



**The 14th Annual
Spring
Undergraduate
Research
Festival**

**Wednesday, April 18, 2018
4:30pm-6:30pm**

University of Iowa
University Capitol Centre
2nd floor South Atrium
Iowa City, Iowa

**This event is hosted by the
Iowa Center for Research by
Undergraduates.**

**ICRU promotes undergraduate
involvement in research and creative
projects at the University of Iowa,
serving students, staff, and faculty.**

**ICRU Director
Bob Kirby
bob-kirby@uiowa.edu**

**ICRU Program Coordinator
Melinda Licht
melinda-smits@uiowa.edu**

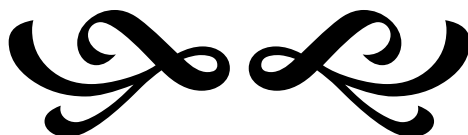
**www.uiowa.edu/icru
319.335.8336
icru@uiowa.edu**

The Spring Undergraduate Research Festival is proud to showcase over **100 visual presentations** given by the University of Iowa's student researchers and creative scholars. Presenters work in over **50 different departments** across campus and represent the senior, junior, sophomore, and freshman classes.

Odd numbered posters will present from 4:30-5:30PM
Even numbered posters will present from 5:30-6:30PM
*****Please note that at 5:30, all of the boards will be turned around to show the even numbering and the second hour presenters' posters*****

We hope that you enjoy talking with these outstanding students and will see you again in for the 8th Annual Fall Undergraduate Research Festival!
Programs with full abstracts are available on the ICRU website: www.uiowa.edu/icru.

Many thanks to the over 100 graduate and professional students and postdocs who have volunteered their time to serve as poster judges for this event.



First Hour Presenters

4:30-5:30PM

(odd numbers only)

1 - Ashley Arkfeld

Majors: Business Analytics & Information Systems, Marketing
Mentor: Jeffrey Ohlmann (Management Sciences)

Optimizing Scholarship Allocations to Shape a First-Year Class

Using data on student profiles, such as location, gender, ethnicity, intended major, and ACT score, we use a classification algorithm to estimate a base probability that a student will matriculate at the University of Iowa. Then historical scholarship offers and student yield data is used to develop a scholarship elasticity model for admitted students to the Tippie College of Business. The optimization model incorporates this scholarship elasticity curve as an input that provides guidance on the allocation of scholarship money that yields a high performing and diverse class. The outputs of this optimization model can then be used to envision likely class outcomes for different scholarship allocation strategies.

3 - Serif Bacevac

Major: Health & Human Physiology
Mentor: Antentor Hinton (Internal Medicine)

Mechanisms for Insulin-dependent Regulation of Skeletal Muscle Mitochondria by OPA-1

Augmentation of mitochondrial oxidative metabolism by insulin might be mediated in part by induction of the inner mitochondrial membrane protein, Optic Atrophy-1 (OPA-1). OPA-1 mediates cristae remodeling to enhance mitochondrial bioenergetics through oligomer formation while increasing mitochondrial fusion. Therefore, we hypothesized that insulin stimulation increases OPA-1 protein levels and mitochondrial respiration by increasing OPA-1 oligomerization and cristae remodeling in skeletal muscle. Two hours of insulin treatment increased OPA-1 protein levels, promoted mitochondrial fusion, elevated mitochondrial respiration, increased cristae number along with volume density and area, decreased the distance of ER-mitochondria contacts, and it may have even changed OPA-1 oligomerization. Depletion of OPA-1 and MFN-2 blocked the metabolic effects of insulin stimulation. OPA-1 depletion reduced cristae number, volume density, and area. This loss of OPA-1 resulted in compensatory elevation of Mitochondrial Associated Membrane proteins (MAMs), increasing the number of ER-mitochondria contacts, blocking OPA-1 oligomerization, and decreasing ER-mitochondria contact distance. Together,

ablation of OPA-1 alters metabolic responses to insulin in skeletal muscle cells. Furthermore, insulin stimulation promotes changes in cristae morphology and triggers mitochondrial fusion through an IR-pAKT pathway that increases OPA-1.

5 - Jennifer Banks

Major: Anthropology

Mentor: Matthew Hill (Anthropology)

Dismal River Housing: a comparative study of Apache housing structures

The Humphrey site (25HO21) is an ancestral Apache site located in the Dismal River of Western Nebraska that dates to AD 1500-1800. During the 2017 field season, a group of University of Iowa undergraduate and graduate students partnered with the Nebraska State Historical Society to conduct archaeological excavations of three well-preserved, burned houses occupied by ancient Apache people. The data from this field season indicates that these three structures were destroyed by fire soon after people abandoned this settlement. The high degree of preservation allows for a detailed study of the architecture and construction techniques of these people. This poster will summarize our findings from the 2017 fieldwork and allow us to compare these new finds to data from previously excavated sites. Because the presence of Apache groups on the central Great Plains is part of a larger migration involving many different groups, we hope that the study of ancient household architecture can tell us something about past social landscapes.

7 - Rachel Bartlett

Major: Psychology & Informatics

Mentor: Kyle Rector (Computer Science)

Exploring Aural and Haptic Feedback for Visually Impaired People on a Track: A Wizard of Oz Study

9 - Marc Beer

Major: Biology

Mentor: Andrew Forbes (Biology)

Adaptive consequences of color variation among recently diverged varieties of a specialist insect

Species in the genus *Strauzia*, a group of plant-feeding specialist insects, exhibit wide variation in thoracic pigmentation that lacks a putative evolutionary explanation. Three genetically distinct varieties of *Strauzia longipennis* emerge sequentially from May-July and utilize a shared host plant. The two varieties that emerge earliest display darker pigmentation

relative to the variety that emerges latest. The thermal melanism hypothesis may explain the correspondence between increased pigmentation and earlier emergence in *S. longipennis* varieties. Darker coloration confers an increased absorption of electromagnetic radiation, which is expected to manifest as an increased heating rate and/or temperature excess. An increase in these parameters may provide darker individuals with an adaptive advantage in low-temperature environments. As preliminary data, we demonstrate that dissected thoraces of *S. intermedia* and *S. perfecta*, species notable for their high and low respective thoracic pigmentation and temporally distinct emergences, differ in temperature excess. However, living individuals of *S. longipennis* varieties do not differ in activity level when illuminated at low temperatures. These preliminary results indicate a relationship between thoracic pigmentation variation and emergence timing, as predicted by the thermal melanism hypothesis. Further research will evaluate the role of phenotypic variation on *Strauzia* survival and reproduction.

11 - Mark Biangmano

Major: Psychology

Mentor: Paul Windschitl (Psychological & Brain Sciences)

Do Wishes Influence Expectations? Depends How You Ask

People's desires for an outcome influence their optimism that the outcome will occur. This is called the desirability bias or the wishful-thinking effect. The desirability bias occurs when people's expectations or hopes for an outcome overrides objectivity when making a prediction about an event. While many studies have shown a desirability bias when making dichotomous predictions, few have measured how changing the prediction metric influences the effect. In the current study, participants viewed a depiction of an endurance race. Participants' desire for an outcome was manipulated by promising a small prize if one (or another) competitor would win. Using a between-subjects design, participants were asked to make one of three types of predictions about the outcome of the race: a dichotomous prediction, a dichotomous likelihood judgment, or a continuous likelihood judgment. We found evidence that the desirability bias varied between types of predictions asked. Specifically, there was more objectivity in continuous likelihood judgments and more wishful thinking in the dichotomous predictions. This research suggests that the type of prediction that is solicited has an impact on the presence of the desirability bias, which has implications for both scientific research and everyday decision-making.

13 - Aaron Buelow

Major: Biomedical Engineering

Mentor: Richard Shields (Physical Therapy and Rehabilitation)

Low Force Electrically Induced Exercise (LFEE) Attenuates Blood Metabolic Biomarkers in People with and without Spinal Cord Injury

People with spinal cord injuries have a greater chance of developing Type II Diabetes and Heart Disease. This increased risk is due mostly because ingested carbohydrates are primarily used through insulin dependent mechanisms with eventual loss of sensitivity. Non-injured individual who can move normally can use other pathways to move carbohydrates into muscle. We believe that activating the legs of people with spinal cord injury using electric stimulation may reduce the amount of glucose in their blood and the amount of insulin needed to pump it out. This may be affected by the fact that after a spinal cord injury the muscles change some of their properties that don't allow for as much glucose uptake. We also investigated other health markers that are changed in individuals with Type II Diabetes and Heart Disease.

