought to revolutionize this classic play with fresh eyes in order to provoke empathy and understanding for those who need it most.

WHERE TWO WORLDS MEET: A COMPARATIVE STUDY OF THEORETICAL AND LITERARY INSIGHTS ON AFRICAN FEMALE IMMIGRANT EXPERIENCES IN THE UNITED STATES OF AMERICA

Presenter: Okonma, Jenefas
Graduate, Theatre and Dance
Mentor: Prof. Kee-Yoon Nahm
Authorship: Jenefas Okonma

Volumes abound on the discourse of African migration to the United States of America on the spectrums of both academia and literature. A relatively recent phenomenon of this discourse is voluntary African female migration, and where there is much to be had by way of resources documenting the experiences of female migrants from the far corners of theory-based and literary-based viewpoints, there doesn't exist much that reaches across those ends to present a cohesive outlook on the subject matter. My presentation aims to bridge that gap, as I conduct a comparative study on themes of female African migration discourse that are presented in the scholarly and literary exploration of the subject. Juxtaposing the scholarly works of African

migration theorists such as John A. Arthur, Mary Johnson Osirim, Isidore Okpewho and Nkiru Nzegwu with the literary works of playwrights and authors such as Mfoniso Udofia, Chimamanda Ngozi Adichie and Imbue Mbolo, I draw out salient themes of Americanization, maintaining Africanness and race and ethnic relations, presenting both academic insights and experiential models of the discourse.

EL TEATRO CAMPESINO AND SOLIDARITY

Presenter: Samuel, Isabel
Graduate, Theatre and Dance
Mentor: Prof. Bruce Burningham
Authorship: Isabel Samueal

In 1965 Luis Valdez founded El Teatro Campesino as a collective theatre group in order to artistically support the Delano grape boycott and La Huelga led by the United Farm Workers. Through the production of improvisatory actos that could tour around various farms, El Teatro Campesino promoted the idea that Mexican farmworkers must band together in order to fight for humane and livable working conditions. Even after El Teatro Campesino formally separated from the United Farm Workers in order to focus their productions on the full breadth of the Chicano experience, the theatre collective still sought to bring the Chicano community together. It is El Teatro Campesino's origin as a pro-labor theatre collective that proves the importance of solidarity in the Chicano theatre movement.

E-Poster Option Abstracts

Art

EVERYTHING AND NOTHING: THE DIARY OF ONE WHO LEAVES

Presenter: Asiedu-Kwarteng, Japheth
Graduate, Art
Mentor: Prof. Tyler Lotz
Authorship: Japheth Asiedu-Kwarteng

The artworks presented in this article are my visual vocabulary discussing the experiences of the diaspora. They discuss how people of the diaspora, especially the Ghanaian/African diaspora, negotiates spaces away from their homeland. On the other hand, they discuss the “diasporan’s” experiences of being a stranger in their homeland during a visit after a long stay away. Premised on being in the diaspora without my young family, I discuss my experiences of separation, belonging, fear, anxiety, perception, pain, stress, nostalgia, confusion, acceptance, rejection, etc and other complexities of living a dual life and having a transnational identity, through these works.

Biological Sciences

PARKINSON'S DISEASE GENES INTERACT WITH ATP7 TO REGULATE COPPER DISTRIBUTION AND AVAILABILITY IN DROSOPHILA MELANOGASTER

Presenter: Allen, Brooke
Graduate, Biological Sciences
Mentor: Prof. Alysia Vrailas-Mortimer
Authorship: Brooke Allen, Alysia Vrailas-Mortimer

Copper is an essential element for enzymes that catalyze oxygen-dependent reactions. When an organism is exposed to either excess copper or deprived of copper, this micronutrient becomes detrimental. A mechanism used to control copper distribution and availability involves the ATPase transporter, ATP7. This X-linked transmembrane protein is responsible for delivering copper into the lumen of the cell by utilizing both endocytic and exocytic mechanisms.

Mutations in ATP7 have been shown to cause Menkes disease and Wilson’s disease, which both share the phenotype of neurodegeneration. These genetic disorders with ATP7 defects both lead to mechanisms of neurodegeneration that is likely shared with other, more common neurodegenerative diseases, such as Parkinson’s disease. A screening of possible candidate genes that interact with ATP7 was conducted by inhibiting Parkinson’s disease genes in a ATP7 loss of function or ATP7 overexpression background. We find that several of the Parkinson’s disease genes showed a genetic interaction with ATP7, indicating that the mechanisms of

neurodegeneration caused by ATP7 mutations may be conserved in Parkinson's disease. These interactions and their link to neurological disorders will be further discussed.

THE ROLE OF COPPER IN PARKINSON'S DISEASE

Presenter: Burkhardt, Jessica
Graduate, Biological Sciences
Mentor: Prof. Alysia Vrailas-Mortimer
Authorship: Jessica Burkhardt

Parkinson's Disease (PD) is a neurodegenerative disease caused by the death of dopaminergic neurons in the substantia nigra region of the brain. PD is characterized by the presence of dysfunctional mitochondria and increased levels of oxidative stress. Though a handful of genes, such as parkin and PINK1, have been identified in familial forms of PD, most cases are sporadic. Therefore, it is thought that environmental factors may act on genetic risk factors to promote disease onset. Therefore, we are exploring the relationship between copper toxicity, which has been linked to other neurological disorders, and parkin and PINK1. We are testing the effect of environmental exposure to copper as well as altering copper levels genetically by manipulating the copper transporter ATP7, which is mutated in the neurodegenerative disorder, Menkes disease. Preliminary findings have shown that increased extracellular copper, from overexpression of ATP7, in conjunction with knockdown of parkin and PINK1 exacerbate Parkinson's symptoms.

IDENTIFICATION OF GAP JUNCTION GENES INVOLVED IN TAIL-FLIP ESCAPE RESPONSES OF MARBELED CREYFISH

Presenter: Miller, Jennifer
Undergraduate, Biological Sciences
Mentor: Prof. Wolfgang Stein
Authorship: Jennifer Miller, Rajit Roy, Wolfgang Stein, Andres Vidal-Gadea

Electrical synapses are direct electrical connections between neurons used to transmit electrical potentials with short delays. They are often found in neural circuits that generate rapid behaviors, such as avoidance or escape reflexes. Electrical synapses are built by gap junctions that are composed of two channel pores (hemichannels) and expressed in adjacent cells. Together, the hemichannels form a physical connection between cell membranes. Each hemichannel is composed of multiple proteins that enable the quick flow of electrical current. In invertebrates, these proteins belong to the innexin family. While it is known that animals express a variety of different innexins, it remains unclear in most animal species which of them contribute to rapid signal propagation at gap junctions.

We use marbled crayfish (*Procambarus virginalis*) to examine the function of innexins in rapid escape responses. Like other crayfish, animals of this species show a rapid tail-flip that propels them away from potential threats in response to mechanical stimuli to the head. This tail-flip is mediated by medial giant (MG) neurons that are activated by sensory input and provide excitation to the tail motor neurons through electrical synapses. Several putative innexins have already been identified. To test their contribution to the MG tail-flip, we used RNA-interference (RNAi) to reduce expression of specific innexins. We then applied mechanical stimuli to the animal's head and monitored escape reflex trajectory and speed. RNAi was administered to reduce expression of innexins 1 and 2. Animals

received intraperitoneal injections with either saline, control dsRNA, or innexin-specific dsRNA. Untreated animals were included as additional control. Behavioral tests and innexin expression measurements were carried out 2 days after the injections. The tail-flip latency remained unaffected by the RNAi treatment and was similar in all treatment groups. In contrast, the time to reach peak velocity during the tail-flip was longer in animals treated with innexin dsRNA than in control animals (13ms vs. 15ms, N=6).

To determine the RNAi effectiveness, the ventral nerve cord was dissected and innexin 1/2 mRNA was extracted and quantified using gel-based PCR. The PCR confirmed that animals treated with innexin dsRNA had decreased innexin expression when compared to control animals, suggesting a correlation between innexin expression and tail-flip kinetics. Our results thus indicate that innexins 1 and 2 contribute to the MG tail-flip and are involved in rapid electrical signal propagation at electrical synapses. We are currently carrying out additional experiments to confirm our results statistically.

THE DIFFERENCE BETWEEN TROPHIC AND REPRODUCTIVE EGGS IN THE STRAWBERRY POISON FROG

Presenter: Talbott-Swain, Evan
Undergraduate, Biological Sciences
Mentor: Prof. Matthew Dugas
Authorship: Evan Talbott-Swain, Ryan Paitz, Matthew Dugas

Parents can benefit from feeding their offspring. Some frogs, in particular the neotropical poison frogs (Dendrobatidae), feed their developing tadpoles with unfertilized trophic eggs regularly throughout development. These eggs provide tadpoles with calories and perhaps nutrients that drive their growth and development (Dugas et al., 2016.; Dugas et al., 2017; Dugas et al., 2013). Eggs, at least when produced for reproduction, also contain hormones from the mother. These hormones have been well-studied in birds and reptiles, and a recent study confirmed that these are present in the eggs of poison frogs. Whether trophic eggs contain hormones and any difference between trophic eggs and reproductive eggs is unstudied. We collected both trophic and reproductive eggs from breeding pairs of the strawberry poison frog (*Oophaga pumilio*). We found that steroids are present in both reproductive and trophic eggs of *O. pumilio*. The types and quantities of steroids were similar in both types of eggs produced by the same female, although a rare androgen was found more often in trophic eggs. We also found that per-egg steroid quantities were lower in larger clutches. These results show, for the first time, that developing tadpoles are exposed to large quantities of steroids, and this exposure is variable. Further work can address the effects of these steroids on tadpole development.

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IDENTIFICATION OF HOMEBOX GENES FOR CRISPR-MEDIATED GENOME EDITING IN CRAYFISH

Presenter: Hudspath, Caleb
Undergraduate, Biological Sciences

Mentor: Prof. Wolfgang Stein

Authorship: Caleb Hudspath, Margaret L. DeMaegd, Rajit Roy, Andres G. Vidal-Gadea, Wolfgang Stein

Targeted genome editing is a powerful tool to identify gene function and study the molecular underpinnings of behavior. Recent progress has been driven by the rapid development of the Nobel Prize-winning CRISPR/CAS9 technique and its application to a variety of animal systems. However, genome editing progress has been slow in animal species that are difficult to raise and maintain in large numbers in research labs. For example, there has been only limited success in gene editing of decapod crustaceans such as crabs, lobsters, and crayfish, despite the large commercial and ecological importance of these animals.

We are working to implement CRISPR-mediated gene editing in the marbled crayfish, *Procambarus virginalis*, using its published genome and transcriptome sequences. Decapod crustaceans have a several week-long embryonic development, and reproduction cycles of several months. Here we are identifying target genes for CRISPR to allow early and high-throughput detection of successful gene editing. We searched for genes that determine early embryonic development ('homeobox genes') and lead to easily detectable phenotypes. We selected genes determining eye and body appendage development, as these features are readily detectable at about 60% embryo development (24 days).

Eye: We identified the marbled crayfish homolog of the *Drosophila melanogaster* eyeless gene as a potential guide-RNA target for CRISPR gene editing. Eyeless should present an easily identifiable phenotype of deformed eyes in early development. BLAST-ing the nucleotide sequence of *Drosophila* eyeless against the marbled crayfish genome revealed a single sequence with high homology. The BLAST returned an e-value of $5e-60$, indicating that the similarities to the *Drosophila* eyeless gene are unlikely to be a result of chance for this sequence. A conserved domain search revealed that, similar to other homeobox genes, the putative marbled crayfish eyeless gene possesses sequence homology to the HTH (Helix-turn-helix) domain, a superfamily of transcription factors.

Appendages: We have identified putative homologs of the *Procambarus clarkii* Ubx gene in marbled crayfish. This gene alters crayfish thoracic development by producing feeding appendages in place of the typical thoracic limbs. BLAST-ing the nucleotide sequence of *Procambarus clarkii* Ubx against the marbled crayfish genome revealed two homologous sequences (e-values: $3e-78$ and $7e-72$), with both regions possessing the homeobox conserved domains.

We are now identifying exons and introns in the putative marbled crayfish homeobox genes. Identifying the exons will allow us to design guide-RNAs specific to the coding regions of these genes, which will allow their specific knock-out by CRISPR-Cas9.

MOLECULAR UNDERPINNINGS OF THE TAIL-FLIP ESCAPE CIRCUIT OF MARBLED CRAYFISH

Presenter: Roy, Rajit
Graduate, Biological Sciences
Mentor: Prof. Wolfgang Stein
Co-Mentor: Prof. Andres Vidal-Gadea
Authorship: Rajit Roy, Andres Vidal-Gadea, Wolfgang Stein

Escape responses are highly stereotyped behaviors that enable an organism to avoid threats in its environment. These behaviors are mediated by dedicated neuronal circuits that process sensory stimuli in a rapid and robust fashion, which requires fast communication between neurons via electrical synapses. Moreover, a special class of electrical synapses, called rectifying electrical synapses, allow current to preferentially flow only in one direction, making neuronal signaling more rapid and stereotyped for fast, reflexive behaviors. Although *in vitro* studies have confirmed the presence of these gap junction proteins (called innexins in invertebrates) in electrical synapses, their functional role in escape responses is yet to be fully discerned. Thus, a full-fledged understanding of escape circuits and their molecular underpinnings is required.

The tail-flip escape behavior of crayfish has been used as a classical behavioral model for understanding escape responses. The neuronal circuitry of the crayfish tail-flip behavior has been largely worked out, with specialized giant neurons identified for the two major types of escape modes in the animal - the lateral giant (LG) and medial giant (MG) tail-flip. These escape circuits contain rectifying electrical synapses that facilitate rapid signal transmission from primary afferents to the motor neurons. However, the specific innexin proteins contributing to these rectifying synapses are still unknown. To address this problem, we are using the marbled crayfish (*Procambarus virginalis*) as a behavioral model. The marbled crayfish is a species of parthenogenetic crayfish whose genome and transcriptome data is largely available, making it easier to utilize cutting-edge molecular approaches in tandem with behavioral assays. We initially identified three putative innexin genes that are expressed in the brain and ventral nerve cord of the animal and are likely involved in escape. To test our hypothesis that these three innexin genes contribute to the escape circuit, we propose to use a two-pronged approach to interrupt the expression of these genes using RNA interference and CRISPR. This will be followed by behavioral assays to study the effects of gene disruption on escape behavior. The preliminary data from RNAi experiments suggests that silencing of innexin ½ in marbled crayfish results in slowing down of the tail-flip response. Next, we plan to individually knockout the putative innexin genes using CRISPR-Cas9 and examine its effects on behavior. Finally, by combining gene expression and behavioral data, we will be able to tease out a possible distribution of different innexins on the pre- and postsynaptic side of the escape circuit.

PARKINSON'S DISEASE MILD COGNITIVE IMPAIRMENT (ATTENTIONAL SET SHIFTING) AND THE ROLE OF THE DORSOLATERAL PREFRONTAL CORTEX

Presenter: Salzman, Ashley
Graduate, Biological Sciences
Mentor: Prof. Alysia Mortimer
Authorship: Ashley Salzman

Parkinson's Disease (PD) is a progressive disease involving the loss of dopamine (DA) neurons in the substantia nigra pars compacta (SNc). The cardinal symptoms consist of tremor, postural

instability, bradykinesia, and rigid muscles. However, 20-80% of PD patients experience impaired cognition, and many consider cognitive dysfunction as more debilitating than motor dysfunction. In particular, PD is associated with an impairment in the cognitive function of attentional set shifting, which is an example of cognitive flexibility, or the ability to move back and forth between different mental sets. However, a synthesis of what is known about attentional set shifting in PD has yet to be performed. Therefore, I undertook a literature review and will 1) summarize theories about what causes attentional set shifting deficits in PD, 2) define examples of impaired attentional set shifting in PD, and 3) discuss the role of the dorsolateral prefrontal cortex in impaired attentional set shifting in PD. Finally, I will discuss future implications for research and treatment of impaired attentional set shifting in PD.

DIVERGENCE AND CONVERGENCE OF THE GUT MICROBIOMES OF WILD INSECT POLLINATORS

Presenter: Sauers, Logan
Graduate, Biological Sciences
Mentor: Prof. Ben Sadd
Authorship: Logan Sauers, Ben Sadd

Pollination services provided by wild insect pollinators are critical to natural ecosystems and the economic value of crops around the world. Gut microbiota of these insects may determine health and the contributions of their hosts to these services. Thus, phylogenetically divergent insect pollinators represent a crucial system in which to investigate evidence for factors contributing to the assembly of host microbial communities, which is a general question in host-microbiota research. We investigated the microbiomes of multiple insect pollinator species from China, distributed across three insect orders. We found lineage specific divergences of dominant microbial genera and microbiota community compositions across the divergent insect pollinator genera. However, we found no broad phylogenetic signal underlying these divergences, even though one is present at finer phylogenetic scales. Although there is clearly no single insect pollinator associated gut microbiota, there is suggestive evidence that ecology, including diet, may be associated with community structure. Indeed, we uncover a similar microbe in the gut microbiomes of a pollinator fly and bees, but comparative genomics indicates potential functional differences that could relate to the evolution with host or other microbiota members. Overall, this study suggests selective processes involving ecology or physiology, or neutral processes determining microbe colonization may predominate in the turnover of lineages in insect pollinators broadly, while evolution with hosts and co-occurring microbes may occur under certain circumstances and on smaller phylogenetic scales.