15 - William Bui Tran

Major: Biomedical Engineering

Mentors: Renata Pereira (Internal Medicine); E. Dale Abel (Internal Medicine)

Fat-Derived FGF21 is Dispensable for the Resistance to Diet-Induced Obesity Observed in Mice Lacking OPA1 in Adipose Tissue

OPA1 (Optic Atrophy 1) is a mitochondrial GTPase that regulates mitochondrial dynamics, cristae structure and respiratory capacity. The role of OPA1 in adipose tissue physiology and systemic metabolism is incompletely understood. We generated mice lacking OPA1 specifically in adipose tissue by crossing OPA1 floxed mice with mice harboring the Cre recombinase under the control of the adiponectin promoter (OPA1 Ad-KO). Surprisingly, OPA1 deletion in adipose tissue resulted in loss of fat mass when mice are fed normal chow and completely prevented diet-induced obesity. These metabolic changes occurred concomitantly with increased levels of FGF21, a potent anti-obesity hormone, in the adipose tissue and in the circulation. We recently reported that OPA1 deficiency in muscle results in a similar phenotype, which is completely dependent on FGF21 secretion from skeletal muscle. To test whether fat-derived FGF21 is required for the resistance to DIO observed in OPA1 Ad- KO mice, we generated mice lacking both OPA1 and FGF21 in adipose tissue (DKO). By NMR, there were no significant differences in body composition between 8-week old wild type (WT) and DKO mice, however, upon euthanasia, gonadal and inguinal fat pads were reduced, while brown adipose tissue (BAT) was enlarged in DKO mice, as previously observed in OPA1 Ad-KO mice. After 4 weeks of high-fat feeding, body weight and total fat mass were significantly reduced in DKO mice compared to WT mice.

17 - Joseph Burba

Major: Biochemistry

Mentor: Madeline Shea (Biochemistry)

Fluorescence-Monitored Assays for Binding Affinity of Calmodulin Mutants to NaV

Calmodulin (CaM) is a ubiquitously expressed, calcium-dependent protein that is responsible for the signaling and regulation of numerous intracellular and trans-membrane target proteins. My target protein of interest is the family of voltage-gated sodium channels (NaV). All 9 isoforms of NaV bind CaM at the "IQ Motif" on the C-terminal tail. My project focuses on newly isolated mutations of CaM and how their binding affinity to Ca²⁺ and the NaV are affected. To determine this, I perform fluorescence-monitored titrations of CaM with Ca²⁺ and measure the conformational change associated with the binding of Ca²⁺. I also titrate a complex of the NaV IQ Motif and two fluorescent proteins with CaM to measure the FRET signal.

19 - Eleanor Burke

Major: Psychology

Mentor: Gary Gaeth (Marketing); Irwin Levin (Psychology)

Errors in Estimation - Predictors and Consequences

The goal of this research is to test whether the classically-observed effect of over-estimation of small percentages and under-estimation of large percentages would differ if the percentages estimated were black dots or white dots, and if a difference in estimation would generalize to a difference in subjective reaction to the amount. To test this, randomly-generated grids of white and black dots were presented for a brief period of time, contextualized by a description of a scenario involving chance. Participants were asked to estimate the percentage of dots that were either white or black, as well as their reactions to the scenario. Results showed a robust over-estimation and under-estimation effect, but less effect of the color of dots. Future research will aim to clarify the effects of estimation on the subjective reaction.

21 - Akanksha Chilukuri

Major: Neuroscience

Mentor: Hanna Stevens (Psychiatry)

Effects of Preeclampsia on Cortical Growth and Cortical-Dependent Behavior Using a Vasopressin Mouse Model

Preeclampsia is a gestational disorder characterized by hypertension, proteinuria, and pregnancy complications, as well as an increased risk for neurodevelopmental disorders in children of preeclamptic mothers. For a

better understanding of how it affects both offspring brain morphology and behavior, we model preeclampsia in mice, where we insert a subcutaneous pump into female mice that continuously releases vasopressin (AVP), a hormone elevated in human preeclampsia and found to be sufficient to cause the endophenotypes of preeclampsia, throughout gestation. Behavioral testing of the AVP offspring has found that adult females exhibit learning and memory deficits, while males display anxiety-like behavior and hypersociability. Brain morphology alterations include a decreased cortical volume in AVP mice at E18, P0, and P7 but not in adults. Microglia, which have been shown to regulate cell proliferation in the developing brain, were found to be increased at E18 and P0 and may be an explanation for the alterations in brain morphology of AVP mice.

23 - Ross Clowser

Majors: Music (Jazz Studies), International Relations

Mentor: Trevor Harvey (Music)

Society for Ethnomusicology Podcast

The research we do explores the use of media technologies, specifically podcasts, to broaden public engagement with scholarly ethnomusicological research and the wide global impact of musical traditions. The podcast seeks to convey ethnomusicological concepts and research to a broader audience in an engaging and accessible way using stories and interviews surrounding a variety of ethnomusicological issues. We do this by creating short 15-20 minute podcast episodes featuring research, interviews, and narration. The episodes we have produced thus far study ethnomusicological issues from around the globe in a wide variety of social settings. Many aspects of culture and society are impacted by musical traditions and practices, and this podcast explores the impact of music and musical traditions on issues of racism, sexism, gender, economic influences, government policies, copyright laws, and many others. Through the production of a public podcast for the Society for Ethnomusicology that is online and freely accessible to anyone, we hope to convey the effects of ethnomusicological research studies more broadly in a global arena and how this research is understood within a cultural context.

25 - Liam Crawford

Majors: Computer Science, Philosophy

Mentor: Juan Pablo Hourcade (Computer Science)

StoryCarnival: Developing Design Principles for Early Childhood Learning Environments

Interactive touchscreen devices - such as smartphones and tablets - have become increasingly present in the lives of young children. These new

technologies are well within the range of their motor capabilities, and thus allow these children to use interactive computing devices in a practical manner. Despite the wide range of commercial apps targeted towards children of this age, little research has been conducted as to how to design these technologies with healthy childhood development in mind. In light of this, we have proposed an approach focusing on what we call the 3Cs: Creating, Connecting, and Communicating. StoryCarnival, the set of applications we have developed based on this strategy, is aimed at supporting make-believe play which connects preschool age children with their social and physical environment while emphasizing communication. Our preliminary findings from interactive “play sessions” have not only guided the design of StoryCarnival, but may hold the key to creating actionable design requirements for designing technology for children in general. The poster will explore our choice of design and research activities, our preliminary findings, and the future of our project.

27 - Christine Czarnecki

Major: Chemical & Biochemical Engineering

Mentor: Jennifer Fiegel (Chemical & Biochemical Engineering)

Formulation of novel dry powder antibacterial aerosols using central composite design of experiments

Pulmonary bacterial infections are often difficult to eradicate through intravenous or oral administration of antibiotics due to the presence of bacterial biofilms and the difficulty in achieving the desired drug concentration at the site of infection. Our lab is working on developing combination therapies consisting of an antibiotic and a nutrient dispersion compound to increase the susceptibility of the biofilm bacteria to antibiotics. The objective of this study is to develop a dry powder aerosol containing colistin sulfate and sodium citrate, that has high yield, good aerodynamic properties, and high drug loading. Dry powder aerosols allow for direct administration of drugs to the lungs, enabling delivery of lower doses of the drug and faster onset of therapeutic activity. A central composite design of experiments, generated using Minitab® software, was used to study the effect of formulation and spray drying process parameters on the yield and aerodynamic properties of the powder. Future studies will examine contents of colistin sulfate and sodium citrate in the powders using the high-performance liquid chromatography (HPLC) and citrate assay technique. Aerodynamic properties such as mass mean aerodynamic diameter (MMAD), fine particle fraction (FPF), and emitted fraction (EF) will be measured using the next generation impactor (NGI).

29 - Sarah DeLong-Duhon

Major: Environmental Science

Mentor: Andrew Forbes (Biology)

Resolving phylogenetic relationships between three endemic Stereum fungi species

Stereum mushrooms are important hardwood saprotrophs with long-lasting fruitbodies that are prevalent in Iowa's forests. There are at least three morphologically-distinguishable variations of Stereum locally, known as Stereum ostrea, Stereum hirsutum, and Stereum complicatum. However, the descriptions of these species in the literature are inconsistent, and Stereum specimens often display intergrading forms that are difficult to assign to any one species. It has therefore been suggested that some Stereum species exist as part of a species complex and are able to hybridize. To test this hypothesis, we have collected many specimens of each of the three endemic Stereum species from public parks within Linn and Johnson County, noting the GPS location of each specimen and taking detailed photographs of its morphology. We have optimized a protocol to extract genomic DNA from collected basidiocarp tissues, and are currently optimizing conditions for PCR amplification of the ITS region, a site commonly used to delineate fungal species. We will use the sequences of each specimen's ITS region to create a phylogenetic tree, which will allow us to examine the relationship between fungal morphology and species, and to clarify the relationship between the Stereum species.

31 - Monica Derby

Major: Nursing

Mentor: Stephanie Gilbertson-White (Nursing)

Personalizing symptom management strategies to meet the needs of rural residents with advanced cancer

Purpose and Background/Significance: Patients undergoing treatment for advanced cancer often experience symptoms in clusters. Oncology Associated Symptoms and Individualized Strategies (OASIS) is a web-application developed for patients with advanced cancer to help them develop self-management skills and focus on symptoms most important to them.

Methods: Data from users enrolled in the OASIS study will be analyzed. Metadata from the daily tracker on OASIS web-application will be extracted for analysis. Analysis of the symptoms and strategies that patients select will be conducted. In addition, descriptive qualitative analysis of patients' journal entries will be conducted.

Results: N=5 adults (40% male, mean age = 63 years, range 56-70 years) with advanced cancer participated. Cancer types included breast (2), rectal (1), kidney (1), chronic lymphocytic leukemia (1). Themes identified include: patient identification of effective self-management strategies, ability to easily implement strategies into their daily routine increases use, and fatigue hinders use.

Conclusions: The results of this research have the potential to improve care of patients with advanced cancer in terms of making the symptom management education more tailored to their individual experience.

33 - Joshua Dunigan

Majors: Genetics & Biotechnology

Mentor: Madeline Shea (Biochemistry)

Calcium-Triggered Activation of Calcineurin: Release of the Auto-Inhibitory Domain is Regulated by Calmodulin

In humans, embryonic heart development, immune rejection of organ transplants and maintenance of neuronal plasticity all depend critically on calcium-activated calcineurin (CaN). CaN is a heterodimeric serine/threonine protein phosphatase consisting of an auto-inhibited large catalytic subunit (CaNA) and a small regulatory subunit (CaNB) that binds calcium. Two isoforms of CaNA (α , β) are abundant in the brain and heart, and tightly bind calcium-saturated calmodulin (CaM); this lets them achieve full enzymatic activity. CaM is similar to the intrinsic CaN subunit CaNB; both have two homologous 4-helix bundle domains that adopt an "open" tertiary conformation after binding calcium ions cooperatively at paired EF-hand binding sites.

We hypothesize that Ca²⁺-dependent regulation of CaN activity is linked to a 3-step mechanism mediated by calcium binding to sites of CaNB, followed by association of calcium-saturated C-domain of CaM (CaMC) with CaNA and then binding of calcium to the N-domain of CaM (CaMN) that triggers it to relieve auto-inhibition. This study focuses on determining how CaMC and CaMN interact to regulate CaN activity. We are probing this with site-specific mutations in the calcium-binding sites of each domain of CaNB and CaM as well as testing physiologically identified mutations of CaM known to interfere with heart function or locomotion.

35 - Lauren Dunlay

Major: Psychology

Mentors: Ryan LaLumiere (Psychological & Brain Sciences); Victoria Muller Ewald (Psychological and Brain Sciences)

Neuronal activity in the infralimbic cortex during cocaine seeking: representations of environment and decision making

Previous work has revealed that the rodent infralimbic cortex is necessary for the inhibition of cocaine seeking behavior. Despite the importance of this brain region, no studies have examined activity of individual infralimbic cortical neurons when animals choose to seek or abstain from cocaine. This project aims to fill this gap in the literature by using in vivo electrophysiology to examine single unit activity in the infralimbic cortex as rats undergo cocaine self-administration, extinction training and reinstatement. Previous

studies have found neurons that are responsive to lever presses (cocaine seeking responses) which we confirm in our work. We further demonstrate neurons that are responsive to an availability onset signal, which indicates to the animal that it can make a cocaine-seeking response. Availability onset-modulated neurons can be further characterized as responsive to environmental cues (e.g. lever extension or light) or pre-motor neurons, which predict the animal's cocaine-seeking response. These data help inform how the infralimbic cortex can have such pervasive control over cocaine-seeking behavior. This research can also help us better understand what changes happen in the brain when an individual is addicted to cocaine and can be harnessed to better inform human therapies for drug abuse moving forward.

37 - Ryder Fink

Major: Human Physiology

Mentor: Toshihiro Kitamoto (Anesthesia)

Genetic Modifiers of a Drosophila model of sodium channelopathies

Epilepsy is a neurologic disease that one in twenty-six people within the US will develop. One third of epilepsy patients are refractory to treatment, which indicates a need to develop a deeper understanding of the basic nature and molecular underpinnings of the disease. Many epilepsy cases are idiopathic, but are likely due to mutations in genes important for neuron function, such as voltage-gated sodium channels (NavC). Mutations within NavC genes are generally regarded as highly penetrant, but clinical sequencing studies show that other genomic loci can significantly modulate the overall severity of these epilepsy-causing mutations and improve neurological functioning. Using forward genetic deficiency screening in a fruit fly model system, we identified genomic regions that functionally interact with a *Drosophila* NavC mutant, Shudderer, to significantly modify its neurological phenotypes. Further, we have identified Glutathione-S-transferase S1 (GstS1), as a modifier of the Shudderer neurological phenotypes. We are currently utilizing the fruit fly UAS/GAL4 binary expression system to systematically knock down GstS1 in the Shudderer genetic background by using a panel of cell-type specific GAL4 drivers. With our robust and systematic approach, we will then determine where in the fly nervous system GstS1 ablation is effective for suppressing Shudderer phenotypes.

39 - Kathryn Gabel

Major: Speech & Hearing Science

Mentor: Elizabeth Walker (Communication Sciences & Disorders)

Narrative Skills in School-Age Children who are Hard of Hearing

The ability to effectively tell a story is a central component of language and a considerable predictor of academic success for children. Due to their reduced

access to auditory input, children with hearing loss (CHL) are at risk for delays in language development. Previous research suggests that CHL lag behind their peers with normal hearing (children with normal hearing; CNH) in narrative language development, however few studies focus specifically on children with mild-to-severe hearing loss (children who are hard of hearing; CHH). The current study examined multiple aspects of narrative skills and their underlying mechanisms in second grade CHH compared to same-age CNH. Our research aims addressed the following questions: 1) Are second grade CHH delayed in their narrative comprehension and production skills compared to CNH?, 2) Does degree of hearing loss have an impact on narrative production skills?, 3) Does performance in areas of working memory, vocabulary, or grammar differ in CHH compared to CNH? How do these factors impact narrative skills in CHH?, 4) Do CHH perform worse on measures of mean length of utterance (MLU), total number of utterances, and correct production of high-frequency morphemes in their narratives when compared to CNH or between HH groups?

41 - Manisha Gore

Majors: Speech and Hearing Science

Mentor: Eileen Finnegan (Communication Sciences & Disorders)

The effects of semiocluded vocal tract (SOVT) techniques on the vocal tract and vocal folds

Speech-language pathologists commonly employ semiocluded vocal tract (SOVT) exercises when working with patients with voice disorders. These techniques are thought to be effective, in part, because they alter the sound source (the vocal folds) and the filter (vocal tract) so that the speaker can increase loudness with less collision between the vocal folds. These techniques have been studied to some extent, but there is a lack of data overall on the different SOVT exercises. The purpose of this study was to test the hypothesis that vocal fold adduction is decreased and pharyngeal width is increased and that this is correlated with an increase in the amplitude of vocal fold vibration during these exercises. Nasendoscopy was used to examine five subjects between ages 18-60 without voice disorders. The subjects produced sustained vowels /u/ and /i/ with and without using the SOVT exercises of bilabial fricative, lip trills, straw phonation, and straw phonation in water. Aspects of vocal fold movement measured were (1) amplitude of vibration, (2) vocal fold adduction via vocal process gap, and (3) pharyngeal width. Within subject ratings were obtained to determine changes associated with the exercises in comparison to baseline.

43 - Christina Grimes

Major: Psychology

Mentors: Victoria Muller Ewald (Psychological & Brain Sciences); Ryan LaLumiere (Psychological & Brain Sciences)

Characterization of infralimbic cortical activity in rats while seeking or abstaining from cocaine

The infralimbic cortex in a rodent is necessary to inhibit cocaine-seeking behavior. Rats learned to self-administer cocaine by pressing an active lever which resulted in an infusion of cocaine. During cocaine self-administration, the infralimbic cortex is important for promoting cocaine-seeking behavior. During a period of extinction, when nothing happens following a lever press, the rats learn to withhold cocaine-seeking behavior and this brain region decreases cocaine seeking. We know the infralimbic cortex is important to control cocaine-seeking behavior, but literature fails to explain how neural activity in this region changes as the rat learns to inhibit their cocaine-seeking behavior. In order to examine single cells activity in the region when rats undergo cocaine self-administration, extinction, reinstatement, our lab uses the technique known as electrophysiology, which studies the production of electrical activity. The data revealed there were not significant changes in the percentage of neurons that fire due to behavioral events during the extinction training. Instead, during the extinction training where the rats learn to withhold their lever pressing behavior there was an increase in neuronal bursting and baseline firing rates. Our data helps us better understand the changes that occur in the brain after chronic cocaine use.