Communication Sciences and Disorders

IMPORTANCE OF ORAL HYGIENE IN THE GERIATRIC POPULATION

Presenter: McElroy, Kayla
Undergraduate, Communication Sciences and Disorders
Mentor: Prof. Taeok Park
Authorship: Kayla McElroy

The purposes of this study are to determine how large the problem of oral hygiene neglect is in geriatric care facilities and to advocate for its implementation. Previous research shows that

providing geriatric patients with oral care costs pennies a day (Sheffler, 2018). The price of a patient lost due to the lack of oral care, however, cannot be measured. Oral hygiene practices are often neglected in institutions for the geriatric population due to low prioritization, nonroutines, and inadequate training of staffs. A lack of proper oral care can lead to undesirable consequences, namely aspiration pneumonia for the geriatric population. This condition occurs when foreign material enters the airway, causing an inflammatory condition of the lung (Wainer, 2020). Critical oral hygiene team members include nursing staffs, speech-language pathologists, and dental hygienists. For this study, two related professionals, a dental assistant and a speech language pathologist were interviewed to provide insight regarding the oral hygiene practice in their fields. The dental assistant discussed the importance of dental hygiene, mentioning poor dental hygiene's link to health concerns like decay, digestive issues, and periodontal disease. Dental hygienists additionally have an educational role. They model correct terminology and demonstrate proper oral care to their patients. The interviewed speech-language pathologist described the role of educating staff members about proper oral care techniques and how to provide the oral care. Staff members in geriatric care facilities can provide proper care by brushing a patient's teeth twice a day using a suction toothbrush and applying dry mouth gel to the lips and mouth every few hours, if required (Sheffler, 2018). Since oral care is neglected in care institutions for the geriatric population across the board, speech-language pathologists must also be advocates, ensuring these practices are carried out. This study demonstrates that a team of collaborating professionals is needed to help geriatric patients preserve their health, comfort, and their overall quality of life (Sheffler, 2018).

Creative Technologies

WHO GOVERNS THE VIRTUAL WORLDS: TENSIONS BETWEEN DEVELOPERS AND PLAYERS AS FORMS OF CULTURAL GOVERNANCE IN MMO VIDEOGAMES

Group Leader: Kalantari, Mojde
Graduate, Creative Technologies

Group Member: Ellie Parvin, Graduate, Creative Technologies

Mentor: Prof. Sercan Şengün

Authorship: Sercan Şengün, Mojde Kalantari, Ellie Parvin

This study focuses on tensions and conflicts between the developers and the players of massively multiplayer online games (MMOs), that emerge while developers struggle to regulate the public and the cultural domains of the virtual worlds and players generate methods to resist these regulations. Apart from deconstructional interventions like cheating and exploitation, players also stay at odds with the developers within the domains of intellectual properties, fan culture and other cultural behaviors. The study appropriates these tensions as collaterals of cultural governance in digital domains and discusses them with case studies. Keywords. Videogames, Digital games, Online games, Machinimas, Virtual worlds, EverQuest, World of Warcraft, Eve Online, DayZ

Criminal Justice Sciences

A DAY IN THE LIFE OF A POLICE OFFICER

Presenter: Hunter, Melissa
Graduate, Criminal Justice Sciences

Mentor: Prof. Jeffrey Walsh

Authorship: Jeffrey Walsh, Melissa Hunter

The primary goal is to gain a greater insight to specific instances in a person's life that may have led towards law violating behavior resulting in periods of incarceration. More specifically, the study participants have been asked what they feel led to their incarceration and what services and opportunities may have helped them to avoid the circumstances that led to their incarceration. The hypothesis in the present study is that the most salient challenges identified by participants will include domains of family dynamics, financial opportunities, educational experiences, and employment opportunities. Survey and interview data has been collected from ten study participants. Study participants were known associates of the Co-Primary Investigator and had an established relationship prior to their participation in the study. The Co-Primary Investigator used information collected as a means of comparison between the lives of the participants, prior to their being incarcerated, during their time of incarceration, and upon community reentry. It is anticipated that this information could be crucial in better understanding future directions for additional reentry programming. Similarly, information learned may also aid in targeted prevention efforts to assist in keeping people out of jails and prisons. Finally, the Co-Primary Investigator, a current active Police Officer, juxtaposes her own personal experiences with the challenges and opportunities of the participants in this study to explore areas of divergence leading to profound differences in justice system involvement.

MISTAKEN EYEWITNESS IDENTIFICATIONS AND OFFICIAL MISCONDUCT IN WRONGFUL CONVICTIONS

Presenter: Kurtz, Meghan
Graduate, Criminal Justice Sciences

Mentor: Prof. Michael Gizzi

Authorship: Meghan Kurtz

This project examines the relationship between eyewitness misidentification and official misconduct in wrongful convictions. A qualitative content analysis of exonerations including these factors from the National Registry of Exonerations has been used to explore not only the sources of eyewitness misidentification, but the roles of specific types of criminal justice actors. The research includes a detailed literature review of the methods that lead to misidentification and considers how it ties to other forms of official misconduct in wrongful convictions

English

I SAW MY OTHER SELF AT THE ZOO: INTERNAL FOCALIZERS AND ILLUSTRATIVE SPACES IN ZOO NARRATIVES

Presenter: Cintron-Gonzalez, Edcel J.
Graduate, English
Mentor: Prof. Mary Moran
Authorship: Edcel J. Cintron-Gonzalez

The proposed poster will explain how the focalization of narrative voices in texts and the spacial aspects of illustrations highlight the otherness of human and non-human animal in Zoos. Heterotopias have the ability to open possibilities for human to interact with animals in desired spaces. Examples of these can be how in *Life of Pi* it is possible for a Tiger and a young man to survive days in the ocean without one eliminating the other. However, one space that can reflect a positive and negative desire for humans and animals is the Zoo. For the most part, Zoos can be seen as a space where humans can experience different wildlife and examine a variety of species of animals. While this is one of many illustrations we see of Zoos, Anthony Browne's "Zoo" and Katherine Applegate's *The One and Only Ivan* demonstrate instances where both human and animals use the Zoo as a space to narrate their social problems without telling the real and implied reader what they are. Both narrators, a little boy going to the zoo, and Ivan the gorilla, display characteristics of internal focalizers who invite their readers to interpret the illustrations provided by the picture book and novel to demonstrate a side of their life that can be interpret as their other. With the little boy, the reader has a glimpse of possible family abuse, and with Ivan, a sort of representation of how life would be if not born and trapped in a mall Zoo.

Family and Consumer Sciences

RESTRICTIVE DIETARY PATTERNS AND WEIGHT REGAIN IN ADULTS BETWEEN 18-40

Presenter: Casas, Isaac
Graduate, Family and Consumer Sciences
Mentor: Prof. Erol Sozen
Authorship: Erol Sozen, Isaac Casas

Although multiple studies have examined the effects of carbohydrate-restrictive diets, their safety in the long term is still heavily debated. Moreover, the dietary restraint theory states that there is alteration in the way food is regulated, switching from physiological to cognitive control; this change makes individuals more susceptible to disinhibited eating. Furthermore, carbohydrates, such as fruits, grains, legumes, etc., are the primary sources of energy that our bodies require during moderate to intense exercise. That being said, their involvement in our diet is crucial, as they grant us the ability to perform and function more efficiently. This study will investigate perceived physical (weight gain), mental (stress, body dissatisfaction), behavioral (binge eating) changes of individuals who had a carbohydrate restrictive diet for two weeks in

the last year. The survey will be developed based on previous literature and have been validated in prior research. The binge eating and overeating scale is adopted from the American Psychiatric Association's binge-eating scale (2013). The perceived stress scale is adopted from Cohen and Williamson's Perceived Stress scale. Finally, the body dissatisfaction scale is adopted from Gideon et al.'s eating disorder examination questionnaire (2018). All of them will be measured as a multi-item scale, ranging from either strongly disagree (1) and strongly agree (5) or never (1) to very often (5). Questions such as gender, age, income, education level, and ethnicity are included. The participants will be asked to report their weight and height. Body Mass Index (BMI) will be calculated as weight (kg) divided by height squared (m²) to their BMI categories. The survey will be distributed via Amazon Mechanical Turk and is expected to be completed by 500 participants. Amazon Mechanical Turk (AMT) is a crowd-sourcing Internet marketplace enabling individuals and business to coordinate the use of human intelligence. AMT is strategically chosen for this study because of its ability to recruit a large number of subjects that is more representative of the U.S. population than in-person convenience samples. Theoretically, the completion of the proposed study will add novel literature to the nutrition research field. Practically, at the completion of this study, we will propose strategies and approaches about restrictive diets, post-diet weight gain, stress, and body dissatisfaction. Furthermore, we also hope that the research findings will give nutrition literature an area to touch on regarding the education, training, and research.

Geography, Geology and the Environment

INVESTIGATION OF OXYGEN ISOTOPES IN ICELANDIC ROCKS TO UNCOVER RHYOLITE FORMING PROCESSES

Presenter: Cox, Riley
Undergraduate, Geography, Geology, and the Environment

Mentor: Prof. Tenley Banik

Authorship: Riley Cox, Tenley Banik, Justin Dodd

Iceland is the product of voluminous magma generation resulting from the combined influences of an ocean spreading center joined with a mantle hotspot—conditions unique on modern Earth. Due to the combination of both features, Iceland has thick crust and a higher abundance of silicic rock than is normally associated with either ridges or hotspots. However, the processes that lead to silicic magma formation under conditions such as those on Iceland are debated.

One of the best ways to distinguish between fractional crystallization and partial melting as the two main processes invoked to explain silicic magma formation on Iceland is to examine O isotope ($\delta^{18}\text{O}$) concentrations in rocks and minerals. Silicates altered by low $\delta^{18}\text{O}$ waters inherit a low $\delta^{18}\text{O}$ value. There is an apparent shift in $\delta^{18}\text{O}$ toward lower values in zircons derived from silicic melts over the last ~3 Myr, coincident with the onset of Northern Hemisphere glaciation. Hyaloclastite, a rock produced when volcanoes erupt under ice or into water, also appeared in Iceland ~3 Myr ago. Due to their hydrous nature, hyaloclastites are more easily melted or assimilated into shallow crust magmas, thereby potentially being a notable contributor to silicic magmas < 3 Ma. Hyaloclastites also potentially retain a low $\delta^{18}\text{O}$ values due to the hydrous nature of their formation and alteration, and meteoric waters during glacial times have even lower $\delta^{18}\text{O}$ than is typical for Iceland during interglacials. To further assess a potential contribution of hyaloclastites

to >>3 Ma silicic magmas, we collected 39 hyaloclastite samples from across Iceland prioritizing both geographic and chronologic variability. Preliminary data suggests that sample glass fragments and whole rock powders are statistically indistinguishable and have a $\delta^{18}\text{O}$ value of $5.1 \pm 0.2\text{‰}$ (n=8). Mantle-derived basalt has $\delta^{18}\text{O} \sim 5.5\text{‰}$; our data suggest little-to-no contribution of low- ^{18}O material to either the parent magma or from low- ^{18}O waters incorporated syn- or post- eruption. Additionally, surface hyaloclastites do not initially appear to be a contributor to low- ^{18}O silicic magmas. Future findings will further elucidate the role of hyaloclastites in Iceland's

Information Technology

ADDRESSING THE FINANCIAL AND ENERGY POLICY DIFFICULTIES OF INSTALLING PV SYSTEMS AT ILLINOIS STATE UNIVERSITY AND CHEYNEY UNIVERSITY IN PENNSYLVANIA

Group Leader: Baumann, Anthony
Undergraduate, Technology

Group Member: James Smith, Undergraduate, Technology

Mentor: Prof. Jin Jo

Authorship: Anthony Baumann, James Smith

Colleges and universities make up 4% of the United States' carbon emissions. One thing that can fix this problem is by having institutions of higher education divest from fossil fuel sources and switch to cleaner forms of energy such as solar energy. Furthermore, solar energy can cut CO₂ emissions caused by colleges and universities in the United States by 28% and meet college energy needs up to 75% or higher. This could help U.S. higher education institutions save on high costs of conventional energy, which on average cost about \$14 billion in energy bills. The goal of this comparative analysis is to see how state incentives, institutional programs, and electricity rates make a power purchase agreement more economically viable than an upfront simple ownership financing model based on the installation of solar systems at Illinois State University and Cheyney University in their respective states. By conceptually implementing solar systems at each University by using solar photovoltaic system design and performance models, a cost analysis comparing both universities can be conducted. Furthermore, this comparative analysis presented case studies through which each university can implement campus programs to help drive down system costs and how their respective states can implement energy policies to help aid solar installation.

ON NEURAL CODE SEARCH FOR SOFTWARE GENERATION

Presenter: Nadeem, Usama
Undergraduate, Information Technology
Mentor: Prof. Shaoen Wu
Co-Mentor: Prof. Noah Ziems
Authorship: Usama Nadeem, Noah Ziems, Shaoen Wu

Reimplementing solutions to previously solved problems is not only inefficient but also introduces inadequate and error-prone code. Traditional methods achieve impressive performance on this issue by using autoregressive text-generation models trained on code. However, these methods are not without their own flaws. The generated code from these models can be buggy, lack documentation, and introduce vulnerabilities that may go unnoticed by developers. An alternative to code generation—neural code search—is a field of machine learning where a model takes natural language queries as input and, in turn, relevant code samples from a database are returned. Due to the nature of this pre-existing database, code samples can be documented, tested, licensed, and checked for vulnerabilities before being used by developers in production. In this work, in an effort to improve the performance of code search, we investigate the impact of various tokenization, pre-training objectives, and deep learning architectures on overall performance.

Physics

PREDICTING CHARGED PARTICLE COLLISION CROSS SECTIONS USING MACHINE LEARNING

Presenter: Nepomuceno, Josh
Undergraduate, Physics
Mentor: Prof. Allison Harris
Authorship: Allison Harris, Josh Nepomuceno

The use of machine learning algorithms in the physical sciences has exploded in recent years, including many areas of physics such as high energy physics, quantum many body problems, quantum computing, molecular chemistry, and material science. However, despite their promise, these techniques have been slow to make their way into atomic collision physics. It is unlikely that machine learning techniques will ever replace first-principles calculations, but they may be able to fill the gap in available cross section data that is needed in fields such as plasma physics and biophysics. The success of the models in these fields relies, at least in part, on the accuracy and availability of electron scattering cross sections over a wide range of energies, target species, and collision processes. Unfortunately, the necessary data sets are often unavailable or incomplete due to the difficulty associated with detailed measurements and sophisticated theoretical models. Machine learning could represent a major leap forward in the prediction of cross sections for complex atomic and molecular targets that are beyond the reach of existing theoretical models. Here, we present preliminary data for the prediction of atomic and molecular collision cross sections using a feed-forward neural network. Validity of the machine learning algorithm is determined by comparison of the predicted cross sections to known data from experimental measurements and theoretical models.

THE CAUSES OF DATA SILOS, THEIR DETRIMENTAL EFFECTS, AND POSSIBLE SOLUTIONS TO THEM

Presenter: Schaut, Levi
Undergraduate, Information Technology
Mentor: Prof. Qi Zhang
Authorship: Levi Schaut

Data silos are collections of information within an organization that are in some way isolated from other parts of the organization, which may cause overlaps across silos, potentially reducing data quality. When data is siloed, it's hard for decision-makers to get a holistic view of company data. Data silos can have a variety of causes, such as the differences in priorities and goals of the departments within an organization, the company structure making it difficult to share information, and technology and software applications being incompatible with each other. Silos can make it hard to retrieve relevant data and can cause data inconsistencies, which can waste a lot of time and resources. To address the barriers in information sharing and collaboration across departments caused by data silos, over the summer of 2021, I participated in a team-based internship project in Optum, Inc. In this project, for processing drug monograph data supplied by OptumRx and improving data consistencies, I created a Python script that parsed through raw data in JSON format and added the data to an existing graph database. This provided a solution to data silos by consolidating all of the data into a single, connected system. In this project, a Python library called "pyTigerGraph" was employed to connect to TigerGraph databases; this software package can integrate the power of graph technology with Python notebooks and libraries. My work is a component of a team project of creating a Web application that queried the graph database for the monograph data and established seamless connections among all the data sets simultaneously, a task which would have previously required connecting to a separate database specifically for that data.