45 - Emily Hanson

Major: Communication Sciences & Disorders

Mentors: Inyong Choi (Communication Sciences & Disorders); Shawn Goodman (Communication Sciences & Disorders)

Quantifying and Identifying Hidden Hearing Loss

Recently, studies found that conventional hearing tests are failing to diagnose a critical form of hearing loss: the degraded ability of understanding speech in background noise. This "hidden" hearing loss (HHL) is an emerging problem in the field of hearing science. Our central hypothesis is that one specific type of auditory nerve, important for speech-in-noise understanding, is easily damaged by environmental noise. Thus people with more noise exposure have a greater chance of obtaining HHL. This project focuses on the recruitment of people who are exposed to noise more than others and test different aspects of their hearing abilities. We also measure the survival rate of their auditory nerves by the use of audiological and neuroimaging techniques. The physiological measures and behavioral scores will be compared to investigate underlying neural mechanisms of HHL. This study will define several neural processes required for successful communication in noisy environments, and will promote our understanding of how processing deteriorates in listeners with degraded ability. This work may lead to the development of clinical tests that can identify specific hearing deficits that are currently undiagnosed, and

raise awareness of HHL. Once identified, it may be possible to develop interventions for this deficit.

47 - Carolyn Hoemann

Major: Ethics & Public Policy

Young, Urban Cambodian's Perceptions of Local Healthcare Services: an Exploratory Qualitative Analysis

The Cambodian healthcare system is comprised of governmental-funded healthcare institutions, private clinics, and private pharmacies that function as primary care facilities. Fourteen young Cambodians (age 18-27) living in two major urban areas were interviewed about their experiences accessing primary and reproductive healthcare. Interview topics included variance in the patient-provider relationship by institution type (public vs. private) and healthcare type (general healthcare vs. reproductive healthcare), their trust in the local healthcare services, and their perception of public opinion of these institutions. The data were analyzed using a grounded theory approach. Significant themes included comparative trust in the private clinics and pharmacies, experiences of class-based and gender discrimination, the influence of peer's experiences and beliefs on personal opinion, and perceived corruption in the public medical institutions.

This research was funded and supervised by the Center for Khmer Studies in Siem Reap, Cambodia.

49 - Jessica Janota

Major: Speech & Hearing Science

Mentor: Alison Lemke (Communication Sciences & Disorders)

Aphasia Reading Club Outcomes: Acquisition and Use of Metacognitive Reading Strategies

Aphasia is a language disorder acquired due to a neurologic condition that disrupts the understanding and use of semantic, syntactic, morphological, and phonological knowledge of language. As a result, individuals with aphasia find it challenging to understand, speak, read, and write language. The Aphasia Reading Club (ARC) is an opportunity offered by the Wendell Johnson Speech and Hearing Clinic for people with mild to moderate aphasia to develop their reading skills within a group setting. Research shows that therapy, especially group therapy, develops reading abilities in people with aphasia due to combining positive psycho-social aspects of group therapy with clinical instruction. In ARC, the coordinator and assisting graduate clinicians provide a variety of reading supports to promote understanding of various levels of print sources dependent on each individual's reading ability. For this study, retrospective and prospective analysis using the MARSII was conducted to

determine individuals' acquisition and use of metacognitive reading strategies over one year of ARC participation. By obtaining this information, the effectiveness of ARC and the most beneficial practices were highlighted, which can help develop other aphasia reading groups as well.

51 - Tiara Kane

Major: English

Mentor: Takis Poulakos (Rhetoric)

Social Justice in Dickens' A Tale of Two Cities and today

My project is a rhetorical analysis of social justice in Charles Dickens' 19th century novel A Tale of Two Cities. Dickens' novel juxtaposes social injustices in France during the French revolution, to the unjust nature of law in England during the same time period. It is through this juxtaposition that Dickens' fictional work is able convey his judgments on the unjust nature of law and his vision of what real justice entails. I explore the social structure in England at the time of publication and discuss why Dickens chose to make this social statement in the 19th century. Furthermore, I explore the relevance of Dickens' perception of social justice in America today. How does today's society demonstrate the conflictual relationship between our laws and our conceptions of social justice? What are challenges we face as a society as we still strive to become a socially just society?

53 - Alethea Kapolis

Major: Environmental Science

Mentors: Emily Finzel (Earth & Environmental Sciences); Justin Rosenblume (Earth and Environmental Sciences)

Sandstone:shale ratio maps of the Pennsylvanian lower Cherokee Group in southern Iowa

This research aims to map fluvial channel and flood plain deposits to interpret the distribution of ancient meandering fluvial systems on or near the eastern margin of the Forest City Basin during the Pennsylvanian (~300Ma). The basin was a topographic low during that time, which allowed for sediments to accumulate. The goal of this research is to map the lowest Pennsylvanian strata of the Cherokee Group from 84 bedrock cores because they represent rejuvenation of sedimentation by fluvial systems after a prolonged depositional hiatus. Sedimentary deposits of the Cherokee Group include three main formations: the Kilbourn, Kalo, and Floris, which we evaluate for their relative proportions of sandstone to mudstone, in addition to their thicknesses, within each rock core. Maps display the relative proportions of sandstone to mudstone as pie charts, which are then scaled by their thicknesses, to highlight the potential locations of sandstone channel deposits. Thin or missing deposits

of the uppermost unit(s) are helpful because they allow for interpretation of recent glacial erosion. This research project is important because these maps will be used to guide future research by providing constraints to the locations and movement of fluvial channels across the continent during the earliest Pennsylvanian.

55 - Madison Kasperek

Major: Physiology

Mentor: Teresa Marshall (Preventative & Community Dentistry)

Acceptability of Measures assessing Environmental Confounders of Dietary Habits

Background: Despite available healthy dietary information, society does not practice healthy dietary behaviors; approximately 39% of adults and 18% of children were classified as obese in 2015-16. Numerous environmental and individual barriers impact dietary habits.

Objectives: 1) Develop a model identifying environmental confounders of dietary habits. 2) Identify validated tools assessing environmental confounders for determination of their acceptability, 3) Create a survey to identify how environmental factors influence dietary knowledge.

Results: A model was designed to identify factors, including their interrelationships, which influence food and beverage intakes. We then explored social media's role in dietary behaviors. Social media platforms contain a wide spectrum of both concrete and abstract food and nutrient-related information. However, these sites are not 'peer-reviewed', and the accuracy of such information is unknown. A descriptive survey designed to identify social media use and related behaviors surrounding diet and nutrition information was developed, and is currently being piloted.

Conclusion: Social media is highly persuasive and used by the majority of individuals. Information obtained from social media may positively or negatively influence dietary choices with potential health consequences. The survey will be used to identify health care students' social media use to inform their dietary knowledge and behaviors.

57 - Morgan Kemerling

Major: Human Physiology

Mentor: Kathleen Markan (Pharmacology)

Investigating the Effects of Exercise on Adipose Tissue Metabolism

Exercise has been reported to induce the beiging of white adipose tissue in rodents, which is characterized by the induction of UCP1 positive, multilocular adipocytes in classically white adipose depots. UCP1 activity results in dissipation of the mitochondrial membrane proton gradient which results in

the uncoupling of oxidative phosphorylation from ATP production. This leads to an enhanced uptake of circulating glucose and lipid, enhanced oxygen consumption and the dissipation of energy as heat; essentially energy wasting. The central question within the field remains: why would exercise activate a mechanism that results in the wasting of energy? We hypothesize that exercise induced beiging of white adipose tissue may function as a mechanism to regulate the flux of triglycerides and free fatty acids through the adipocyte and peripheral circulation. In order to test this hypothesis, we have initiated a series of studies investigating the potential mechanisms underlying the beiging of white adipose tissue in response to exercise. We have determined that voluntary wheel running at thermoneutrality is sufficient for the induction of white adipose tissue UCP1 expression. We are now focused on understanding the effects of exercise on triglyceride and free fatty acid cycling within the adipocyte. We hope to determine novel effects of exercise and gain new insight regarding the relationship between exercise and the beiging of white adipose tissue.

59 - Eric Knapp

Major: Chemical Engineering

Mentor: Julie Jessop (Chemical & Biochemical Engineering)

Determining Parameters for Optimal Transferrable Shadow Cure Polymerization

The lab group has developed a syringe-like device to take advantage of some of the unique attributes of cationic photopolymerization. Because cationic polymerization has slower kinetics than other types of polymerization, and because the cationic active centers are long lived and will react hours or days after they are formed, polymers will cure long after the polymerization reaction is initiated with UV light. This is known as dark cure. The device is designed so that liquid monomer is illuminated by UV light in the syringe, initiating the polymerization reaction, and then uncured liquid monomer is expelled while leaving solid polymer in the syringe. The expelled liquid is then allowed to shadow cure. The monomer 3,4-Epoxy cyclohexylmethyl-3',4'-epoxycyclohexane carboxylate (ECC) was used with 0.5 wt% photoinitiator [4-(2-hydroxy-1-tetradecyloxy)-phenyl]phenyliodonium hexafluoroantimonate (IFA). The volume of monomer used, the intensity of UV light, and the time of UV light exposure were all varied over multiple trials. Central composite design (CCD) was utilized to determine the best parameters to minimize solid polymer remaining in the syringe while maximizing conversion of dark cured polymer. Raman spectroscopy was used to measure conversion of monomer to polymer.

61 - Virginia Lamas Meza

Major: Environmental Chemistry

Mentor: Hans-Joachim Lehmler (Occupational and Environmental Health)

Analysis of Extractable Lipids and PCB 136 (2,2',3,3',6,6'-hexachlorobiphenyl) in Transgenic Mice Tissues

63 - Josh Larson

Majors: Electrical Engineering, Physics

Mentor: David M. Miles (Physics & Astronomy)

CaNoRock - The Canada-Norway Student Sounding Rocket Field School

65 - Rikki Laser

Major: Neuroscience

Mentors: Mark Blumberg (Psychological & Brain Sciences); Cassandra Coleman (Psychological & Brain Sciences)

Deficits in REM sleep twitching indicate developmental delay in a mouse model of autism

Autism is a neurodevelopmental disorder that affects approximately 1% of the population. Although primarily known for producing deficits in social behavior, autism is also characterized by motor deficits. As social deficits are not noticed until children begin school, these motor deficits may be the key to earlier diagnosis. Previous studies have shown abnormalities in rolling, crawling, and walking, which are expressed from a few months of age to a year. In contrast, myoclonic twitching begins in the womb. Here, in order to see if myoclonic twitching can be a sensitive indicator of motor deficits in autism, we compared the twitch activity of infant 16p11.2 del/+ mice—thought to provide one model of autism—to the twitch activity of wild-type littermates. Through the use of high-speed videography and motion tracking, we found lower rates of twitching and altered twitch-burst organization at postnatal days 4 and 6 in the 16p11.2 del/+ mice. Our findings suggest that, early in development in this mouse model of autism, twitching can be used to detect subtle sleep-related differences in motor behavior. This approach may prove useful for detecting risk in autism and other neurodevelopmental disorders.

67 - Yahang Li

Major: Biomedical Engineering

Mentors: E. Dale Abel (Internal Medicine); Antentor Hinton (Internal Medicine)

DRP-1 and Mitochondria-associated endoplasmic reticulum membranes are important for inducing fission during exercise

Dynamin-related protein 1 (Drp-1) is a cytosolic GTPase protein that plays a central role in mitochondrial fission during exercise with the help of mitochondria-associated endoplasmic reticulum membranes (MAMs). However, it is not known if MAMs can influence mitochondrial fission in the absence of DRP-1 after exercise. We hypothesized that MAMs can induce

fission in the absence of DRP-1 in skeletal muscle after exercise. We used CRISPR technology to knock out DRP-1 in C2C12 cells and electrical stimulation (e-stim) paradigm to mimic exercise. Glycogen, lactate, insulin, and free glucose activity assay kits were used to determine if e-stim was effectively working. Next, we measured complex I, III, and IV activity assay kits to determine how exercise influenced complex activity in skeletal muscle. To date, we were able to demonstrate that e-stim in C2C12 cells decreased free glucose in cell media by 33 percent and increased lactate by 2 ½-fold. Next, we were able to show that CRISPR successful knockdown DRP-1 in C2C12 cells. We also saw an increase in ER-stress and FGF-21 markers before e-stim. In conclusion, were able to demonstrate that our e-stim protocol worked and that CRISPR technology can be used to knock down DRP-1 in C2C12 cells.

69 - Kaylee Lindburg

Major: Economics

Mentor: John Solow (Economics)

Economic Effects of Johnson County Minimum Wage Increase on Local Business Activity

This paper examines the effects of Johnson County, Iowa's minimum wage increase on local retail business activity. Using quarterly retail sales tax data, I use time-series regression models to examine the impact of the minimum wage increase. In the first model, using difference-in-differences estimations, I compare all sectors in Johnson County to all sectors in three other Iowa counties (Linn, Black Hawk, and Story) that have similar economies and did not raise their minimum wage in the treatment period. The second difference-in-differences model compares eating and drinking establishments in Johnson County, which are heavily reliant on low wage workers, to the same sector in Linn, Black Hawk, and Story. In the third time-series regression model, I compare Johnson County eating and drinking establishments to establishments in the eleven other sectors in Johnson County that are less reliant on minimum wage workers. The predictor variables for each model were time, quarterly indicators, sector-specific intercepts and sector-specific minimum wage effects. I allowed for possible different industry-specific and county-specific effects. I find no statistically significant evidence of negative impacts on either the number of establishments or on sales per establishment during the period of the increased minimum wage in Johnson County.

71 - Michael Lord

Major: Human Physiology

Mentor: Rhonda Souvenir (Internal Medicine)

The Role of Uncoupling Protein 2 (UCP2) in Platelet Mitochondrial Function

Approximately 610,000 people die from cardiovascular diseases annually in the

United States (CDC, 2018). Thrombosis, a key player in cardiovascular disease (CVD), is often correlated with platelet hyperactivity. Preliminary data from the Framingham offspring cohort showed an increase platelet transcripts of Uncoupling Protein 2 (UCP2) positively correlated with CVD risk. UCP2 is a proton channel located on the inner mitochondrial membrane. This channel allows for the separation of oxidative phosphorylation and ATP production by transferring protons from the intermembrane space to the mitochondrial matrix independent of the ATPase. To determine if these increases in UCP2 were beneficial or detrimental, we generated platelet specific UCP2 knockout mice using the cre-lox recombination system. Western blotting revealed reduced levels of UCP2 protein in the platelets of knockout mice. Blue native PAGE, showed a notable reduction in mitochondrial supercomplexes I/IV, III/IV, and I/III/IV. There was also a visual decrease in complex I, III, IV, and V. Surprisingly, a measure of mitochondrial function via respiration revealed that there is increased ATP linked mitochondrial respiration in UCP- deficient platelets. Understanding the effects of UCP2 deletion on mitochondrial function has the potential to be a critical stepping stone in determining underlying mechanisms by which UCP-2 alters thrombosis.

73 - Lucas Maakestad

Majors: Biochemistry, Chemistry

Mentor: Todd Washington (Biochemistry)

The Effects of Protein Architectures on Polymerase Selection During Translesion Synthesis

DNA damage occurs from a variety of sources. During replication, the replication fork stalls at a site of DNA damage, leading to cell death if left unaddressed. DNA damage bypass is one mechanism to circumvent this phenomenon. Translesion synthesis (TLS), an error-prone DNA damage bypass pathway, is performed by a multi-protein complex involving PCNA (the trimeric "sliding clamp" protein involved in DNA replication and repair), as well as Rev1 and Pol (TLS polymerases which accurately and efficiently bypass specific DNA lesions). Rev1 and Pol can bind each other and PCNA to form two different architectures: the Rev1 bridge and the PCNA tool belt. We are interested in understanding how the appropriate polymerase is chosen for a given type of DNA damage. Brownian dynamics simulations have predicted how frequently each protein within each architecture interacts with DNA. This has informed the hypothesis that the PCNA tool belt architecture equally utilizes Rev1 and Pol, whereas the Rev1 bridge favors Rev1 interaction with DNA. Förster resonance energy transfer will allow us to quantify the frequency of interactions between each protein and DNA in each architecture. To force the complex into these desired architectures, mutant forms of PCNA were generated.

75 - Russell Martin

Major: Biomedical Engineering

Mentors: Robert Cornell (Anatomy & Cell Biology); Alexander Bassuk (Pediatrics)

Using zebrafish to test potential drugs for their efficacy against epileptic seizures

Epilepsy is a disorder whose primary symptom, convulsions, can have a wide variety of underlying causes. Therefore, there is strong motivation to seek novel anticonvulsant drugs. New drug development is an expensive and time-consuming process, so a central goal in this work is to repurpose drugs that are already FDA-approved. In our research, we are utilizing bioinformatics data obtained by our collaborators, who used tissue from the resected hippocampus of individuals with temporal lobe epilepsy to perform gene expression analysis. They identified a subset of genes that were differentially expressed in seizing tissue compared to non-seizing tissue. A drug library was applied to cells *in vitro*, and the gene expression profile was compared to the changes seen in patients. Some drugs induced a gene expression change opposite to that seen in seizing tissue, and were flagged as potential anti-convulsant drugs. We test the efficacy of these drugs *in vivo*, quantifying their anti-convulsant effect using zebrafish that had also been given pentylenetetrazol (PTZ) to induce seizures. Drugs that lessened PTZ-induced movement were considered to have an anti-convulsant effect. We are also working with CRISPR/Cas9 methods to create loss-of-function mutations in genes linked to human epilepsy, which will allow further testing of potential anticonvulsants. The overall goal of this work is to repurpose FDA approved drugs as novel anticonvulsant medications.