Psychology

PARENT SHAMING: THE IMPACT OF RACE AND ABILITY STATUS ON PERCEPTIONS OF PARENTING

Presenter: Cicciarelli, Kara
Graduate, Psychology
Mentor: Prof. Brea Banks
Co-Mentor: Prof. Karla Doepke
Authorship: Kara Cicciarelli, Brea Banks, Karla Doepke, Adena Meyers, Christy Borders, Amber Richardson

Perception plays an important role in the human experience. The current culture of the U.S. contains an abundance of pressure to appear and behave in a certain way. People passing judgements and making assumptions based on appearance has become so heavily entrenched in U.S. culture that many do not realize the judgements they are making, the conclusions they are drawing, or the impact of negative judgement, stigma, and faulty conclusions. In order to shift from a culture of judgement to one of embracing differences there needs to be recognition of the

judgements being made. The goal of the current study was to develop a better understanding of how appearance and description impacts how a person is perceived and by extension judged through an experimental design dissertation project. Specifically, to determine if parents are perceived differently based on the race and assumed ability status of their children I used scenarios that included images of either a white or Black child and revealed the child as being either typically developing, having an invisible disability, or having a visible disability. Altogether, this research may contribute to a much larger discussion about the serious impact of human perceptions, assumptions, and judgements.

Keywords: Perception, parents, ability status, race

THE EFFECTS OF RACE ON FACIAL RECOGNITION

Group Leader: Carrillo, Michelle
Undergraduate, Psychology
Group Member: MaKayla Smullin, Graduate, Psychology
Mentor: Prof. Dawn McBride
Authorship: Michelle Carrillo, MaKayla Smullin

Facial recognition is a huge part of our world today, and being able to understand different factors that play a role when we are recognizing faces is very important. Understanding how race plays a role when using our facial recognition skills, especially when faces display a particular emotion, will allow us to better be able to understand the world because race and emotional expression are such a big parts of our lives. The goal of this study is to bring more awareness to studying facial recognition with various types of races because in past studies there has been a lack of diversity, which could be a contributing factor to not getting accurate results when studying facial recognition effects in emotional expressions. In this study 100 participants from Illinois State University will be tested in a 2 x 2 x 2 design where they are asked to study faces with different facial expressions (angry and happy) race (Black and White faces). The participants will then be tested for their recognition of the faces at an immediate and 15 minute delay. We predict that faces tested at the short delay will be better remembered with an angry than a happy expression based on results from past studies. We expect this effect to reverse at the longer delay. We also predict that the race of the faces will affect this interaction, with the Black faces showing no reversal of expression advantage at the longer delay.

Key words: Facial recognition, race, emotional expression, time delay

WHY DO WE PRECRASTINATE? THE RELATIONSHIP BETWEEN PRECRASTINATION AND COGNITIVE OFFLOADING

Group Leader: Michaels, Liz
Undergraduate, Psychology
Group Member: Elizabeth Marsh, Graduate, Psychology
Mentor: Prof. Dawn McBride
Authorship: Liz Michaels, Elizabeth Marsh

Precrastination can be defined as completing a task earlier than necessary despite incurring extra cost. This can refer to people who need to respond to emails or texts right away or people who need to wash the dishes as soon as they are done being used. The cognitive-load-reduction

(CLEAR) hypothesis (VonderHaar et al., 2019) suggests precrastination is a form of cognitive offloading; completing a task early instead of having to remember to complete the task preserves cognitive resources for other tasks. The current study aims to examine if precrastination and cognitive offloading are directly related as a test of this hypothesis. This study will utilize an alphabetizing task where the participants will be asked to put a list of words in alphabetical order. The participants will also have to verify sets of math problems by determining which ones are correct or incorrect. The participants will have the option to choose when they want to complete the math task (before, during, or after the alphabetizing task). Precrastination is measured in this task based on when the participant chooses to verify the math problems relative to the alphabetizing task – verifying the math problems before starting the alphabetizing task or early within this task shows precrastination of math verification. For the second part of the experiment, participants complete the same two tasks. However, for the alphabetizing task participants are given a specific category of objects to list at the end no matter what letter they start with (e.g., animals). Participants will complete trials with reminders, trials without reminders, and then trials where they have the option to use or not use reminders. Results are expected to show a significant relationship between precrastination and cognitive offloading, such that those who rely on cognitive offloading will precrastinate more. The current study is expected to further support the CLEAR hypothesis and help us better understand why some people precrastinate.

PROBING FOR INFORMATION: DIFFERENTIATING AMONG MULTIPLE PROPERTIES OF A SINGLE PROBE-SURFACE SYSTEM

Presenter: Oak, Devyn
Undergraduate, Psychology
Mentor: Prof. Jeffrey Wagman
Authorship: Devyn Oak, Ashton Grant

Many interactions with everyday objects involve wielding, manipulating, or hefting those objects by means of muscular forces. In doing so, people can perceive (and differentiate among) many different properties of that object – even when that object is out of view. For example, people can differentiate between the whole length of the object and the partial length of that object to one side of the grasp location. People can also perceive (and differentiate among) many properties of objects that are probed with a wielded object – even when both the probe and surface are out of view. For example, people can differentiate between the length of the probe and the distance of the probed surface. In this study, we investigated the degree to which people can perceive and differentiate among several properties of a single probe-surface system – the whole length of the probe, the partial length of the probe to one side of the grasp location, and the distance of the probed surface. We found that participants were able to differentiate among these properties. The results are discussed in the context of the mechanical variables that might provide information about such properties to a perceiver.

Sociology/Anthropology

ONLINE SEX WORK IN THE TIME OF COVID-19

Presenter: Ebersole, Courtney
Graduate, Sociology/Anthropology
Mentor: Prof. Jason Whitesel
Authorship: Courtney Ebersole

Young college-age women have been increasingly using online sex work as a popular avenue to raise capital. This study explores the experiences of women (both cis and trans) undergraduate students who engage in self-produced sex work using the mainstream online adult entertainment platform, Onlyfans. Posting explicit content such as pictures and videos on the Onlyfans platform has allowed many college women to earn an income and fund their university costs, especially during the ongoing COVID-19 pandemic. This study aims to identify interpretative narratives used by undergraduate women in the U.S. to make sense of their labor as sex workers within capitalist relations. To access these narratives, online social research methods, collection of fieldnote data, and semi-structured interviews of industry participants has been conducted. Participants have been recruited using convenience sampling methods, such as snowball sampling as well as responding to participant recruitment flyers posted to social media. In interviews, participants have been asked about their initial motivations for producing explicit content on Onlyfans, the impact of the Covid-19 pandemic on their experiences as a sex worker, the labor required of them as a content creator, their reactions to Onlyfans announcing and then reversing a ban on explicit content, and opinions on how to ensure sex work platforms are properly supporting their creators. This intention of this study is to move toward strategies that would resist the capitalist exploitation of online sex work by centering the voices of sex workers themselves.

DEFENSE MECHANISMS OF THE SELF AGAINST REIFICATION

Presenter: Park, Dani
Graduate, Sociology/Anthropology
Mentor: Prof. Michael Hendricks
Authorship: Dani Park

Sovereignty of personhood demands that the Self is prioritized and placed above that of objects. In this sense, there is a distinction between Subject and Object that can never be breached: $S > O$.

However, under the logic of capitalism, nothing can be made sacred and thus incapable of being quantified and commoditized, including the Self and its many forms of expression (with special emphasis on labor). Such is the process of reification, in which human properties and processes—and eventually the human—become things capable of being commoditized. Thus, through reification a crucial concern becomes the abolition of the Subject/Object distinction in which neither has priority and therefore inherent value other than what can be quantified and objectified: $S = O$.

Given this change in relation, the objectification of the Subject and the subjectification of the Object serve to obfuscate, but never completely eliminate, the logic of reification. However, I argue that the Subject is never capable of being completely reified and instead

utilizes defense mechanisms with which she seeks to subvert the process of reification altogether. This comes in three forms influenced by Freud's psychosexual development stages and Deleuze and Guattari's body without organs:

1. Oral (Internalization/Causation). This mechanism involves the process of "consuming" the object and thus demanding its acknowledgment of the Subject as above that of the Object. Through internalization, the Subject literally envelops the Object as the cause of said internalization, thereby rejecting the logic of the Object as external to the Subject. By internalizing the Object, the Subject replaces this externality as cause, thereby reasserting sovereign supremacy before reification.
2. Anal (Expulsion). This mechanism involves the process of "shitting out" the object. Through expulsion, the Subject maintains the boundaries—and asserts her ability to maintain such boundaries—that distinguish the Subject from Object by the literal pushing out of that which obfuscates the Subject/Object distinction, thus forcing the separation of the Subject/Object that subverts reification.
3. Genital (Creation). This mechanism involves the process of asserting creative dominance over the Object. By utilizing the Object in a manner not prescribed by externality, the Subject imbues the Object with a creativity that in turn demands the recognition of a new Object—one that is derived from the Subject. This productive force leads to the reassertion of the Subject-dominance before reification.

A STUDY OF THE IMPACT OF COVID-19 ON LATINX COLLEGE STUDENTS IN THE MIDWEST

Presenter: Ricci, Molly
Graduate, Sociology/Anthropology

Mentor: Prof. Maura Toro-Morn

Authorship: Molly Ricci

This study proposes to examine how Latinx Illinois State college students who were enrolled in the Spring, 2020 semester experienced the transition to online learning after the onset of the worldwide Coronavirus pandemic. We are interested in investigating how they were affected by the pandemic and how they coped with it in the aftermath of college closures and movement to online learning. We draw on qualitative data which will be collected through a series of 30 total interviews collected in a snowball sample with various starting points. We anticipate that the pandemic affected the students' learning and college experiences. Given what we know about racial differences in the impact of COVID-19 more broadly, we anticipated that Latinx students were differentially impacted in both the transition to online learning and their college experiences. We anticipate that our research will contribute to existing research by giving voice to the unique experience of Latinx students. We also want to examine the student's perception of the university's response. This study will contribute to the growing body of work that is emerging about the impact of the 2020 pandemic in college campuses across the nation.

Teaching and Learning

ESL TEACHERS' PERSPECTIVES: INCLUSION OF STUDENTS DESIGNATED AS ENGLISH LEARNERS WITH SPECIAL NEEDS IN THE GENERAL CLASSROOM.

Presenter: Bhat, Sukanya
Graduate, Teaching and Learning
Mentor: Prof. Anna Smith
Authorship: Sukanya Bhat

The purpose of this mixed method study is to explore ESL teachers' perspectives on inclusion of students designated as English learners with special needs in their general classroom. This topic is very essential at this time, since literature review proves that inclusive education for students designated as English learners with special needs helps to bring in learners from the periphery, making everyday education more responsive to learners. If inclusion has to be successful, then the educators implementing inclusion need to have favorable perspectives towards inclusion. Research proves that when educators tend to have neutral or negative attitude towards inclusion then it would be less effective in bringing out student's potential. Gaining the perspectives of ESL certified teachers on inclusion of students designated as English learners with special needs in the general classroom is very important since teachers play a great role in influencing curriculum design, teaching methods & providing equity for students' academic success. In their research, Shore & Sabatini 2009 & Artiles et al., 2006 observed that although the education literature on learning disabilities and on second-language acquisition is extensive, little is known about the characteristics of English learner students with learning disabilities (as cited in Burr et al.,2015, p.1).Based on such research it is evident that most educators are less trained to distinguish students who truly have learning disabilities from students who are failing for other reasons, such as limited English. This research would also help determine the factors that could influence teachers perspectives on inclusion of students designated as English learners with special needs. This study employs a mixed method design involving a close ended questionnaire survey to 100 ESL certified teachers teaching third grade from 100 elementary schools in Central Illinois. This will be followed by pre observation interview of 2 ESL Certified teachers and observation of 2 classrooms where these teachers provide inclusion. The close ended questionnaire survey responses will help determine how the independent variables (i.e., gender, primary language, race, citizenship, educational qualification, experience working with ESL with special needs) affect the teachers' perspectives towards inclusion of students designated as English learners with special needs. Regarding pre observation interview questions, teachers' responses are audio recorded which will be transcribed. This transcript will be read carefully, to identify broad themes emerging from the data which will be further categorized into themes and ideas that will help answer the research questions.

THE RELATIONSHIP BETWEEN MATH FLUENCY AND MATH PERFORMANCE IN MIDDLE SCHOOL STUDENTS

Presenter: Billig, Ryan
Graduate, Teaching and Learning
Mentor: Prof. Erin Quast
Authorship: Ryan Billig

Mathematics is always going to be a subject area that has high stakes testing and we as educators need to see how to best educate our youth and prepare them for these high-stake tests. Looking at the relationship between math fluency skills and overall math performance can allow us to do just that. While several studies have already shown there it is important to value and work on fluency skills in elementary schools, is this also true for middle schools as well? So often middle school students are getting problems wrong because they are adding, subtracting, multiplying, or dividing incorrectly. Would working on these skills throughout middle school have a positive impact on their math performance even though these are elementary level learning standards? This study looks at that by looking at relationships between 6th grade students' math fluency skills and their overall math skills through their standardized testing scores.

TEACHER PERCEPTIONS OF THE IMPLEMENTATION OF TRAUMA-INFORMED PRACTICES IN THE CONTEXT OF LITERACY

Presenter: Bolin, Ashley
Graduate, Teaching and Learning
Mentor: Prof. Anna Smith
Authorship: Ashley Bolin

A considerable number of children are exposed to traumatic events, and many carry these traumatic experiences into the classroom. Through the use of trauma-informed teaching, teachers can support student's healing and growth. Unfortunately, due to a gap between theory and practice, teachers feel inadequately prepared to support trauma-affected students. As a result, teachers are hesitant to implement trauma-informed practices into their classroom. The purpose of this study is to explore the perceptions of teachers regarding the implementation of traumainformed practices in the context of literacy. Using a mixed-methods approach, the study will explore 39 teachers' (preschool-twelfth grade, certified general and special education, 9 male and 30 female) perceptions of trauma-informed practices. Surveys and interviews will be used to collect data prior and following a district required training on trauma-informed practices in the context of literacy. The research questions that guide this study are: after participating in a professional development training, is there (a) a change in teacher perceptions related to implementation and (b) a statistically significant increase in teachers' positive attitudes towards implementation?

Keywords: trauma, trauma-informed, teacher, perceptions, attitude, professional learning, implementation, literacy

FLIPPED CLASSROOMS AND HOW THEY CAN BE USED TO MAKE CONTENT CONNECTIONS

Presenter: Botello, Jessie
Graduate, Teaching and Learning
Mentor: Prof. Erin Quast
Authorship: Jessie Botello

The world students live in and learn in is changing, and students are getting information in new and different ways, and learning in new and different ways. The traditional learning style classroom with students listening to lectures from teacher, taking notes, doing an assignment, and then being assessed isn't effective anymore. Over the last 20 years, learning has shifted from passive teacher-centered to active learner-centered. The more hands-on activities students can do the more engaged and interested in learning students become. The problem with this is there just isn't enough time to do all the activities students need in order to make meaningful connections in their learning. The flipped classroom model allows students to learn basic content on their own at home, and then engage in content connecting activities in-class in a group setting that allow ideas to be shared and different learning styles to emerge. This study will look to see how the flipped classroom model using concept connecting activities can be an effective way on increase student understanding of gas laws. The study was conducted over a 5- week period in an Honors Chemistry class during a unit on gas laws. Students watched basic content videos at home and did some basic problem-solving homework, and in-class students did group activities that were built on previous chemistry concepts and concepts within the gas law unit. The students were evaluated using group quizzes, individual quizzes, and a unit test. These scores were then correlated with other class data and data from the previous year's test scores to find emerging patterns. The students also completed a Likert scale survey about their opinion of the flipped model and how it helped with their understanding of gas laws. The overall goal was to determine if the flipped classroom model helped with student understanding of gas laws and if content connections were made throughout the unit.

HOW TO MOTIVATE MIDDLE SCHOOL STUDENTS TO READ

Presenter: Buerkett, Danielle
Graduate, Teaching and Learning
Mentor: Prof. Anna, Smith
Authorship: Danielle Buerkett

Middle school students are not motivated to read during their free time. They are also disengaged with novels that teachers "make" them read in class. The purpose of this study is to show that independent reading of choice and interest will keep students engaged in reading. 80 students participated in the study over a four week period during literature class. The researcher observed the students' facial and body language while reading. A self reflection was also written at the end of the study to see what the students' thoughts and feelings are about reading. Classroom environment that a teacher creates should encourage and motivate students to feel comfortable as a member of the class and hopefully have them be excited about reading. Research on reading motivation and engagement can help students become lifelong learners and strong community members.

FIELD WORK: ALLOWING ALL STUDENTS TO ROCK IT!

Group Leader: Cardenas, Laisha
Undergraduate, Geography, Geology, and the Environment

Group Member: Mark Grandos, Undergraduate, Accounting

Mentor: Prof. Allison Kroesch

Authorship: Laisha Cardenas, Mark Grandos

Field work is an instructional strategy that allows all students to be hands on in the real world. This research to practice presentation discusses ways to implement the instructional strategy within Business Education and Earth and Space Science Education to meet the instructional needs of all learners within our content areas. We will utilize a universal design for learning approach with an anti-ableist and anti-racist lens. We will include research related to this instructional strategy and provide specific examples that reach across content areas.