77 - Hailey Moore

Major: Physics & Astronomy

Mentor: Cornelia Lang (Physics & Astronomy)

Polarization in the Radio Arc in the Galactic Center

In the center of our galaxy lies a series of linear filaments that are visible in the radio wavelengths. We have observed these filaments in two separate frequency bands using the Very Large Array in New Mexico. These filaments are sourced by synchrotron radiation and are likely signifiers of the structure of the magnetic field in the galactic center. The radiation is polarized along the filaments. We identified regions of the highest amount of polarized intensity, and then analyzed these regions both qualitatively and quantitatively. By comparing the values of the regions in polarization to the total intensity of all radiation in the filaments, we are able to determine the fractional polarization. We hope to begin to understand the structure and strength of the polarization, the origin of the filaments themselves, and the structure of the magnetic field in the galactic center.

79 - Sarah Nguyen

Major: Psychology

Mentor: Cathleen Moore (Psychological & Brain Sciences)

The role of the surface completion in the convexity context effect

In order to represent and interact with our environment, the visual system has to perceptually organize the retinal image into potential objects and their spatial relations. One aspect of perceptual organization is figure-ground segregation, the process of identifying which parts of a scene are figure and which are background. One tendency is for the visual system to assign convex regions as figure and concave regions as ground. Recently, this convexity bias was discovered to increase when the number of repeating figure-ground regions increases. It has been hypothesized that this convexity context effect (CCE) is caused by observers perceptually completing the concave regions into a single background behind the convex figures. If true, then the CCE should occur even when regions are made discontinuous by another surface that partially occludes them, but should not occur when regions are discontinuous with no occluding surface to explain the discontinuity. The results of my project partially confirm these predictions in that partially occluded displays produced an equal magnitude CCE as unoccluded displays. However, discontinuous displays without an occluding surface also produced an equal magnitude CCE as unoccluded contiguous displays. Follow-up experiments will address this failure of our control condition.

81 - Claire O'Connell

Major: Biomedical Engineering

Mentor: Michael Schnieders (Biomedical Engineering)

Validating Rotamer Optimization Using Goldstein Elimination Criteria

Proteins with an unknown structure can be comparatively modeled by basing the atomic coordinates for the unknown structure on the known atomic coordinates for a protein with a similar amino acid sequence. Although comparative modeling works reasonably well, comparative models can be optimized using a process called protein side-chain repacking. The protein side-chain repacking algorithm involves running energy calculations on each possible side chain conformation for each amino acid in a protein to find the side-chain position that has the most favorable, or lowest, energy conformation. Side-chain repacking is a combinatorial problem. Goldstein Elimination Criteria can be used to reduce this combinatorial problem to a much simpler problem by provably eliminating high-energy side-chain positions from the lowest energy conformation possible for the protein. To test the protein side-chain repacking algorithm in our Force Field X (FFX) software, we created intuitive tests. We systematically found the lowest energy side-chain position for all amino acids in a small protein and compared the results to those from the Goldstein Criteria calculated in FFX. The results from the FFX software matched the results from our tests, so we conclude that the protein side-chain repacking algorithm was implemented correctly in the FFX software package.

83 - McKenna Pierson

Major: Psychology

Mentor: Jatin Vaidya (Psychiatry)

Adolescent Risk Taking and Sensitivity to Negative Outcomes

A number of risk taking behaviors emerge or peak during adolescence. Experimental risk-taking tasks in adolescence have focused on frequency of risk-taking but have failed to examine changes in risk-taking as a function of task feedback. The aim of our study was to investigate risk-taking and sensitivity to negative feedback using the "Balloon Analogue Risk Task" in 133 adolescents and 72 young adults. The BART involves blowing up balloons on a computer screen. Each pump is associated with winning points, but balloons can also explode in which case all points are lost on that trial. Thus, in addition to examining total number of pumps (which reflects risk-taking), we also examined changes in pumping behavior from trial-to-trial based on previous trial explosions (negative feedback). Our findings indicate that young adults took significantly more risk than their younger counterparts. Additionally, young adults who were more reward responsive based on a personality measure of reward sensitivity were also more sensitive to negative feedback. These results indicate that the transition from adolescence to young adulthood is a time when sensitivity to both positive and negative feedback is enhanced overall, as individuals are learning to better incorporate cues that result in the most advantageous outcomes.

85 - Morgan Rafferty

Major: Mathematics

Mentor: Isabel Darcy (Mathematics)

Artificial Intelligence for Financial Services

Artificial intelligence for financial services using Topological Data Analysis is a vital tool in business. TDA is one of many systems developed by the software company Ayasdi which has allowed researchers to uncover information and discoveries on large data sets from disease research to information security to fraud detection and much more. Financial Crimes Intelligence is one of Ayasdi's three main areas of focus under financial services and has become increasingly important over the years with the growth of international fraud. One of the most challenging aspects of fraud detection is keeping pace with new, evolving techniques. The slow, monitoring process following the traditional detecting approach allows fraudsters to regularly change and improve their strategies. Fortunately Ayasdi's automated approach allows faster and more accurate results from high-dimensional data sets. Ayasdi's machine intelligence software quickly discovers critical outliers and subtle, new fraud patterns hidden within complex data. Identifying problem areas in allows us to make fixes in existing models. The United States from detecting only a mere 30% of fraud to now 99% of fraud. While there has been much

advancement, Ayasdi continually improves the software. Their Financial Service Solutions offer the important context required to address specific business challenges.

87 - Alex Rice

Major: Economics

Mentor: Julia Garlick (Economics)

How Technology is Transforming the Retail Space

We have all seen how technology has advanced throughout the last decade. This paper will look at how these advances in technology have caused major changes in our economy. As technology advances, many occupations have the potential to be replaced in the near future due to machine automation. In order to show the effect technology has on the economy I have chosen to select one industry in particular and examine data on various growth and employment factors. The industry I have selected to examine is the retail industry. I have found that many traditional retailers are seeing decreased growth, mostly due to online retailers such as Amazon. This paper will address potential options for addressing the issues associated with the affect technology has on the economy. One of the solutions being a basic income grant and another being retraining the current workforce.

89 - Amy Schembari

Majors: Marketing, Entrepreneurial Management

Mentor: Amy Kristof-Brown (Management & Organizations)

The Effect of Career Preparation and Perceived Proactivity on Anticipated Person-Environment Fit

This study was conducted to determine the relationship between anticipations of person-environment (P-E) fit and proactivity in undergraduate students about to enter the workforce for the first time. The study sought to ascertain whether students who perceive themselves as being more proactive, and who partook in more career preparation activities during their undergraduate years, will report higher anticipations of fitting with their first full-time employment positions. The types of P-E fit measured in this study were person-job (P-J) and person-organization (P-O). Participants' self-reports of anticipated P-E fit and perceived proactivity were collected through an online survey. Those willing to complete the study were also asked to report the various career preparation activities they participated in during their years as undergraduates, including: internships, career fairs, and memberships in professional organizations. The results of this study are currently being analyzed.

91 - Cassandra Sheridan

Major: Psychology

Mentors: Ed Wasserman (Psychological & Brain Sciences); Leyre Castro (Psychological and Brain Sciences)

The Role of Category Density in Pigeon's Tracking of Relevant Information

Prior categorization studies have shown that pigeons reliably track features that are relevant to a category discrimination (e.g., Castro & Wasserman, 2014, 2016). In these studies, category exemplars contained two relevant and two irrelevant features; therefore, category density (specifically, the relevant to irrelevant information ratio) was relatively high. Here, we reduced category density so that, in Phase 1, each exemplar contained only one relevant and three irrelevant features. This manipulation greatly increased the difficulty of the task; overall accuracy and relevant tracking rose to rather modest levels after 100 days of training. In Phase 2, we modified the exemplars so that they displayed just one relevant and one irrelevant feature. Now, accuracy and relevant tracking further improved. Moreover, this improvement was sustained when the pigeons were returned to the same exemplars that were shown during the original training phase. These results help illuminate factors affecting pigeons' tracking of relevant information in visual categorization.

93 - Neevetha Sivagurunathan

Majors: Psychology, Statistics

Mentor: Molly Nikolas (Psychological & Brain Sciences)

The Effects of ADHD and Depression on Sensitivity to Reward and Punishment

Reward and punishment sensitivity play important roles in guiding behavior. Previous research has indicated aberrant levels of reward and punishment sensitivity in those with depression or ADHD, but few studies have explored the synergistic effects of both depression and ADHD on reward/punishment sensitivity, particularly in adults. Study 1 examined performance on a delay discounting task across diagnostic groups (ADHD, depression, co-morbid ADHD/depression). Study 2 investigated associations between ADHD/depression symptoms and self-report/behavioral measures of reward and punishment sensitivity. MANOVAs in Study 1 indicated that diagnostic groups differed from the control group in their average rate of delay discounting; however, diagnostic groups did not differ from each other. In Study 2, hierarchical regression models revealed an interaction effect between ADHD and depression symptoms in males when predicting behavioral changes to reward/punishment. Sex also moderated the separate effects of ADHD/depression symptoms on reward/punishment sensitivity. Our results suggested that reward/punishment sensitivity are altered among individuals

with symptoms and diagnoses of ADHD and depression, but that the impact of psychopathology on these processes varies by sex. Future work should explore sex differences in reward/punishment processing in the context of psychopathology while also investigating links between ADHD/depression and sub-constructs of reward/punishment sensitivity.

95 - Brittany Stephanie

Major: Mathematics

Mentor: Isabel Darcy (Mathematics)

Car Insurance Factors

The purpose of this research was to find patterns in car accident claim data to educate and better insure specific age groups and genders that are driving. I have found patterns in the data that lead me to a number of possible conclusions. First, the youngest age group (between 17-20), with little driving experience, had the most car accidents over any other age group. Next, the oldest age group (60+) had the second highest amount of crashes. Finally, male drivers were also more prone to car accidents than female drivers. As a result, I conclude that young, elderly, and male drivers are more likely to get into a car accident and therefore shall pay more for their car insurance.

97 - Sarah Stueve

Major: Biology

Mentor: Rhonda Souvenir (Internal Medicine)

Uncoupling Protein (UCP)-2 and Thrombosis Risk

Cardiovascular disease and thrombosis are both major public health burdens in the United States. People at risk for cardiovascular disease often exhibit an increased expression of Uncoupling Protein (UCP)-2 transcripts in their platelets according to data from the Framingham Offspring Cohort. UCP-2 is a transporter which transfers protons across the inner mitochondrial membrane without producing ATP. Whether an increase in UCP-2 is harmful or beneficial to platelet function, and subsequent thrombus formation, is unclear. To elucidate the role of UCP-2 in thrombosis we generated platelet-specific UCP-2 knockout mouse model using Cre-Lox recombination. Real time PCR and western blot confirmed reduced levels of UCP-2 mRNA and protein in UCP-2 floxed mice's platelets. Agonist-induced platelet activation data revealed reduced platelet activation. Additionally, reduced hemostasis was observed via tail-bleeding assay. We further assessed thrombosis using an inferior vena cava (IVC) ligation a model of deep vein thrombosis. While both platelet activation and tail-bleeding showed a bleeding phenotype, the IVC ligations were inconclusive due to a small sample size. This led us to conclude that UCP-2 plays a critical role in hemostasis and maybe critical for thrombus formation. This research could help elucidate the mechanism of thrombosis in those at risk for cardiovascular disease.

99 - Keely Sybesma

Majors: Mathematics, Chemistry

Mentor: Elizabeth Stone (Chemistry)

Effects of Biomass Burning Emissions on Pregnancies in Temuco, Chile

Breast cancer is the most common cancer diagnosed in women worldwide. Many breast tumors express phosphatidylserine (PS) on their cell surface. PS promotes tumor growth by inhibiting the immune response. The goal of the study was to test the effects of Annexin V (AnV) and an anti-CTLA 4 antibody on a 4T1 tumor, a mouse model of breast cancer. AnV is a protein that binds to and blocks PS. It is expected to retard tumor growth. CTLA 4 is an immune checkpoint inhibitor found on the surface of immune T-cells. When a substrate (CD80/CD86) is bound to CTLA 4, it downregulates T-cell function. In theory, blocking CTLA 4 with an anti-CTLA 4 antibody could inhibit this downregulation, and therefore promote early proliferation of anti-tumor T-cells. Based off of previous studies, it was hypothesized that blocking CTLA 4 and introducing AnV would be most effective in retarding tumor growth. Mice were injected with 4T1 cells, then treated with AnV producing adenovirus (Ad-AnV), and/or anti-CTLA 4 antibody. Tumor growth was carefully monitored and measured. It was found that anti-CTLA 4 antibody slowed tumor growth, indicating that anti-CTLA 4 antibody could be an effective mode of treatment for breast tumors. The effects of AnV were inconsistent.

101 - Ravjot Viridi

Major: Biomedical Sciences

Mentors: Joel Shilyansky (Surgery, Pediatrics); Chaobo Yin (Surgery)

Effect of combination therapy with Annexin V and CTLA 4 in a mouse model of breast cancer

Breast cancer is the most common cancer diagnosed in women worldwide. Many breast tumors express phosphatidylserine (PS) on their cell surface. PS promotes tumor growth by inhibiting the immune response. The goal of the study was to test the effects of Annexin V (AnV) and an anti-CTLA 4 antibody on a 4T1 tumor, a mouse model of breast cancer. AnV is a protein that binds to and blocks PS. It is expected to retard tumor growth. CTLA 4 is an immune checkpoint inhibitor found on the surface of immune T-cells. When a substrate (CD80/CD86) is bound to CTLA 4, it downregulates T-cell function. In theory, blocking CTLA 4 with an anti-CTLA 4 antibody could inhibit this downregulation, and therefore promote early proliferation of anti-tumor T-cells. Based off of previous studies, it was hypothesized that blocking CTLA 4 and introducing AnV would be most effective in retarding tumor growth. Mice were injected with 4T1 cells, then treated with AnV producing adenovirus (Ad-AnV), and/or anti-CTLA 4 antibody. Tumor growth was carefully monitored and measured. It was found that anti-CTLA 4 antibody slowed tumor growth, indicating that anti-CTLA 4 antibody could be an effective mode of treatment for breast tumors. The effects of AnV were inconsistent.

103 - Bowen Wang

Major: Accounting

Mentors: Kevin Markle (Accounting); Jaron Wilde (Accounting)

Effect of Country-by-Country Reporting on Multinational Enterprise Tax Avoidance Strategy

OECD's BEPS Action Plan 13 introduced Country-by-Country Reporting (CbCR), and proposed that CbCR could provide sufficient information about Multinational Enterprises' structural information (parent company, subsidiaries, etc.). This research evaluates the potential effect CbCR could have on MNEs' tax avoidance strategy. The study first demonstrates Apple Inc.'s "Double Irish Dutch Sandwich" as a typical MNE tax avoidance strategy. Then, the study breaks down the CbCR adopted by IRS to see if it would be effective in providing required information to disclose the tax structure. In addition, the study analyzes CbCR's benefits and costs. The conclusion is that CbCR alone could not disclose essential tax information. Therefore, CbCR would not be effective in altering MNE tax avoidance behavior as expected, and the most effective way to change tax avoidance strategy is to change tax law to be favorable.

105 - Nicole Wendel

Major: Chemistry

Mentor: Lei Geng (Chemistry)

Monitoring and Modeling Drug Dissolution Kinetics: New Experiment for Pharmaceutical Education

The monitoring of drug dissolution is one of the central operations in research and development in pharmaceutical sciences, to guide the development of new drug release vehicles and to maintain the consistency in drug production. Although a substantial number of students in science and engineering go into careers in pharmaceutical sciences, a comprehensive teaching lab on drug dissolution does not exist. This work develops a new laboratory experiment for the training of life scientists towards a career in pharmaceuticals.

We created and tested a reliable cost-effective dissolution apparatus to efficiently monitor drug dissolution kinetics. Utilizing the apparatus, naproxen sodium tablets were dissolved, and the amount of drug dissolved over the progression of time was detected with UV spectrophotometry. The kinetic data was modeled with nonlinear least squares method (NLLS) to determine the mechanism of drug dissolution. Many dissolution curves were collected through the use of this apparatus and compared in order to ascertain the consistency in the dissolution kinetics, a key measurement mandated by the FDA. The protocol has been tested in a Chemistry laboratory course (CHEM:2021) and proved to be a successful experiment for pharmaceutical education.

107 - Ziling Xia

Major: Health & Human Physiology

Mentor: Gayle Walter (Health & Human Physiology)

How to Improve the Health of International Students in American Colleges

In 2017, approximately 1.08 million international students studied in American colleges. Most of the international students came from Asian countries - especially China, India, and South Korea. Because of the culture shock of a new environment, many students experience challenges with language barriers, homesickness, and numerous health issues. Mental health issues, such as depression, anxiety, and suicidal ideations have stricken international students. Because of the stigma associated with mental illness, many students are reluctant to access campus mental health services. Health insurance plans for international students are very costly furthering limiting their choices in accessing health care. Culture competency, such as language, religious beliefs, and cultural practices, have a significant impact on international students' health. The mental and physical health of international students would be greatly improved by improving cultural competency and increasing access to affordable health care.