SOCIAL EMOTIONAL LEARNING: HOW AN INTEGRATED APPROACH AFFECTS STUDENTS' SELF REGULATION

Presenter: Clarke, Jessica
Graduate, Teaching and Learning

Mentor: Prof. Anna Smith

Authorship: Jessica Clarke

The present study will investigate the effects of teaching social emotional learning (SEL) with an integrated approach into core curricular subjects of math and reading. Participants will be 18 first grade students in a rural school district. Data will be collected using a mixed-methods approach. Quantitative data will be collected from participants when they take a self-reflection assessment before and after the study begins regarding their feelings towards SEL skills. Qualitative data will be gathered during a three-week period of observations taken on students and how they use SEL skills to regulate themselves when taught these skills explicitly. Then, there will be a three-week period of observations taken when students are receiving SEL instruction integrated with math and reading lessons. The data will be triangulated and compared to find common themes that relate students' attitudes towards SEL with their usage of SEL skills.

TEACHERS OF THE D/DEAF AND HARD OF HEARING PERCEPTIONS AND SUGGESTIONS FOR PROFESSIONAL DEVELOPMENT

Presenter: Colón, Cora
Graduate, Teaching and Learning

Mentor: Prof. Anna Smith

Authorship: Cora Colon

The purpose of this quantitative study is to investigate teachers of the d/Deaf and hard of hearing's perceptions of professional development (PD), both currently and what the recommendations are for PD moving forward. Effective professional development is crucial in the

continuing education of teachers, especially those of servicing the unique d/Deaf and hard of hearing demographic of students. Thus, this study seeks to survey d/Deaf and hard of hearing (DHH) teachers from across the United States to gain understanding of the opinions of the DHH teachers on the topic of PD. The surveys will be coded and triangulated based on common ideas and organized by cross tabular tables. The findings from this study will enlighten administrators, DHH professional organizations, teacher leaders, and any other creators of PD on what DHH teachers views on current PD are and what suggestions they have for PD's future.

THE EFFICACY OF COLLABORATIVE STRATEGIC READING IN DIVERSE, PEERS SUPPORTING PEERS

Group Leader: Connelly, Mary
Undergraduate, English

Group Member: Kassidy Heffelfinger, Undergraduate, Kinesiology & Recreation

Mentor: Prof. Allison Kroesch

Authorship: Kassidy Heffelfinger, Mary Connelly

Peer mentoring is an instructional strategy that trains peer leaders to teach positive communication skills and problem-solving techniques to their classmates. This research to practice presentation discusses ways to implement the instructional strategy within Physical Education and English Language Arts to meet the instructional needs of all learners within our content areas. We will utilize a universal design for learning approach with an anti-ableist and anti-racist lens. We will include research related to this instructional strategy and provide specific examples that reach across content areas.

MULTICULTURAL MIDDLE SCHOOL CLASSES

Presenter: Conroy, Ethan
Graduate, Teaching and Learning

Mentor: Prof. Erin Quast

Authorship: Ethan Conroy

The COVID-19 pandemic pushed many students and teachers to learn and teach in ways they never had before. Remote learning proved to be an imperfect system through which many students struggled. Now that schools are back in person, learning loss and skill deficiencies are being seen in many students. The most at risk students for learning loss are typically those from lower socioeconomic standings, students receiving special education services, and emerging bilingual students. Collaborative Strategic Reading (CSR) is a collection of literacy and metacognitive strategies intended to help students work through new texts effectively and teach them proper remediation skills for when they do not understand what they are reading. In this study, CSR will be implemented by one teacher in two of their five seventh grade social studies classrooms. The two classes that receive CSR instruction will have their MAP English/Language Arts scores compared to the classes that did not receive CSR instruction to see if CSR is a valid method to increase student literacy skills. Previous research has proven CSR to be effective with learners of all designations.

THE IMPACT OF A DISTRICT CREATED SEL CURRICULUM ON STUDENT BEHAVIOR

Presenter: Dytrych , Amanda
Graduate, Teaching and Learning
Mentor: Prof. Erin Quast
Authorship: Amanda Dytrych

Within the last several years there has been a greater focus on the impact that SEL has on the behavior and academic achievement of students. Through my study I will look at the impact a district created SEL curriculum has on the behavior of students who come from middle to high income households with no previous trends of aggressive or disruptive behaviors in the classroom. Which will provide valuable information on the impact of SEL since it is focusing on a student population, curriculum, and data collection that is different from many studies previously done on the topic. The study will use both qualitative and quantitative data to track the progress and impact of the district created curriculum. Students will fill out a monthly survey that focuses on the areas of behavior tracked in the school. The teacher will complete a similar survey using observations and student SEL journals. The scores will be tracked from the beginning of the study until the end, looking to see if the scores are higher as students are exposed to more of the curriculum.

FACTORS INFLUENCING STUDENT DIVERSITY IN HIGH SCHOOL SCIENCE CLASSROOMS

Group Leader: Fink-Galletti, Claire
Graduate, Teaching and Learning
Group Member: Kayla Schahrer, Graduate, Teaching and Learning
Mentor: Prof. Anna Smith
Authorship: Claire Fink-Galletti, Kayla Schahrer

Throughout the history of the United States, differences in race and gender have been a prominent topic in education. As educational practices evolve, the diversity and practices of science education remain stagnant. With the demographics of American schools quickly becoming more diverse, it is critical that science education catches up with these changes. There is ample research on the lack of diversity in science education and career fields. However, there is not much research looking into the cause of the lack of diversity in the sciences. The aim of this study is to add to the research on why there is a lack of diversity in the science classroom and thus later professional career realm. From here, researchers hope to propose strategies that institutions and educators can implement to make students from different races and genders feel more comfortable in the science field.

A STUDY ON THE RELATIONSHIP BETWEEN SOCIAL-EMOTIONAL LEARNING, INDIVIDUAL GROWTH AND STUDENTS' AND THEIR PERCEPTION OF THEIR ABILITIES

Presenter: Foreman, Marisa
Graduate, Teaching and Learning
Mentor: Prof. Erin Quast
Authorship: Marisa Foreman

This study aims to analyze and identify any potential relationships between social emotional learning and student growth and/or perception of their abilities. The study takes place in a 2nd grade classroom in a fringe-rural school a year after the Covid-19 pandemic required schools and businesses to close. Students and teachers reinvented the ways in which learning has taken place for decades. With that shift came feelings of isolation and loneliness from both adults and children. After students returned, it became clear that the need for social-emotional learning was greater than ever. This study will be qualitative in nature and will use the one-group pre-test, post-test design. This study will provide insight into how SEL influences students' day-to-day decision-making skills as well as their feelings towards their abilities as they relate to social-emotional skills.

THE IMPACT OF COLLABORATIVE ORAL STORY-WRITING ON TIER 2 AND 3 STUDENTS' WRITING SKILLS

Presenter: Fritsch, Anne
Graduate, Teaching and Learning
Mentor: Prof. Anna Smith
Authorship: Anne Fritsch

This study will explore the impact of collaborative oral story-writing sessions on students who receive tier 2 and 3 interventions. The story-writing sessions will involve teacher and students taking turns in orally crafting a story together which the teacher will write on the whiteboard. Pre- and post-assessments will be administered before and after these sessions to determine the impact of this activity on students' individual story-writing skills as well as their writing self-concepts.

TEACHER PERSPECTIVES AND EXPERIENCES ON IMPLEMENTATION OF SEL CURRICULUM

Presenter: Greenaberg, Bailey
Graduate, Teaching and Learning
Mentor: Prof. Erin Quast
Authorship: Bailey Greenaberg

Social emotional learning (SEL) has been growing in education, especially upon the return to in-person learning during the COVID-19 pandemic. With the COVID-19 pandemic continuing in the 2021-2022 school year, there have not been many studies conducted regarding the implementation of SEL programs in high schools during this time. This study was completed in a high school where they are in the early stages of school-wide SEL implementation where teachers' perspectives and experiences with SEL and its implementation were collected. Considerations

should be made with teacher perspectives and experiences as the primary implementers of these programs.

TEACHER PERCEPTIONS ON THE EFFECTIVENESS OF HOMEROOM

Presenter: Grimes, Laura
Graduate, Teaching and Learning
Mentor: Prof. Erin Quast
Authorship: Laura Grimes

As we emerge from the COVID-19 pandemic and the effects it has had on our education system since March 2020, the need for both academic and social-emotional support for students has never been more important. As schools work to find their “new normal” and take away lessons learned from the experiences since March 2020, we see opportunities to incorporate new structures into our school day. This is where the effective implementation of a homeroom/advisory period at the high school level comes into play. In this study, we examine teacher experiences and perspectives of homeroom and the effect that has on students’ academic performance.

KINDERGARTEN PLAY ENGAGEMENT AND TIMING

Presenter: Ham, Claire
Graduate, Teaching and Learning
Mentor: Prof. Erin Quast
Authorship: Claire Ham

Kindergarten is part of the primary grades that guide and form a student’s educational career. Students grow and gain academic and social emotional knowledge through immersion even more than teachers can plan for. One of the largest areas that students engage and evolve in is the area of play in the classroom. This study explores the relationship between the timing of play in the school day, and the engagement in academics from kindergarten students. This study includes research from two general education kindergarten classrooms that have implemented play in the classroom.

EFFECTIVE CLASSROOM PRACTICE METHODS IN AN AP CHEMISTRY CLASSROOM

Presenter: Harris, Maricar
Graduate, Chemistry
Mentor: Prof. Erin Quast
Authorship: Maricar Harris

The aim of this study was to investigate the most effective teaching strategies to elicit student confidence in an Advanced Placement (AP) Chemistry classroom. Empirical data (n=15) were collected by daily student surveys for a total of seven days. As nightly homework, students were assigned a video to actively watch. Survey 1 was administered at the beginning of class, prior to

any face-to-face teacher instruction. A guided practice method was used during class time to review the concept presented in the video. Different learning modalities were used as practice, including collaborative practice problems, drawing representations of phenomenon, and verbal explanations. Survey 2 was administered at the end of class. In addition, formative assessments were intermittently administered during the seven days to gauge student understanding of the concepts presented. Data collected identified the guided practice tasks students deemed most effective at improving student understanding and thus more positively affecting student confidence with the material.

PEER SUPPORT SYSTEMS

Group Leader: Howard, Kyle
 Undergraduate, English

Group Members: Matt Feeney, Undergraduate, Technology; Nathaniel Parson,
 Undergraduate, Music

Mentor: Prof. Allison Kroesch

Authorship: Kyle Howard, Matt Feeney, Nathaniel Parson

Using peer support in the classroom is an effective instructional strategy that helps bridge the gap for students with disabilities while supporting inclusion. This research to practice presentation discusses ways to implement peer supports in English Language Arts, music, and technical education courses to meet the instructional needs of all learners within our content areas. We will utilize a universal design for learning approach with an anti-ableist and anti-racist lens. We will include research related to this instructional strategy and provide specific examples that reach across content areas.

AN INVESTIGATION OF ELL STRATEGIES TO USE IN A MIDDLE SCHOOL CLASSROOM

Presenter: Jachymiak, Susan
 Graduate, Teaching and Learning

Mentor: Prof. Anna Smith

Authorship: Susan Jachymiak

The purpose of this mixed methods study is to investigate strategies that help ELL students learn in a middle school setting. This topic is relevant due to the influx of students from different cultures and, due to this, teachers need to know how to best reach these students via the instruction that takes place within their classrooms. For an ELL program to be successful, there needs to be buy-in from the staff, and that is why faculty and staff will be surveyed via an electronic form in order to get authentic feedback. Students will also be assessed via exit slips in the classroom to see how much impact these various strategies are making in their learning process. After the responses are obtained, they will be analyzed. This research will lead to an increased amount of knowledge in terms of what is working within our school specifically and how this can transfer over to reach the needs of ELL students as well as all our students.

HIGH STAKES CURRENT EVENTS

Group Leader: Jackson, Blake
Undergraduate, History
Group Member: Michael Park, Undergraduate, Teaching and Learning
Mentor: Prof. Allison Kroesch
Authorship: Blake Jackson, Michael Park

Using current events is an instructional strategy that helps teach important concepts in social conflicts and government policies. This research to practice presentation discusses ways to implement the instructional strategy within physical education and social studies classes to meet the instructional needs of all learners within our content areas. We will utilize a universal design for learning approach with an anti-ableist and anti-racist lens. We will include research related to this instructional strategy and provide specific examples that reach across content areas.

TEACHER PERCEPTIONS OF HOW PHONICS INSTRUCTION IMPACTS READING DEVELOPMENT

Presenter: Kaiser, Lindsay
Graduate, Teaching and Learning
Mentor: Prof. Anna Smith
Authorship: Lindsay Kaiser

The purpose of this qualitative study is to explore primary grade teacher perceptions of how phonics instruction impacts reading development. Being that reading is an essential, lifelong skill, teaching the fundamentals of how to read words in the most effective way will forever be relevant and of importance. The existing literature surrounding the topic of phonics instruction validates the effectiveness of a couple different teaching methods. Although, researchers suggest the need for teachers to further develop their understanding and application of phonetic terms and rules to best support the needs of developing readers. Worthy of attention are the valuable opinions primary grade teachers have in regard to phonics instruction considering they witness and experience it firsthand. Therefore, this study will survey primary grade general education and special education teachers of phonics from two elementary schools in Central Illinois. The survey responses will be coded based on common values, ideas, experiences, and needs. The findings will be presented as themes to convey the perceptions teachers have of implementing phonics instruction with developing readers. To the benefit of various school personnel such as curriculum directors, administrators, literacy coaches, primary-grade teachers, and reading interventionists, this study will provide insight to teacher values and desires of phonics instruction that are honest.

BENEFITS OF PEER MEDIATION IN SCHOOLS

Group Leader: Kraemer, Anna
Undergraduate, History

Group Member: Francesco Cullotta, Undergraduate, Kinesiology & Recreation

Mentor: Prof. Allison Kroesch
Authorship: Anna Kraemer, Francesco Cullotta

Peer mediated instruction is an instructional strategy that promotes the development of both academic achievement and social skills of students with specific learning needs. This research to practice presentation discusses ways to implement the instructional strategy within the social sciences and physical education subjects to meet the instructional needs of all learners within our content areas. We will utilize a universal design for learning approach with an anti-ableist and anti-racist lens. We will include research related to this instructional strategy and provide specific examples that reach across content areas.

TEACHER ATTITUDES AND HOW THEY IMPACT STUDENT SELF-EFFICACY AND ACADEMIC GROWTH

Presenter: Lacy, Michelle
Graduate, Teaching and Learning

Mentor: Prof. Anna Smith
Authorship: Michelle Lacy

The research study focus is on teacher attitudes and how they impact student self-efficacy and academic growth. After conducting an experiment, interviewing, and surveying, I was able to analyze the results to create an E-Poster focusing on the results and what they mean for educators. Because educators and their attitudes have such a lasting impact on students it is important to study how their actions directly impact student successes, motivation, and eagerness to learn. Teachers' attitudes can impact a students' self-efficacy, belief in themselves, directly lowering their confidence level towards academics leading to a lifelong struggle from just one meaningful altercation that a student can recall in the future.

MAKING SOCIAL CONNECTIONS THROUGH PEER SUPPORTS

Group Leader: Leininger, Mallory
Undergraduate, English

Group Member: Paul Patton, Undergraduate, Kinesiology & Recreation

Mentor: Prof. Allison Kroesch
Authorship: Mallory Leininger, Paul Patton

Making social connections through peer supports is an instructional strategy that aids students in forming relationships in the classroom with their peers to help them excel both academically and

socioemotionally. This research to practice presentation discusses ways to implement the instructional strategy within English Language Arts and Physical Education to meet the instructional needs of all learners within our content areas. We will utilize a universal design for learning approach with an anti-ableist and anti-racist lens. We will include research related to this instructional strategy and provide specific examples that reach across content areas.

THE DECLINE OF SCIENCE INSTRUCTIONAL TIME AND K-6 TEACHER'S SCIENCE SELF EFFICACY

Presenter: Lewis, Anna
Graduate, Teaching and Learning
Mentor: Prof. Erin Quast
Authorship: Anna Lewis

This study of science instructional time in grades K-6 examines if science instructional time is on the decline in a small, rural school district. Large scale policy changes starting with No Child Left Behind continuing with Common Core State Standards put pressures on teachers to focus on specific core subjects: reading, writing, and mathematics. As this occurs, science and other subjects are taught less often per week to make room for more instructional time for those core subjects. This study will determine how much each grade level allocates instructional time throughout the week to determine if science instructional time is declining and if achievement gaps may result between grade levels. In addition, this study explores science self-efficacy (SSE) and attitudes of K-6 teachers. SSE survey data will help provide evidence of preparedness and effectiveness of teachers and attitudes towards teaching science content. The results will help provide a path forward to increase science instructional time if necessary, provide better training for mastery of content and increase comfortability teaching the inquiry process to learn science in K-6 classrooms.

CAN YOU SEE ME NOW?

Group Leader: Loska, James
Undergraduate, English
Group Member: Brandon Day, Undergraduate, Health Sciences
Mentor: Prof. Allison Kroesch
Authorship: James Loska, Brandon Day

Incorporating visual aids into the classroom is an instructional strategy that assists in the success of deaf and hard of hearing students within an inclusive environment. This research to practice presentation discusses ways to implement the instructional strategy within health education and English education to meet the instructional needs of all learners within our content areas. We will utilize a universal design for learning approach with an anti-ableist and anti-racist lens. We will include research related to this instructional strategy and provide specific examples that reach across content areas.

USING COMPREHENSIBLE INPUT METHOD ACROSS THE BOARD: A CASE STUDY OF VOCABULARY LEARNING WITH A LANGUAGE LEARNING STRATEGY

Presenter: Lynch, Monica
Graduate, Educational Administration & Foundations

Mentor: Prof. Anna Smith

Authorship: Monica Lynch

Students are given facts, practice problems, vocabulary, and statistics in core subjects like science, social studies, and mathematics, that teachers want their students to retain and apply into their learning. However, do our students have skills to remember or break down the information that aids retention? This study will explore the Comprehensible Input (CI) method and strategies when applied in core classes of science, social studies and mathematics. World language students apply this method in the study of a target language and this method proves students are learning through consistent input and output of the language successfully along with strategies to establish meaning and develop vocabulary knowledge. With a mix-method approach participants will use reflection pieces to make discoveries in learning of application of CI strategies in core classes.

Keywords: comprehensible input, vocabulary development, establish meaning

FOREVER FRIENDS

Group Leader: Mcmillen, Meghan
Undergraduate, English

Group Member: Matthew Kieft, Undergraduate, Kinesiology & Recreation

Mentor: Prof. Allison Kroesch

Authorship: Meghan Mcmillen, Matthew Kieft

A peer buddy program is an instructional strategy that has general education students assist students with disabilities. It helps students with disabilities by having them interact with other students which integrates social and academic skills. This research to practice presentation discusses ways to implement the instructional strategy within English and physical education to meet the instructional needs of all learners within our content areas. We will utilize a universal design for learning approach with an anti-ableist and anti-racist lens. We will include research related to this instructional strategy and provide specific examples that reach across content areas.

STUDENTS SUPPORT STUDENTS

Group Leader: McNamara, Rachel
Undergraduate, Family and Consumer Sciences

Group Member: Jena Hassert, Undergraduate, Geography, Geology, and the Environment

Mentor: Prof. Allison Kroesch
Authorship: Rachel McNamara, Jena Hassert

Learning through peer support is an instructional strategy that promotes inclusion and social connections. This research to practice presentation discusses ways to implement the instructional strategy within geography and family and consumer sciences to meet the instructional needs of all learners within our content areas. We will utilize a universal design for learning approach with an anti-ableist and anti-racist lens. We will include research related to this instructional strategy and provide specific examples that reach across content areas.

CLASSROOM TEACHERS' PERSPECTIVES ON COLLABORATIVELY TEACHING ENGLISH LEARNERS

Presenter: McReynolds, Joanna
Graduate, Teaching and Learning

Mentor: Prof. Anna Smith
Authorship: Joanna McReynolds

Collaboration between ESL teachers and classroom teachers is the main focus of this study. Research has proven that collaboration between teachers is the biggest indicator of success for English Learners, regardless of what teaching model is utilized. This study highlights past research, identifying challenges, barriers and gaps when it comes to teachers' collaborative efforts. One of the gaps identified was classroom teachers' perspectives on this topic. This study aims to eliminate this gap through a mixed-methods approach utilizing both surveys and interviews of classroom teachers in order to gain a cohesive understanding on how to move forward in the right direction for supporting English Learners in a collaborative approach.

INCREASING FEMALE PARTICIPATION IN STEM COURSES

Presenter: Meeks, Bronco
Graduate, Teaching and Learning

Mentor: Prof. Anna Smith
Authorship: Bronco Meeks

This research focuses on methods for increasing female participation in STEM courses at the high school level. The research uses a mixed method approach of a quantitative survey given to engineering instructors and a qualitative interview of leaders within female STEM organizations. The data will be used to evaluate commonalities among those that have successfully increased participation in STEM courses. The data analysis will allow for recommendations of interventions

for high school STEM instructors to increase female participation. behavior management approaches utilized by teachers in middle school classrooms. Teachers and students are impacted daily by various behaviors and environmental factors causing the solution to this issue to be an ongoing process. Therefore, this study will focus on interviewing 5th through 8th grade middle school teachers about their use of behavior management strategies. The teachers will be selected at random based on their level of experience. Three teachers will be chosen with 1-5 years of experience and another 3 will be selected with 10 or more years of teaching experience. Teachers being interviewed are being chosen from one elementary school in central Illinois. With this study, the researcher, educators, and school personnel will be equipped with further understanding of how behavior techniques are being used in middle school classrooms.

INTEGRATION AND UTILIZATION OF TECHNOLOGY IN THE PRIMARY CLASSROOM

Presenter: Meiss, Zachary
Graduate, Teaching and Learning
Mentor: Prof. Anna Smith
Authorship: Zachary Meiss

The purpose of this narrative study is to understand teachers' development in integrating technology into the classroom. This topic is imperative as internet and technology access increases for primary students. Districts have a barrage of barriers that impede their integration of technology. To weather this storm, the administration must guide their school districts through the difficulties in front of them. School district administrators need to work with technology leaders to assist teachers in positively integrating technology. A need for technology leadership that can be distributed among leaders of technology integration. Teachers need support and time to integrate technology into their lessons. With the appropriate professional development, districts should integrate technology in a meaningful way for students.

Keywords: technology integration, barriers, classroom, professional development

EFFECTIVE FEEDBACK ACCORDING TO SECONDARY EDUCATION MATHEMATICS STUDENTS: IS EDTPA RIGHT?

Presenter: Montoney, Natalie
Graduate, Teaching and Learning
Mentor: Prof. Anna Smith
Authorship: Natalie Montoney

The purpose of this qualitative study is to explore the student perspective of effective feedback in a secondary education mathematics classroom. This topic is important at this time because teachers are spending many hours on feedback that is not being used effectively by the students. Additionally, edTPA, the high stakes teacher readiness assessment, gives the highest marks for feedback given in a certain way. Little research has been done to determine if students find this format of feedback effective in mastering the educational topics of the classroom. Additionally, if this is not what students find most effective, it needs to be determined what students view as effective feedback. This study will analyze reflections from about 50 students from a Central Illinois High school currently enrolled in Accelerated Geometry and Geometry, taught by the

researcher. These reflections will be coded based on common ideas, and then be reported as themes to describe what students find effective in feedback and why. This research will inform teachers on how to provide feedback that students will find effective in learning, advise student teachers what students find effective in addition to what edTPA deems effective, and educate edTPA writers on if they are forcing students to provide feedback that is not considered most effective by the students.

TEACHERS' SELF-REPORTED PERSPECTIVES ON RESPONSE TO INTERVENTION AND FIDELITY AND THE EFFECTS ON STUDENT OUTCOMES

Group Leader: Morris, Brittany
Graduate, Teaching and Learning

Group Members: Malley Zadrzynski, Graduate, Teaching and Learning; Erica Varvil,
Graduate, Teaching and Learning

Mentor: Prof. Anna Smith

Authorship: Brittany Morris, Erica Varvil, Malley Zadrzynski

Response to Intervention (RTI) frameworks are consistently used to help provide early intervention to at risk students. The current study aims to understand the perceptions of stakeholders involved in the RTI model in their school. Utilizing a survey to teachers who have experience with RTI, the researchers will analyze the results regarding participant background, fidelity of implementation, movement of tiers, and professional development insight. Based on tentative findings, we suggest continuation of teacher support through professional development, frequent fidelity checks, and support providing and implementing the evidence-based intervention.

USING DIVERSE PICTURE BOOKS AS MENTOR TEXTS IN THE MIDDLE SCHOOL CLASSROOM

Presenter: Musselman, Tayler
Graduate, Teaching and Learning

Mentor: Prof. Anna Smith

Authorship: Tayler Musselman

This study investigates the benefits of using diverse picture books as mentor texts in reading and writing classes. Many secondary schools use chapter books, articles, or other high level texts as mentor texts. However, I believe diverse picture books can be just as beneficial if not more beneficial than high level texts. The central questions I will be investing include: Are diverse picture books being utilized at the middle school level in the literacy curriculum? How are diverse picture books as mentor texts in literacy helpful to middle school students who are not yet performing at grade level? Previous studies have indicated that picture books can be beneficial to readers at the secondary level. Other studies have discussed the importance of incorporating diversity into all curriculum. However, there is little research around the benefits of incorporating diverse picture books into curriculums.

USING A PHENOMENON BASED LEARNING APPROACH TO INCREASE HIGH SCHOOL STUDENT CONFIDENCE LEVELS IN CHEMISTRY TOPICS

Presenter: Norrman, Mark
Graduate, Teaching and Learning
Mentor: Prof. Anna Smith
Authorship: Mark Norrman

Chemistry concepts can be difficult for high school students, especially when they begin to doubt their abilities as the complexity of the material increases. Many concepts being covered are hard for students to grasp since they cannot directly see the atoms in question, causing them to doubt themselves and struggle to achieve mastery of the material. This study aims to determine if using a phenomenon based learning approach to the material can increase the students confidence levels in chemistry. Using real world phenomena and models to help students understand the underlying concepts should increase their confidence levels. This increased confidence will help change their mindset into a more positive mindset leading to increased likelihood of mastery. The research used a mixed methods approach on 50-70 students completing their second year of high school in Dedham, Massachusetts. These students have previously only taken one high school science course, a Biology course that was taught in a hybrid model due to COVID safety protocol. After completing a phenomenon based learning unit, students completed a Likert survey to rank their confidence levels on the material. These rankings were then analyzed to determine if this pedagogical style increased confidence levels. In addition to the survey, mini conferences were held with the students to allow them to expand on their answers to the survey. Students were then asked to apply the newly learned material to explain a second, similar, natural phenomenon.

EXPLORING THE READING ATTITUDES OF HIGH SCHOOL STUDENT-ATHLETES

Presenter: O'Daniel, Kyle
Graduate, Teaching and Learning
Mentor: Prof. Anna Smith
Authorship: Kyle O'Daniel

Both high school and collegiate student-athletes suffer from the “dumb jock” stereotype, despite a growing body of evidence suggesting the varied interests and abilities of this student population. In particular, student-athletes are often perceived as having more difficulties or disinterest in reading than their non-athlete peers. The current study aims to explore the reading attitudes of high school student-athletes, a group that is historically underrepresented in academic research, in a central Illinois high school. Data was collected using an adapted Rhody Secondary Reading Attitude Assessment (Tulloch-Rhody & Alexander, 1980) with additional qualitative questions. Results of this study may help teachers and other educational staff to better serve this student population.

ARE TEACHERS IN MIDDLE SCHOOL USING HUMANIZING APPROACHES WITH STUDENT BEHAVIORS

Presenter: Rappe, Ashley
Graduate, Teaching and Learning
Mentor: Prof. Anna Smith
Authorship: Ashley Rappe

The purpose of this study is to examine the use of behavior management approaches utilized by teachers in middle school classrooms. Teachers and students are impacted daily by various behaviors and environmental factors causing the solution to this issue to be an ongoing process. Therefore, this study will focus on interviewing 5th through 8th grade middle school teachers about their use of behavior management strategies. The teachers will be selected at random based on their level of experience. Three teachers will be chosen with 1-5 years of experience and another 3 will be selected with 10 or more years of teaching experience. Teachers being interviewed are being chosen from one elementary school in central Illinois. With this study, the researcher, educators, and school personnel will be equipped with further understanding of how behavior techniques are being used in middle school classrooms.

CULTURALLY RESPONSIVE TEXTS IN A FAMILY & CONSUMER SCIENCE MIDDLE SCHOOL CLASSROOM

Presenter: Riley, Sara
Graduate, Teaching and Learning
Mentor: Prof. Anna Smith
Authorship: Sara Riley

This research study analyzes how the use of culturally responsive texts in a middle school Family and Consumer Science (FACS) classroom can benefit students. As the demographics of today's public classrooms shift, educators are met with a convergence of social challenges that require teaching practices that help support and inspire all students. Culturally responsive teaching is a framework that meets these needs and layers in the use of multicultural texts. Classroom texts and supportive literature can be selected to mirror the faces and family backgrounds of students and tell the stories of diverse populations. This provides students the opportunity to learn about their backgrounds and the cultures of others, while connecting with ideas and interests of their peers. This qualitative study explored the potential benefits of reading, discussing, and interacting with culturally relevant and critical texts selected to support the learning targets of FACS units of study on consumerism, nutrition and cooking, and fashion and design. Insights on student interest, engagement, identity, sense of belonging, and cultural empathy have started to emerge. The findings start to suggest students benefit from reading and interacting with multicultural texts in many ways, including increased academic success and greater personal achievement. The findings also suggest Family and Consumer Science and other content-area programs can select related texts that promote cultural understanding and provide unique learning opportunities to meet the intellectual, emotional, and cultural needs of diverse 21st century classrooms.

TECHNOLOGY INTEGRATION WITHIN WRITER'S WORKSHOP

Presenter: Rocke, Valerie
 Graduate, Teaching and Learning
Mentor: Prof. Erin Quast
Authorship: Valerie Rocke

Technology drives the world we live in and is an integral part of students' lives in this 21st -century world. With that, one would assume, educators are preparing our future generation to understand how to best use these technology devices, but what we are often seeing is that technology integration is not taking place in the classroom. Technology is a huge advantage to students in the classroom when used correctly. Technology has the power to increase student engagement and, overall, benefit student growth. So, what's stopping teachers from integrating? Challenges are discussed as well as common strategies to incorporate technology integration within a classroom.

SUPPORTING TRANSITIONS IN THE CLASSROOM ENVIRONMENT

Group Leader: Rzeszuto, Monica
 Undergraduate, Family and Consumer Sciences
Group Member: Michelle Mueller, Undergraduate, Family and Consumer
 Sciences

Mentor: Prof. Allison Kroesch
Authorship: Monica Rzeszuto, Michelle Mueller

Worksheets are an instructional strategy that help support the organization and process of a transition. This research to practice presentation discusses ways to implement the instructional strategy within Early Childhood in the Family Consumer Sciences Department to meet the instructional needs of all learners within our content areas. We will utilize a universal design for learning approach with an anti-ableist and anti-racist lens. We will include research related to this instructional strategy and provide specific examples that reach across content areas.

STRATEGIES TO INCORPORATE MULTICULTURAL LITERATURE IN THE SECONDARY CLASSROOM

Presenter: Sanders, Jessica
 Graduate, Teaching and Learning
Mentor: Prof. Anna Smith
Authorship: Jessica Sanders

The purpose of the study is to push to include multicultural literature in the classroom by providing a new strategy, textured teaching. The overall goal of this is to enhance student understanding and comprehension of cultures/races other than their own by incorporating textured teaching components. Including multicultural literature in the classroom is proven to have many benefits, but there has not been much research showing how to implement this within the classroom. This

study would do just that. While textured teaching is incorporated in the classroom, student work will be collected, including homework and assessments, in addition to notes being taken whilst observing lessons. The collected data will be analyzed and evaluated with a narrative discussing the findings and the success found in textured teaching. The study results will provide teachers with a strategy to utilize in order to include multicultural literature in the classroom

THE RELATIONSHIP BETWEEN FACT FLUENCY AND OVERALL MATH ABILITY IN MIDDLE SCHOOL

Presenter: Schmidt, Kyle
Graduate, Teaching and Learning
Mentor: Prof. Erin Quast
Authorship: Kyle Schmidt

Math fact-fluency is one of the first skills developed by students in their math classes in elementary school. If a student does not maintain these skills throughout their schooling, their overall math ability may decline. This paper will analyze previous research that has shown there to be a relationship between fact fluency and a student's success in later schooling and ability to problem solve. At the middle school level, fact-fluency and math fact knowledge are key to succeeding because of the application that students must perform of math facts in problem solving. This study will analyze the results of two standardized tests, one that measures a student's math fact-fluency and one that measures a student's ability to apply math knowledge, by comparing the scores each student earns to determine the correlational relationship between the two tests. Students take both tests in the fall at the start of the school year, again in the middle of the year, and at the end of the year. This paper will collect the results of the first two tests and compare the growth from fall to winter, to better analyze the growth between fact-fluency and math ability. This analysis will highlight the correlation between fact fluency and overall math ability. Then, the results of this study will guide the design of a curriculum that will better serve students struggling in math to build their math application skills through fact fluency work.

Keywords: math fact-fluency, application, problem-solving, math ability, standardized assessment, intervention

GAINING PERSPECTIVE: SPANISH-SPEAKING PARENT PERCEPTIONS ON INVOLVEMENT AND BARRIERS

Presenter: Sherrill, Matt
Graduate, Teaching and Learning
Mentor: Prof. Anna Smith
Authorship: Matt Sherrill

The purpose of the proposed research study is to explore parental involvement as it pertains to parents of English Learner (EL) Middle School students. Research shows the link between parent involvement and academic achievement, while also showing that EL students are not necessarily seeing the same levels of achievement as their non-EL peers. As schools grapple with bridging achievement gaps that have occurred as a result of remote learning during the COVID-19 pandemic, it would be logical to try to increase parent involvement as a strategy to help bridge that gap. However, studies have shown that EL parents may have different perceptions from the

school on what parent involvement looks like. Additionally, EL parents face a variety of potential barriers to their involvement. This study intends to explore these perceptions and barriers through the use of a mixed-methods survey, closely aligned with Joyce L. Epstein's (1987; 2007) six types of parent involvement. The survey will be administered to Spanish-speaking parents of EL students at a Central Illinois Middle School. Results of the study have the potential to help educators develop strategies to build stronger school-to-home partnerships for the improved success and well-being of EL students.

AN INVESTIGATION OF HOW GIFTED STUDENT INVOLVEMENT IN CREATING PROFICIENCY FRAMEWORKS IMPACTS LEARNING AND MOTIVATION

Presenter: Shore, Rachel
Graduate, Teaching and Learning
Mentor: Prof. Anna Smith
Authorship: Rachel Shore

As standards-driven learning becomes increasingly more prevalent in classrooms, so too does the need for student involvement in that process. Gifted students benefit from being given more ownership over their education, so this push for more standards-based learning provides an opportunity to challenge those accelerated students further. This research study will focus on what happens when gifted students fully understand expectations and the skills behind the content they are learning, through the creation of proficiency frameworks that can act as a rubric for their argumentative writing. The increased amount of student involvement in these standards discussions will hopefully lead to improved student learning and motivation.

KEEPING STUDENTS ACTIVE IN LEARNING: USING ACTIVITY BASED APPROACHES IN CLASSROOMS

Group Leader: Szela, Justin
Undergraduate, Teaching and Learning
Group Member: John Green, Undergraduate, Kinesiology & Recreation
Mentor: Prof. Allison Kroesch
Authorship: Justin Szela, John Green

An activity-based approach in any classroom is an instructional strategy that benefits students with disabilities who struggle with traditional learning via didactic teaching. This research to practice presentation discusses ways to implement the instructional strategy within science and physical education classrooms to meet the instructional needs of all learners within our content areas. We will utilize a universal design for learning approach with an anti-ableist and anti-racist lens. We will include research related to this instructional strategy and provide specific examples that reach across content areas.

IMPACT OF USING LETTER-SOUND CORRESPONDENCE VS. WHOLE WORD MEMORIZATION TO TEACH A TARGET LIST OF SIGHT WORDS ON FIRST GRADE STUDENTS' ABILITY TO READ AND CORRECTLY SPELL THE WORDS

Presenter: Teel, Amanda
Graduate, Teaching and Learning
Mentor: Prof. Anna Smith
Authorship: Amanda Teel

Primary teachers across the United States spend a portion of their reading instructional time teaching high frequency/sight words. Related literature on this topic indicates many instructional techniques for high frequency/sight words often focus on whole word visual memorization because many of these words have irregular spellings. The purpose of this mixed methods study is to explore primary teachers' beliefs and perceptions about teaching high frequency/sight words and to examine the impact of differing instructional techniques on students' ability to read and write a target list of high frequency/sight words within the Wilson Foundations curriculum. This study will survey kindergarten-2 nd grade teachers and resource teachers at a Central Illinois PreK-8 th grade private school who are familiar with high frequency word instruction and whose teaching experience varies in terms of grade level and number of years they have been teaching. Survey responses will be coded based on key terms and concepts that emerge about teachers' beliefs and instructional techniques for high frequency word instruction. Transcriptions of audio recordings of two of the first-grade teachers' (one being the researcher) high frequency word instruction will be coded based on key phrases used in instruction with similarities and differences in instructional techniques noted. First grade student participants will complete a pretest and posttest word reading and dictated spelling test of a list of 11 high frequency/sight words within the Foundations curriculum. Student scores will be compared and analyzed as to the number of words correct and any other trends that emerge, indicating the impact of the teachers' instructional techniques. This research will equip primary teachers, resource teachers, interventionists, and even parents with a greater understanding of evidence-based practices that best support how students learn to read and spell high frequency words.

LEARNING OPPORTUNITIES OUTSIDE THE CLASSROOM

Group Leader: Turcotte, Briana
Undergraduate, Kinesiology & Recreation
Group Member: Stephanie Flood, Undergraduate, English
Mentor: Prof. Allison Kroesch
Authorship: Briana Turcotte, Stephanie Flood

Online Learning is an instructional strategy that provides students with disabilities opportunities to learn outside of the classroom and makes content accessible when students cannot be in a classroom. This research to practice presentation discusses ways to implement the instructional strategy within physical education and English to meet the instructional needs of all learners within our content areas. We will utilize a universal design for learning approach with an anti_ableist and anti-racist lens. We will include research related to this instructional strategy and provide specific examples that reach across content areas.

EXPERIENCING DEVELOPMENTAL PLAY ACCORDING TO KINDERGARTEN TEACHERS

Presenter: Veldhuizen, Haley
Graduate, Teaching and Learning
Mentor: Prof. Erin, Quast
Authorship: Haley Veldhuizen

This study analyzed kindergarten teachers' perspectives on the implementation of developmental play in a kindergarten classroom. In order to understand the successes and challenges of implementing developmental play, eight participants who currently teach kindergarten and implement developmental play daily were selected. An electronic survey was conducted to allow teachers to share their experiences of implementing developmental play time while meeting academic standards and how learning happens during developmental play time. The findings support kindergarten teachers by giving them ideas on how to implement developmental play and how to support learning throughout developmental play. Further discussions regarding limitations, results, and future research are addressed. Keywords: developmental play, kindergarten teachers' perceptions, importance of developmental play, changes in kindergarten

ADOLESCENT WRITER IDENTITY IN THE 21ST CENTURY: DOES WRITER IDENTITY IMPACT ACADEMIC WRITING?

Presenter: While, Andrea
Graduate, Teaching and Learning
Mentor: Prof. Anna Smith
Authorship: Andrea While

Personal identity is created through the compilation of influences that range from parental and peer influences to personal experiences and social constructs. These identities begin forming during adolescence, therefore possibly impacting the academic identities of students. Because of this overlap, it becomes advantageous to more closely examine the impact that identity has on writing and academics. In this study we look at the writer identity and academics dynamic in greater detail. The study will be conducted during a unit focusing on the formation of personal identity. Open-ended questions will be posed to a group of freshman students regarding identity and writer identity. Student responses and academic assignments will be collected and examined to determine if there is a relationship between student writer identity and academic performance.

Technology

ILLINOIS DEPARTMENT OF TRANSPORTATION'S UTILIZATION OF HIGHWAY RIGHT OF WAY: ENHANCING GOVERNMENT OWNED LAND WITH SOLAR POWER

Group Leader: Jimenez, Eduardo
Undergraduate, Technology
Group Member: Brennan Douglas, Undergraduate, Technology
Mentor: Prof. Jin Jo
Authorship: Eduardo Jimenez, Brennan Douglas

Some states' transportation departments showcased sustainable infrastructures using their land areas. For example, Georgia decided to make a section on I-85 to be a net zero highway. This highway has piloted a grid connected solar electric vehicle charging station that offers free charging. They also began to develop a drivable solar road on a rest stop along with a onemegawatt right of way solar project that will supply electricity to the grid. Other states have been using and exploring use of "highway right of way" as way to create highway solar energy projects. Although there is a growing solar market in Illinois, the Illinois Department of Transportation (IDOT) does not withhold any renewable energy projects that are integrated with highways, and they are not utilizing land that can be viable in producing electrical energy. IDOT is one of the largest landowners in Illinois which can be utilized to create renewable energy. IDOT would highly benefit from solar photovoltaic (PV) energy production because it can create a source of revenue with other direct and indirect benefits. The primary application would be to supply electricity to the grid as well as providing energy to the designated areas of rest stops. Another application is electrical vehicle (EV) charging stations that can create revenue or create free charging for people. We analyzed a section in I-55 and implemented a "right of way"

photovoltaic energy system as well as designed PV system on the rest areas. For the design we utilized professional solar design and performance models to calculate the amount of solar energy and to perform a financing analysis. Another software tool called Invest was used, which to help solar energy highway by providing feedback on the solar project. We modeled a solar PV system that can connect to the grid as well as the rest areas and evaluated the possibility of integrating EV charging stations with the solar PV system. We analyzed the economic cost of the IDOT solar PV systems as well as the total energy produced. The research conducted concluded that the use of solar PV systems was beneficial in providing energy as well as lowering the cost of energy for the IDOT. The results show that there is enough energy to create EV charging stations in the rest stop area. This research study provides a replicable model for other IDOT owned land areas for further applications of renewable energy infrastructures.

DEVELOPING HOLISTIC GUIDELINES TO ASSESS A SOLAR PHOTOVOLTAIC SYSTEM'S SUSTAINABILITY FOR HIGHER EDUCATION INSTITUTIONS

Group Leader: Miller, Austin
Undergraduate, Technology

Group Members: Cole Cook, Undergraduate, Technology; Enoc Ilunga,
Undergraduate, Technology

Mentor: Prof. Jin Jo
Authorship: Austin Miller

Sustainability will be the key to humankind's existence in the future; its importance is unmatched. The United Nations has established an agenda by 2030 that assembles 17 goals towards global sustainable development. The sustainability goals aim to end poverty, improve health and education, reduce inequality, and promote economic growth – while tackling climate change and preserving our ocean and forests. The purpose of this research is to dive deeper into sustainability at the solar energy scope. This is important as in the future world energy trends will shift toward renewable energy sources. Specifically, this research aims to establish a preliminary examination on a solar PV system's level of sustainability through review of the process plan, design, and operating improvements of the array. In a more refined scope, the research will be applied to a case study, Cheyney University of Pennsylvania. Cheyney University is interested in installing solar on their campus by selection of a proposal through the Department of Energy's design competition, the Solar District Cup. The research identifies aspects of a PV solar system from planning to post-life care and then examines these processes/plans and offers recommendations for improvement in the sustainability sectors. Sustainability can be seen as broken into four pillars: human, social, economic, and environmental. The intention of the improvements and recommendations established in the research is that it be used as a template or tool for other academic institutions to better their future designs.

FEASIBILITY STUDY OF INSTALLING A SOLAR PHOTOVOLTAIC SYSTEM WITH A BATTERY STORAGE TO OFFSET THE ILLINOIS STATE FARM AND ITS STORM SHELTERS' ELECTRICAL DEMAND

Group Leader: Nihan, Jacob
Undergraduate, Technology
Group Member: Gabrielle Hershey, Undergraduate, Technology
Mentor: Prof. Jin Jo
Authorship: Jacob Nihan, Gabrielle Hershey

Electrical energy demand at the ISU Farm has the potential to be supplied and maintained by a solar plus energy storage system located on the property. Research in this area would further promote sustainability initiatives throughout the university and help to alleviate some carbon emissions that may stem from campus energy consumption. Data was collected regarding load profile and energy consumption at the farm which allowed us to properly size the solar photovoltaic system and battery storage. To do this, we used professional energy simulation software tools such as Helioscope and Systems Advisory Model to assess expected system electrical energy output data. As a result, we present a couple of optimized system solutions through which we would be able to offset the farm's electrical consumption.

Theatre and Dance

THEATRE IN THE MATHEMATICS CLASSROOM: HOW THEATRE ARTS INTEGRATION IMPACTS THE AFFECTIVE DOMAIN

Presenter: Turner, Chris
Undergraduate, Theatre and Dance
Mentor: Prof. James Chrismon
Authorship: James Chrismon, Chris Turner

Arts Integration is defined by the Kennedy Center as “an approach to teaching in which students construct and demonstrate understanding through an art form. Students engage in a creative process which connects an art form and another subject and meets evolving objectives in both” (Silverstein & Layne, 2010). The benefits of Arts Integration have been researched extensively and include positive impacts on students academic achievement (Pepler et al., 2014), long- term retention of content (Rinne et al., 2011), and social emotional learning (Casiano et al., 2019). Theatre Arts Integration, in particular, has been found to positively impact student achievement in both language arts and mathematics (Walker et al., 2011).

For this study, the researchers investigated Theatre Arts Integration in the mathematics classroom, focusing, in particular, on the effect that integrating theatre into mathematics instruction has on students' perceptions of learning mathematics. Students' attitudes towards several aspects of learning mathematics have been shown to have a measurable impact on mathematics learning. Students' confidence and their enjoyment of mathematics have both

been shown to correlate to greater rates of growth in mathematics (Benken et al, 2015). Additionally, student motivation (to develop their understanding of mathematics) and students' value of mathematics (understanding how math relates to real life situations) are both positive predictors of success in mathematics (Guy et al, 2015).

During this study, the researcher taught several arts integrated math lessons to 40 6th graders into two 6th grade math classes. The researcher employed several theatrical techniques, including Story Drama and scene development, as vessels for mathematics instruction. After the lessons, students were asked several questions to determine the effect that the Arts Integrated instruction techniques had on their Confidence, Motivation, Value, and Enjoyment of mathematics. A Likert scale (1-5) was used for each category, where a 1 indicated that a student strongly disagrees that the instruction improved their Confidence, Motivation, Value, and Enjoyment of mathematics, respectively. A 5 indicated that a student strongly agrees that the instruction improved their Confidence, Motivation, Value, and Enjoyment of mathematics, respectively. For Confidence, Motivation, Value, and Enjoyment, respectively, the mean ratings were 3.40, 3.90, 4.00, and 4.65, indicating that arts integrated instruction can have a positive effect on students' perception of mathematics, which, as stated above, greatly influence students' mathematical success.

Works Cited:

Benken, B. M., Ramirez, J., Li, X., & Wetendorf, S. (2015). Developmental mathematics success: Impact of students' knowledge and attitudes. *Journal of developmental education*, 14-31.

Casciano, R., Cherfas, L., & Jobson-Ahmed, L. (2019). Connecting Arts Integration to Social-Emotional Learning among Special Education Students. *Journal for Learning through the Arts*, 15(1).

Guy, G. M., Cornick, J., & Beckford, I. (2015). More than math: on the affective domain in developmental mathematics. *International journal for the scholarship of teaching and learning*, 9(2), n2.

Peppler, K. A., Powell, C. W., Thompson, N., & Catterall, J. (2014, October). Positive impact of arts integration on student academic achievement in English language arts. In *The Educational Forum* (Vol. 78, No. 4, pp. 364-377). Routledge.

Rinne, L., Gregory, E., Yarmolinskaya, J., & Hardiman, M. (2011). Why arts integration improves long-term retention of content. *Mind, Brain, and Education*, 5(2), 89-96.

Silverstein, L. B., & Layne, S. (2010). *What is arts integration*. Washington, DC: The Kennedy Center for the Performing Arts.

Walker, E., Tabone, C., & Weltsek, G. (2011). When achievement data meet drama and arts integration. *Language Arts*, 88(5), 365.

Oral Presentations

DEPARTMENT OF PHYSICS

April 2 (Saturday)

Physics Undergraduate Morning Zoom Sessions
(meeting ID # 917 9005 4915)

Faculty mentors: Dr. M. Biswas; Dr. M. Caplan; Dr. N. Christensen;
Dr. R. Grobe; Mr. R. Zich; and Dr. Q. Su

Session 1

8:00-8:15

Naomi Satoh

INVESTIGATING THE EFFECTS OF MODIFIED ELECTRIC FIELD
REPRESENTATIONS ON STUDENT INTERPRETATION OF ELECTRIC FIELD DIAGRAM

8:15-8:30

Jeffrey Rosauer

STUDENT ATTITUDE CHANGES AND CURRICULAR BENEFITS FROM
TWO INSTRUCTIONAL INTERVENTIONS

8:30-8:45

Jimmy DiCaro

INCORPORATING COMPUTATIONAL ACTIVITIES IN A GENERAL
EDUCATION ASTRONOMY COURSE

8:45-9:00

Break

(See Session 2 presenters next pg.)

Session 2

9:00—9:15

Luis Rizo

MACHINE LEARNING APPROACH TO FINDING DIFFERENTIAL
EQUATIONS

9:15-9:30

Alex Furcoiu

EVOLUTIONARY SYMBOLIC REGRESSION FROM A PROBABILISTIC PERSPECTIVE

9:30-9:45

Amelia Korveziroska

NANOMETER SCALE MATERIAL GROWTH AND PATTERNING

9:45-10:00

John Miles

GALAXY MERGER SIMULATIONS

10:00-10:15

Dylan Chambers

DYNAMICAL SYSTEMS MODELS FOR PLASMA DILUTION

10:15-10:30

Nevin Smith

SIMULATING RESPIRATORY DROPLET TRAJECTORIES WITH
ENVIRONMENTAL FACTORS

10:30

End of the Physics Department Oral Sessions

SCHOOL OF THEATRE & DANCE

Hybrid Oral Presentations

Organized by Dr. Kee-Yoon Nahm

Thursday, March 31, Centennial West, Room 302

Zoom <https://illinoisstate.zoom.us/j/92482066254>

3:00 - 5:00 p.m.

Isabel Samuel

(MFA in Lighting Design)

EL TEATRO CAMPESINO AND SOLIDARITY

Thomas Brown

(Master's in Theatre Studies)

"TRAGIC POPULISM OR ESTRANGEMENT?: CONTRASTING VISIONS FOR A REVOLUTIONARY
POLITICAL
THEATRE"

María Amenábar Farias

(MFA in Directing)

TECHNOLOGY, SOCIAL MEDIA, AND THE GEN Z THEATRE

Sanhawich Meateanuwat

(MFA in Directing)

GLOBALIZING LEFTY: MAKING CLIFFORD ODETS SPEAK TO THE PRESENT

Jenefas Okonma

(Master's in Theatre Studies)

WHERE TWO WORLDS MEET: A COMPARATIVE STUDY OF THEORETICAL AND LITERARY
INSIGHTS ON AFRICAN FEMALE IMMIGRANT EXPERIENCES IN THE UNITED STATES OF
AMERICA

ALPHABETICAL LISTING BY STUDENT LAST NAME

MORNING SESSION

A

Presenter Last Name	Presenter First Name	Page Number	Department/School	Faculty Mentor
Addo	Rosemary	21	Chemistry	Christopher Mulligan
Adehinmoye	Adewale	21	Chemistry	Jun-Hyun Kim
Akpan	Jessica	54	Psychology	Shengtian Wu
Appiah	Sarah	66	Social Work	Kate Sheridan
Arndt	Tom	22	Chemistry	Richard Nagorski
Asante	Philippa	66	Social Work	Karen Stipp
Auth	Sydney	65	Psychology	Jeffrey Kahn
Ayedun	Kehinde	34	Family and Consumer Sciences	Ui-Jeen Yu
Azizan Durisic	Danial Bin	43	Kinesiology & Recreation	Liz Sattler

B

Presenter Last Name	Presenter First Name	Page Number	Department/School	Faculty Mentor
Baker	Andie	56	Psychology	Suejung Han
Baker	Andie	63	Psychology	Suejung Han
Barnes	Andy	23	Chemistry	Andrew Mitchell
Barnes	Cesiley	50	Mathematics	Gaywalee Yamskulna
Beattie	Grace	67	Social Work	Kate Sheridan
Beavers	Laura	67	Social Work	Kate Sheridan

Beltran	Nathan	60	Psychology	Laura Finan
Berg	Rachel	7	Biological Sciences	Pirmin Nietlisbach
Bergeron	Kathryn	44	Kinesiology & Recreation	Kelly Laurson
Bergh	Allison	40	Chemistry	Christopher Weitzel
Blake	Kaitlyn	33	English	Danielle Lillge
Blasko	Kaitlyn	34	Family and Consumer Sciences	Ui-Jeen Yu
Bondzie	Ebenezer	23	Chemistry	Christopher Mulligan

C

<i>Presenter Last Name</i>	<i>Presenter First Name</i>	<i>Page Number</i>	<i>Department/School</i>	<i>Faculty Mentor</i>
Cabrera Cervantes	Jose de Jesus	77	Technology	Jaby Mohammed
Calhoun	Austin	8	Biological Sciences	Ben Sadd
Camp	Madalynn	5	Agriculture	Michelle Kilber
Carlson	Kristen	38	Accounting	Vladimir Kotomin
Carrillo	Juana	68	Social Work	Kate Sheridan
Carroll	Rowan	40	Health Sciences	LC Yang
Charboneau	Christina	8	Biological Sciences	Ryan Paitz
Cole	Mason	51	Physics	David Marx
Collins	Nichelle	68	Social Work	Karen Stipp
Colwell	Alexis	56	Psychology	Alycia Hund
Concepción Cabán	Lourdes	57	Psychology	Gregory Braswell

Conover	Kimberlee	68	Social Work	Karen Stipp
Corea Dubón	Maria	63	Psychology	Dawn McBride
Crull	Joshua	38	Mathematics	Vladimir Kotomin

D

<i>Presenter Last Name</i>	<i>Presenter First Name</i>	<i>Page Number</i>	<i>Department/School</i>	<i>Faculty Mentor</i>
Darko	Kwabena	24	Chemistry	Andrew Mitchell
Darter-Krantz	Ava	9	Biological Sciences	Lise Comte
Davis	Lucas	69	Social Work	Karen Stipp
DiCaro	James	52	Physics	Raymond Zich
DiSciullo	Rachael	9	Biological Sciences	Charles F. Thompson
Donnelly	Megan	58	Psychology	Dan Lannin
Douglas	Melissa	75	Sociology/ Anthropology	Susan Sprecher
Duffrin	Tyler	58	Psychology	Jeffrey Wagman

E

<i>Presenter Last Name</i>	<i>Presenter First Name</i>	<i>Page Number</i>	<i>Department/School</i>	<i>Faculty Mentor</i>
Ebbah	Eunice	24	Chemistry	Jun-Hyun Kim
Eckhardt	Kiera	74	Politics and Government	Michael Hendricks
Ehlbeck	Johanna	25	Chemistry	Michael Webb
Elliott	Jordan	69	Social Work	Kate Sheridan
Ellis	Miranda	59	Psychology	Alycia Hund
Ellis	Miranda	60	Psychology	Laura Finan

Eley	Erica	34	Family and Consumer Sciences	Gabriela Fonseca Pereira
Erzuah	Marymoud	25	Chemistry	Andrew Mitchell
Evans	Katherine	10	Biological Sciences	Steven Juliano
Eyimegwu	Faith	56	Chemistry	Jun-Hyun Kim

F

<i>Presenter Last Name</i>	<i>Presenter First Name</i>	<i>Page Number</i>	<i>Department/School</i>	<i>Faculty Mentor</i>
Farchmin	Paige	10	Biological Sciences	Scott Sakaluk
Faudoa	Alondra	56	Psychology	Suejung Han
Faudoa	Alondra	63	Psychology	Suejung Han
Fay	Ali	60	Psychology	Laura Finan
Folk	Robyn	69	Social Work	Karen Stipp
Frere	Wyatt	38	Finance, Insurance and Law	Vladimir Kotomin

G

<i>Presenter Last Name</i>	<i>Presenter First Name</i>	<i>Page Number</i>	<i>Department/School</i>	<i>Faculty Mentor</i>
Gibbons	Sarah	76	Special Education	Kim Fisher
Godinez	Ertemisa	31	Communication	John Baldwin
Goss	Jadira	57	Psychology	Alycia Hund
Grage	Casey	62	Psychology	Gary Cates

H				
<i>Presenter Last Name</i>	<i>Presenter First Name</i>	<i>Page Number</i>	<i>Department/School</i>	<i>Faculty Mentor</i>
Hafner	Alex	11	Biological Sciences	Bill Perry
Harders	Emily	11	Biological Sciences	Ryan Paitz
Harris	Arthur	26	Chemistry	Lisa Szczepura
Harrod	Audrey	12	Biological Sciences	Ben Sadd
Haubein	Cailyn	12	Biological Sciences	Steven Juliano
Hayes	Michaela	36	Psychology	Alycia Hund
Hepp	Delaney	61	Psychology	Dawn McBride
Hernandez	Felipe	65	Psychology	Jordan Arellanes
Herr	Aaron	56	Psychology	Alycia Hund
Ho	Cheng Yi	35	Family and Consumer Sciences	Julie Schumacher
Hoberg	Joseph	39	Geography, Geology, and the Environment	Eric Peterson
Hobson	Brandon	44	Kinesiology & Recreation	Tyler Kybartas
Hodges	Linds	76	Special Education	Kim Fisher
Holoch	Jacob	6	Agriculture	Iuliia Tetteh
Hopwood	Emily	70	Social Work	Kate Sheridan
Hoveke	Lily	75	Sociology/ Anthropology	Susan Sprecher
Hughes	Grace	55	Psychology	Jeffrey Kahn
Hynes	Keeley	61	Psychology	Brea Banks

I

<i>Presenter Last Name</i>	<i>Presenter First Name</i>	<i>Page Number</i>	<i>Department/School</i>	<i>Faculty Mentor</i>
Irwin	Samuel	13	Biological Sciences	Martin Engelke
Iverson	Brien	70	Social Work	Karen Stipp

J

<i>Presenter Last Name</i>	<i>Presenter First Name</i>	<i>Page Number</i>	<i>Department/School</i>	<i>Faculty Mentor</i>
Jacobsen	Sarah	56	Psychology	Alycia Hund
Jasinski	Luke	62	Psychology	Gary Cates
Jegade	Kehinde	50	Mathematics	Óscar Chávez
Johnson	Cierra	62	Psychology	Adena Meyers
Johnston	Jamie	42	Physics	Matt Caplan

K

<i>Presenter Last Name</i>	<i>Presenter First Name</i>	<i>Page Number</i>	<i>Department/School</i>	<i>Faculty Mentor</i>
Kamineni	Aditya Rao	77	Technology	Pranshoo Solanki
Kanuk	Taylor	75	Sociology/ Anthropology	Susan Sprecher
Katuri	Gangadhar	42	Information Technology	Rosangela Follmann
Klann	Kalista	51	Nursing	Megan Rappleyea
Kraft	Allena	45	Kinesiology & Recreation	Karen Dennis
Kuna	Will	14	Biological Sciences	Ben Sadd
Kaufman	Grant	53	Physics	Raymond Zich

L				
<i>Presenter Last Name</i>	<i>Presenter First Name</i>	<i>Page Number</i>	<i>Department/School</i>	<i>Faculty Mentor</i>
Lamkin	Maya	14	Biological Sciences	Steven Juliano
Leischner	Lauren	15	Biological Sciences	Pirmin Nietlisbach
Lesser	Margaret	71	Social Work	Kate Sheridan
Lewis	Emmalee	71	Social Work	Karen Stipp
Li	Yunpeng	43	Information Technology	Yousra Javed
Lopata	Emily	6	Agriculture	Iuliia Tetteh
Lyons	Ashley	41	Health Sciences	Guang Jin
M				
<i>Presenter Last Name</i>	<i>Presenter First Name</i>	<i>Page Number</i>	<i>Department/School</i>	<i>Faculty Mentor</i>
Mangini	Olivia	52	Communication Sciences and Disorders	Alycia Hund
Maranville	Ryan	74	Politics and Government	Michael Hendricks
Marcheschi	Michael	16	Chemistry	Jon Friesen
Martin	Emma	50	Mathematics	Gaywalee Yamskulna
Martin	Amanda	63	Psychology	Dawn McBride
McCormick	Elyse	16	Biological Sciences	Ben Sadd
McGinnis	Cassie	52	Physics	Epaminondas Rosa
McKermitt	Jack	17	Biological Sciences	Ben Sadd
Meister	Rachel	65	Psychology	Jordan Arellanes
Metternich	Sydney	17	Biological Sciences	Diane Byers

Metz	Hope	46	Kinesiology & Recreation	Kelly Laurson
Meyer	Ryan	18	Biological Sciences	Bill Perry
Mintun	Bronson	46	Kinesiology & Recreation	Kelly Laurson
Monroe	Emily	37	Psychology	Alycia Hund
Morales	Mishell	65	Social Work	Jordan Arellanes
Morr	Rudy	38	Finance, Insurance and Law	Vladimir Kotomin
N				
<i>Presenter Last Name</i>	<i>Presenter First Name</i>	<i>Page Number</i>	<i>Department/School</i>	<i>Faculty Mentor</i>
Newswander	Taylor	31	Communication	John Baldwin
Nguyen	Kim Phung	36	Family and Consumer Sciences	Yoon Jin Ma
Nguyen	Kim Phung	37	Family and Consumer Sciences	Yoon Jin Ma
Nickel	Allison	18	Biological Sciences	Steven Juliano
O				
<i>Presenter Last Name</i>	<i>Presenter First Name</i>	<i>Page Number</i>	<i>Department/School</i>	<i>Faculty Mentor</i>
Odeh	Yasmin	75	Sociology/ Anthropology	Susan Sprecher
Ogunlusi	Tosin	27	Chemistry	Jeremy Driskell
Ortiz	Julian	56	Psychology	Suejung Han
Ortiz	Julian	63	Psychology	Suejung Han
Owens	Jordan	71	Social Work	Karen Stipp
P				
<i>Presenter Last Name</i>	<i>Presenter First Name</i>	<i>Page Number</i>	<i>Department/School</i>	<i>Faculty Mentor</i>
Palmer	Justin	19	Biological Sciences	Ben Sadd

Parks	Megan	19	Biological Sciences	Ryan Paitz
Paton	Hanna	20	Biological Sciences	Laura Vogel
Pecoraro	Calista	72	Social Work	Kate Sheridan
Perkins	Tyla	72	Social Work	Kate Sheridan
Pohlman	Mary	34	Family and Consumer Sciences	Ui-Jeen Yu
Pranskevicius	Emily	20	Biological Sciences	Alysia Mortimer
Promise	Ifeanyichukwu	27	Chemistry	Andrew Mitchell
Prostko	Stephanie	47	Kinesiology & Recreation	Samantha McDonald
Pruett	Allie	72	Social Work	Karen Stipp
R				
<i>Presenter Last Name</i>	<i>Presenter First Name</i>	<i>Page Number</i>	<i>Department/School</i>	<i>Faculty Mentor</i>
Redman	Grace	48	Kinesiology & Recreation	Scott Pierce
Reynoso-Romero	Emily	48	Kinesiology & Recreation	David Thomas
Richey	Breianne	49	Kinesiology & Recreation	Nicole Hoffman
Riley	McKenzie	28	Chemistry	Jeremy Driskell
Rivers	Davey	32	Criminal Justice Sciences	Michael Gizzi
Rosauer	Jeffrey	176	Physics	Raymond Zich
S				
<i>Presenter Last Name</i>	<i>Presenter First Name</i>	<i>Page Number</i>	<i>Department/School</i>	<i>Faculty Mentor</i>
Santana	Michelle	61	Psychology	Brea Banks
Schultz	Jaime	73	Social Work	Kate Sheridan

Seeley	Max	53	Politics and Government	Michael Hendricks
Service	Josalyn	50	Mathematics	Gaywalee Yamskulna
Sloan	Stephen	38	Finance, Insurance and Law	Vladimir Kotomin
Solka	Jake	60	Psychology	Laura Finan
Solka	Jake	64	Psychology	Laura Finan
Storm	Hailey	61	Psychology	Brea Banks
Swanson	Alexis	32	Criminal Justice Sciences	Ralph Weisheit

T

<i>Presenter Last Name</i>	<i>Presenter First Name</i>	<i>Page Number</i>	<i>Department/School</i>	<i>Faculty Mentor</i>
Taylor	Jasmine	28	Chemistry	Christopher Mulligan
Tibbs	Reagen	6	Agriculture	Maria Boerngen
Tomasson	Lauren	65	Psychology	Mark Swerdlik
Troyer	Joseph	5	Accounting	Madeline Trimble

V

<i>Presenter Last Name</i>	<i>Presenter First Name</i>	<i>Page Number</i>	<i>Department/School</i>	<i>Faculty Mentor</i>
Vance	Savanna	73	Social Work	Karen Stipp
Vargas	Stephanie	33	Criminal Justice Sciences	Joanne Savage
Vasquez	Shania	65	Psychology	Jordan Arellanes

W

<i>Presenter Last Name</i>	<i>Presenter First Name</i>	<i>Page Number</i>	<i>Department/School</i>	<i>Faculty Mentor</i>
Walsh	Jeffrey	54	Politics and Government	Michael Hendricks
Wilson	Madison	31	Communication	John Baldwin

Wilson	Jallah	73	Social Work	Karen Stipp
Z				
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Zak	Bridget	39	Geography, Geology, and the Environment	Alec Foster
Zaman	Faeq	30	Chemistry	Jon Friesen
Zaman	Shariq	29	Chemistry	Marjorie Jones
Ziegler	Logan	30	Chemistry	Christopher Weitzel

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<i>Presenter Last Name</i>	<i>Presenter First Name</i>	<i>Page Number</i>	<i>Department/School</i>	<i>Faculty Mentor</i>
Acquah	Bismark	79	Biological Sciences	Alysia Vrailas-Mortimer
Allen	Tae'lor	80	Biological Sciences	Rebekka Darner
Angles	Susanna	89	Chemistry	Andrew Mitchell
Archie	Shira	89	Biological Sciences	Alysia Vrailas-Mortimer
Avella	Philip	80	Biological Sciences	Lise Comte
Awe	'Tope	81	Biological Sciences	Andrés Vidal-Gadea
B				
<i>Presenter Last Name</i>	<i>Presenter First Name</i>	<i>Page Number</i>	<i>Department/School</i>	<i>Faculty Mentor</i>
Behrem	Gaiye	123	Psychology	Kimberly Schneider
Boron	Davida	101	Criminal Justice Sciences	Charles Bell
Brewster	Jonathan	90	Chemistry	Chris Weitzel
Brown	Thomas	130	Theatre and Dance	Kee-Yoon Nahm
Brozenec	Hannah	88	Biological Sciences	Craig Gatto
Buhmann	Grace	112	Health Sciences	Quen VanDermay-Kirkham
Butler	Joclyn	112	Health Sciences	Quen VanDermay-Kirkham

C				
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Chambers	Connor	118	Geography, Geology, and the Environment	Lisa Tranel
Chambers	Dylan	105	Physics	Neil Christensen
Clay	Taylor	97	Communication Sciences and Disorders	Antony Joseph
Clay	Taylor	98	Communication Sciences and Disorders	Antony Joseph
Commander	Okiemute	105	Geography, Geology, and the Environment	Eric Peterson
Contreras	Berenice	123	Psychology	Kimberly Schneider
Corrie	Seth	90	Chemistry	Andrew Mitchell
Cross	Megan	84	Biological Sciences	Alysia Vrailas-Mortimer

D				
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Diffor	Alexander	128	Technology	Isaac Chang
Donald	Samone	81	Biological Sciences	Steven Juliano
Duncan	MacKenna	84	Biological Sciences	Alysia Vrailas-Mortimer

E				
<i>Presenter Last Name</i>	<i>Presenter First Name</i>	<i>Page Number</i>	<i>Department/School</i>	<i>Faculty Mentor</i>
Efobo	Oghenevwede	106	Geography, Geology, and the Environment	Eric Peterson
Essex	Cameron	107	Geography, Geology, and the Environment	Tenley Banik
Evans	Erica	88	Biological Sciences	Craig Gatto

F				
<i>Presenter Last Name</i>	<i>Presenter First Name</i>	<i>Page Number</i>	<i>Department/School</i>	<i>Faculty Mentor</i>

Farias	María Amenábar	130	Theatre and Dance	Kee-Yoon Nahm
Fever	Lacey	107	Geography, Geology, and the Environment	Catherine O'Reilly
Fick	William	113	History	Kathryn Jasper
Flint	Arielle	123	Psychology	Kimberly Schneider
Franklin	Krista	98	Communication Sciences and Disorders	Antony Joseph

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Gaeti	Anthony	108	Geography, Geology, and the Environment	Lisa Tranel
Galewsky	Isaac	103	Family and Consumer Sciences	Sally Xie
Gallagher	Brett	121	Psychology	Eric Wesselmann
Gautam	Liza	82	Biological Sciences	John Sedbrook
Gleeson	Robbie	115	Kinesiology & Recreation	Kelly Laurson
Goytia	Gabrielle	115	Kinesiology & Recreation	Dale Brown
Graybeal	Alexis	91	Chemistry	Timothy Lash
Gwin	Haley	103	Family and Consumer Sciences	Elke Altenburger

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Hansen	Emily	82	Biological Sciences	Victoria Borowicz
Harris	Emma	123	Psychology	Kimberly Schneider
Harwick	Aaron	116	Kinesiology & Recreation	Kelly Laurson

Hayes	Alyssa	83	Biological Sciences	Rebekka Darner
Hazzard	Evan	114	Information Technology	Shaoen Wu
Hennes	Madison	122	Psychology	Dawn McBride
Hernandez	Mayra	88	Biological Sciences	Craig Gatto
Hernandez-Ramos	Catalina	99	Creative Technologies	Kristin Carlson
Herr	Aaron	122	Psychology	Jeffrey Kahn
Hussain	Md Lokman	101	Criminal Justice Sciences	Ashley Farmer
Hyer	Annamarie	88	Biological Sciences	Craig Gatto
J				
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Jean-Louis	Benael	102	Economics	Bibek Adhikari
Johnson	Amanda	88	Biological Sciences	Craig Gatto
Jordan	Jack	120	Physics	Raymond Zich
K				
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Kiam Assato	Carol	83	Biological Sciences	John Sedbrook
Kleinfall	Julia	97	Communication Sciences and Disorders	Antony Joseph
Kleinfall	Julia	98	Communication Sciences and Disorders	Antony Joseph
Klos	Piotr	84	Biological Sciences	Alysia Vrailas-Mortimer
Kneller	Ryan	113	Health Sciences	Quen VanDermay-Kirkham
Komas	Jerome	108	Geography, Geology, and the Environment	Wondwosen Seyoum

Korveziroska	Amelia	119	Physics	Mahua Biswas
Kostrub	Kate	102	Economics	Eric Lenz
Krueger	Emily	88	Biological Sciences	Craig Gatto
L				
<i>Presenter Last Name</i>	<i>Presenter First Name</i>	<i>Page Number</i>	<i>Department/School</i>	<i>Faculty Mentor</i>
Lai	Quyen	92	Chemistry	Marjorie Jones
LaPorte	Manda	120	Politics and Government	Michael Hendricks
Larsen	Abigayle	98	Communication Sciences and Disorders	Antony Joseph
Le	Kimberly	92	Chemistry	Timothy Lash
Le	Amy	93	Chemistry	Cris Weitzel
Lowe	Megan	127	Sociology/Anthropology	Cristina Prestin-Beard
Lusk	Elliot	84	Biological Sciences	Joseph Casto
M				
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Maciej	Caroline	88	Biological Sciences	Craig Gatto
Mast	Daniel	97	Communication Sciences and Disorders	Antony Joseph
Mast	Daniel	98	Communication Sciences and Disorders	Antony Joseph
McCleish	Danielle	104	Family and Consumer Sciences	Yoon Jin Ma
Meateanuwat	Sanhawich	131	Theatre and Dance	Kee-Yoon Nahm
Melecio	Christopher	123	Psychology	Kimberly Schneider
Middendorf	Jaclyn	115	Health Sciences	Dale Brown

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Naeger	Lauren	89	Biological Sciences	Alysia Vrailas-Mortimer
Nagy	Paige	123	Psychology	Kimberly Schneider
Nguyen	Trang	93	Chemistry	Chris Weitzel
Northern	Grace	121	Politics and Government	Lori Riverstone-Newell
O				
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Okonma	Jenefas	131	Theatre and Dance	Kee-Yoon Nahm
Oladuji	Olaoluwa	109	Geography, Geology, and the Environment	Wondwosen Seyoum
Olivares	Jonathan	117	Kinesiology & Recreation	Nicky Wu
Oliver	Ethan	85	Biological Sciences	Chris Weitzel
Olson	Alexander	110	Geography, Geology, and the Environment	Alec Foster
Osborne	Jordan	128	Technology	Isaac Chang
P				
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Pauley	Kenneth	93	Chemistry	Andrew Mitchell
Pereira Gloor	Rochele	100	Creative Technologies	Kristin Carlson
Perez	Marcos	119	Physics	Mahua Biswas
R				
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Radtke	Jacob	114	Information Technology	Eric Wesselmann

Reyes-Cruz	Kendy	80	Biological Sciences	Rebekka Darner
Riedel	Jake	110	Geography, Geology, and the Environment	Eric Peterson
Roden	Emerson	85	Biological Sciences	Steven Juliano
Roseberry	Brendan	86	Biological Sciences	Jan Dahl

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Sahad	Alhassan	111	Geography, Geology, and the Environment	Eric Peterson
Sam-Paintsil	Benjamin	95	Communication	John Baldwin
Samuel	Isabel	132	Theatre and Dance	Bruce Burningham
Satoh	Naomi	120	Physics	Raymond Zich
Sawe	Caleb	86	Biological Sciences	Martin Engelke
Schuck	Morgan	98	Communication Sciences and Disorders	Taeok Park
Setti	Fabio	124	Psychology	Jeffrey Kahn
Shosanya	Teni	87	Biological Sciences	Alysia Vrailas-Mortimer
Stipp	Lauren	100	Creative Technologies	Sercan Şengün
Strandquist	Evan	88	Biological Sciences	Craig Gatto
Strandquist	Evan	95	Chemistry	Chris Weitzel
Symonds	Halle	127	Psychology	Dawn McBride

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Thielbar	Savannah	111	Geography, Geology, and the Environment	Lisa Tranel

Thomas	Hunter	96	Communication	John Baldwin
V				
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Vanka	Venkata Sai Vikas	129	Technology	Sally Xie
Virola-Iarussi	Alyssa	89	Biological Sciences	Alysia Vrailas-Mortimer
W				
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Weihe	Jake	129	Technology	Isaac Chang
Whitcomb	Molly	97	Communication Sciences and Disorders	Antony Joseph
Whitcomb	Molly	98	Communication Sciences and Disorders	Antony Joseph
Whitworth	Devin	88	Biological Sciences	Craig Gatto
White	Leila	118	Philosophy	Daniel Breyer
Wieland	Caroline	112	Health Sciences	Quen VanDermay-Kirkham
Wightkin	Jack	113	Health Sciences	Quen VanDermay-Kirkham

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Allen	Brook	133	Biological Sciences	Alysia Vrailas-Mortimer
Asiedu-Kwarteng	Japheth	133	Art	Tyler Lotz
B				
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Baumann	Anthony	143	Technology	Jin Jo
Bhat	Sukanya	150	Teaching and Learning	Anna Smith
Billig	Ryan	151	Teaching and Learning	Erin Quast
Bolin	Ashley	151	Teaching and Learning	Anna Smith
Botello	Jessie	152	Chemistry	Erin Quast
Buerkett	Danielle	152	Teaching and Learning	Anna Smith
Burkhart	Jessica	134	Biological Sciences	Alysia Vrailas-Mortimer
C				
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Cardenas	Laisha	153	Geography, Geology, and the Environment	Allison Kroesch
Carrillo	Michelle	146	Psychology	Dawn McBride
Casas	Isaac	141	Family and Consumer Sciences	Erol Sozen
Cicciarelli	Kara	145	Psychology	Brea Banks
Cintron-Gonzalez	Edcel J.	141	English	Mary Moran

Clarke	Jessica	153	Teaching and Learning	Anna Smith
Colón	Cora	154	Teaching and Learning	Anna Smith
Connelly	Mary	154	English	Allison Kroesch
Conroy	Ethan	154	Teaching and Learning	Erin Quast
Cook	Cole	174	Technology	Jin Jo
Cox	Riley	142	Geography, Geology, and the Environment	Tenley Banik
Cullotta	Francesco	160	Kinesiology & Recreation	Allison Kroesch
D				
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Day	Brandon	160	Health Sciences	Allison Kroesch
Douglas	Brennan	173	Technology	Jin Jo
Dytrych	Amanda	155	Teaching and Learning	Erin Quast
E				
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Ebersole	Courtney	148	Sociology/ Anthropology	Jason Whitesel
F				
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Feeney	Matt	158	Technology	Allison Kroesch
Fink-Galletti	Claire	155	Teaching and Learning	Anna Smith
Flood	Stephanie	171	English	Allison Kroesch
Foreman	Marisa	156	Teaching and Learning	Erin Quast
Fritsch	Anne	156	Teaching and Learning	Anna Smith

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Grandos	Mark	153	Accounting	Allison Kroesch
Green	John	170	Kinesiology & Recreation	Allison Kroesch
Greenberg	Bailey	156	Teaching and Learning	Erin Quast
Grimes	Laura	157	Teaching and Learning	Erin Quast

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Ham	Claire	157	Teaching and Learning	Erin Quast
Harris	Maricar	157	Chemistry	Erin Quast
Hassert	Jena	163	Geography, Geology, and the Environment	Allison Kroesch
Heffelfinger	Kassidy	154	Kinesiology & Recreation	Allison Kroesch
Hershey	Gabrielle	175	Technology	Jin Jo
Howard	Kyle	158	English	Allison Kroesch
Hudspath	Caleb	136	Biological Sciences	Wolfgang Stein
Hunter	Melissa	140	Criminal Justice Sciences	Jeffrey Walsh

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Ilunga	Enoc	174	Technology	Jin Jo

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Jachymiak	Susan	158	Teaching and Learning	Anna Smith

Jackson	Blake	159	History	Allison Kroesch
Jimenez	Eduardo	173	Technology	Jin Jo
K				
<i>Presenter Last Name</i>	<i>Presenter First Name</i>	<i>Page Number</i>	<i>Department/School</i>	<i>Faculty Mentor</i>
Kaiser	Lindsay	159	Teaching and Learning	Anna Smith
Kalantari	Mojde	139	Creative Technologies	Sercan Şengün
Kieft	Matthew	162	Kinesiology & Recreation	Allison Kroesch
Kraemer	Anna	160	History	Allison Kroesch
Kurtz	Meghan	140	Criminal Justice Sciences	Michael Gizzi
L				
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Lacy	Michelle	160	Teaching and Learning	Anna Smith
Leininger	Mallory	160	English	Allison Kroesch
Lewis	Anna	161	Teaching and Learning	Erin Quast
Loska	James	161	English	Allison Kroesch
Lynch	Monica	162	Educational Administration & Foundations	Anna Smith
M				
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Marsh	Elizabeth	146	Psychology	Dawn McBride
McElroy	Kayla	138	Communication Sciences and Disorders	Taeok Park
Mcmillen	Meghan	162	English	allison Kroesch

McNamara	Rachel	163	Family and Consumer Sciences	Allison Kroesch
McReynolds	Joanna	163	Teaching and Learning	Anna Smith
Meeks	Bronco	163	Teaching and Learning	Anna Smith
Meiss	Zachary	164	Teaching and Learning	Anna Smith
Michaels	Liz	146	Psychology	Dawn McBride
Miller	Jennifer	134	Biological Sciences	Wolfgang Stein
Miller	Austin	174	Technology	Jin Jo
Montoney	Natalie	164	Teaching and Learning	Anna Smith
Morris	Brittany	165	Teaching and Learning	Anna Smith
Mueller	Michelle	166	Family and Consumer Sciences	Allison Kroesch
Musselman	Taylor	165	Teaching and Learning	Anna Smith

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Nadeem	Usama	144	Information Technology	Shaoen Wu
Nepomuceno	Josh	144	Physics	Allison Harris
Nihan	Jacob	175	Technology	Jin Jo
Norrman	Mark	166	Teaching and Learning	Anna Smith

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Oak	Devyn	147	Psychology	Jeffrey Wagman
O'Daniel	Kyle	166	Teaching and Learning	Anna Smith

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Park	Dani	148	Sociology/ Anthropology	Michael Hendricks
Park	Michael	159	Teaching and Learning	Allison Kroesch
Parson	Nathaniel	158	Technology	Allison Kroesch
Parvin	Ellie	139	Creative Technologies	Sercan Şengün
Patton	Paul	160	Kinesiology & Recreation	Allison Kroesch

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Rappe	Ashley	167	Teaching and Learning	Anna Smith
Ricci	Molly	149	Sociology/ Anthropology	Maura Toro-Morn
Riley	Sara	167	Teaching and Learning	Anna Smith
Rocke	Valerie	168	Teaching and Learning	Erin Quast
Roy	Rajit	137	Biological Sciences	Wolfgang Stein
Rzeszuto	Monica	168	Family and Consumer Sciences	Allison Kroesch

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Salzman	Ashley	137	Biological Sciences	Alysia Mortimer
Sanders	Jessica	168	Teaching and Learning	Anna Smith
Sauers	Logan	138	Biological Sciences	Ben Sadd
Schahrer	Kayla	155	Teaching and Learning	Anna Smith
Schaut	Levi	145	Information Technology	Qi Zhang

Schmidt	Kyle	169	Teaching and Learning	Erin Quast
Sherrill	Matt	169	Teaching and Learning	Anna Smith
Shore	Rachel	170	Teaching and Learning	Anna Smith
Smith	James	143	Technology	Jin Jo
Smullin	MaKayla	146	Psychology	Dawn McBride
Szela	Justin	170	Physics	Allison Kroesch

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Talbott-Swain	Evan	135	Biological Sciences	Matthew Dugas
Teel	Amanda	171	Teaching and Learning	Anna Smith
Turcotte	Briana	171	Kinesiology & Recreation	Allison Kroesch
Turner	Chris	175	Theatre and Dance	James Chrismon

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Varvil	Erica	165	Teaching and Learning	Anna Smith
Veldhuizen	Haley	172	Teaching and Learning	Erin Quast

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Wallace	Melanie	172	Teaching and Learning	Anna Smith
While	Andrea	173	Teaching and Learning	Anna Smith

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Zadrzynski	Malley	165	Teaching and Learning	Anna Smith