109 - Ziyang Yu

Majors: Finance, Mathematics

Mentor: Shagun Pant (Finance)

Social media sentiments and company performance

This research will focus on finding relationships between social media sentiments and company performance in high tech automobile industry, especially for plug-in electric vehicles. It collects predictions from comments when a company announce their new products and when the company actually releases this product. Based on the these comments, we will compare how people change their attitudes during these two time periods and to see if there is a consistence for sentiments and how these comments will affect trend of stock price. I will also compare company performance by listing some financial ratios from their financial statements.

111 - Cody Zak

Majors: Psychology, Neurobiology

Mentors: Ryan LaLumiere (Psychological & Brain Sciences); Kelle Nett (Psychological and Brain Sciences)

Role of infralimbic projections to the nucleus accumbens core in extinction of cocaine seeking behavior.

While recent studies are showing different functions of the infralimbic cortex (IL) in initiation and inhibition of cocaine seeking behavior; not much is known about the role of infralimbic projections into the nucleus accumbens core (NAc) in cocaine extinction learning. In order to test the role of this pathway in inhibition of extinction, unreinforced lever presses during early extinction learning, post self-administration, resulted in optical inhibition of infralimbic projections into the nucleus accumbens core for 20s. After the early extinction and full length extinction phases, rats then received cued, cocaine-prime, or cued + cocaine prime reinstatements. Preliminary data showed that optical inactivation of the neuronal pathway from the IL to the NAc during a shorten extinction phase did not cause an increase in drug seeking behavior during cued, cocaine-prime, or cued + cocaine prime reinstatement. However, an observable effect may not be noticeable due to a lack of power among experimental groups which is currently being addressed. This preliminary data, if support by current experimental groups, could suggest that while individually, the IL and NAc individually play a role in inhibition of drug seeking behavior but the pathway between them does not.

113 - Shao Yang Zhang

Major: Biomedical Engineering

Mentor: Justin Grobe (Pharmacology)

Angiotensin AT1A Receptors on AVP-expressing Neurons Contribute to Vasopressin Secretion

Arginine vasopressin (AVP) is a hormone generated within specific nuclei of the brain, which is secreted in response to blood loss and cardiovascular hormones such as angiotensin. AVP acts at the kidney to cause water retention, and on blood vessels to cause constriction ultimately to retain blood volume and maintain blood pressure during cardiovascular insults such as hemorrhage or dehydration. Inappropriate increases in secretion of AVP are implicated in various blood pressure and fluid balance disorders. Thus, our team is working to understand the neurocircuitry that mediates the control of AVP secretion. Fluorescent In Situ Hybridization (FISH) in C57BL/6J and triple transgenic (AVP-Cre X ROSA-stopflox-tdTomato X NZ44) mouse models both revealed localization of AT1a receptors specifically in AVP-producing neurons of SON region but not of PVN region. AT1a receptors were then knocked out from AVP-neurons via cre-recombinase, and we performed ICV ANGII infusion of 5 ng/hr and 50 ng/hr on the mouse models. The results demonstrated AT1a receptors play an important role in AVP secretion but dispensable in blood pressure control, polyuria, and polydipsia. Insights gained inform our understanding of the neurobiology of AVP, which ultimately informs the delivery of care for hypertension, diabetes, obesity, obstetric and trauma medicine.

115 - Shiwen Zhou

Majors: Psychology, Communication Studies

Mentor: Grazyna Kochanska (Psychological & Brain Sciences)

Parents' Mind-Mindedness in Infancy and Children's Theory of Mind at Preschool Age

Previous studies have identified the importance of parental mind-mindedness and suggested its connection to children's Theory of Mind (ToM). The current study tested the relation between 102 community mothers' and fathers' mind-mindedness in infancy and children's ToM at preschool age. We coded parents' ToM from their comments directed to infants in a naturalistic context of a snack. At preschool age, we assessed children's ToM using false-belief tasks. Higher levels of both parents' mind-minded comments were associated with children's better ToM. For fathers and children, there was a significant interaction between the number of mind-minded comments and children's gender, such that those comments promoted boys', but not girls' ToM development. The study provides paths for future research on the relation between parental mind-mindedness and children's development of social cognition.

Second Hour Presenters

5:30-6:30PM

(even numbers only—boards will be turned around)

2 - Kevin Blicharski; Alexander Powers

Major: Computer Science and Engineering; Computer Science and Engineering
Mentor: Hans Johnson (Electrical and Computer Engineering)

Bootstrapping Using Machine Learning to Create Training Datasets for Automatic Cerebellum Segmentation

Manual segmentation of the cerebellum is prohibitively time-consuming and thus infeasible for big data applications. However, traditional methods are poorly suited for automatic segmentation due to the cerebellum's tree-like, branching structure. Our approach used high-probability label maps generated by a machine learning algorithm and extensive data augmentation to supplement manual labels. This is necessary to produce the large and diverse set of data needed for deep learning. This data curation has laid the groundwork necessary to train a deep learning algorithm to perform said automatic segmentation.

4 - Alexis Brannan

Major: Human Physiology
Mentors: Leonard MacGillivray (Chemistry); Gonzalo Campillo (Chemistry)

Teaching Boronic Acids New Tricks: Hydrogen-donor templates and supramolecular catalysts of [2+2] photocycloadditions in the solid state

Modulation of chemical reactivity is of wide interest as molecular structure has a profound impact on characteristics, stabilities, and uses of chemicals and pharmaceutical drugs. Successfully transforming reactivity of molecules can be challenging, time extensive, environmentally degrading, and costly. Our goal in this study was to explore the possibility of modulating reactivity of olefins to carry out [2+2] photocycloadditions in the solid state by generating cocrystals (i.e. solids containing two or more components interacting by non-covalent interactions). To modulate chemical reactivity, boronic acids were employed as cocrystal formers due to their versatility, chemical transformations, low-toxicity, and commercial availability. In addition, boron-based supramolecular interactions have remained unexplored in the field of chemical reactivity of solids until now. We discovered that by appropriately selecting the functional group present in boronic acids, [2+2] photocycloadditions were achieved in near quantitative yields. Reactivity can also be carried out using catalytic amounts of boronic acids and a combination of dry grinding and UV-irradiation mechanisms. Our work revealed the formerly unknown use of boronic acids to successfully achieve supramolecular catalysis in the solid state previously only carried out in solutions, consequently increasing successful implementation of Green Chemistry.

6 - Ashely Chong

Major: International Studies

Mentor: Natasa Duricova (International Writing Program)

Exploring the Creative Process

This presentation explores three projects exploring the creative process. First, the creative process was traced backwards (from the product to the environment in which it was created) as I researched and wrote questions for *Origins*, a podcast by the International Writing Program (IWP). Second, I compared two creative processes backwards across different artistic mediums (music and writing) when I helped curate a collaboration between the IWP and the University of Iowa String Quartet Residency Program (UISQRP). Finally, I initiated a creative process for my online anthology inspired by the Korean term *madang*, which means open space. Reflecting on the projects I have done and continue to do, I have realized that the creative process is a dynamic equilibrium, where the final product feeds heavily on the circumstances with which it was created and vice versa. The dynamic equilibrium nature of the creative process yields two conclusions: first, that it is crucial to have a holistic understanding for pieces of art and second, that there are many possibilities for collaboration and creation if one taps into the equilibrium of a finished product.

8 - Greg Collins

Major: Human Physiology

Mentors: E. Dale Abel (Internal Medicine); Helena Kenny (Internal Medicine)

OPA1 deletion results in ER stress, cardiac dysfunction and death

The optic atrophy 1 (OPA1), mitochondrial dynamin-like GTPase, regulates mitochondrial inner membrane fusion. Reduced myocardial OPA1 protein expression has been reported in humans and animal models of heart failure. The present study sought to determine whether OPA1 deficiency would cause mitochondrial dysfunction, heart failure and death. Inducible cardiac-specific OPA1 (cOPA1) knockout (KO) mice were generated by administering tamoxifen to mice harboring OPA1^{flox/flox} and Δ ±MHC-MerCreMer for 5 days at 7 weeks of age. cOPA1 protein was significantly decreased 4 weeks after tamoxifen injection, and mice with cOPA1 KO had reduced ejection fraction at 6 weeks and started to die 8 weeks after tamoxifen injection. Relative to WT mice cOPA1 KO mice displayed cardiac hypertrophy and fibrosis at 8 weeks. Mitochondrial respiratory function was decreased as evidenced by lower state 3 respirations in cOPA1 KO cardiac fibers relative to WT hearts, as early as 4 weeks after tamoxifen injection. Transmission electron microscopy revealed disorganized cristae, and reduced aspect ratio in cOPA1 KO hearts compared to WT. Markers of ER stress were markedly increased 4 weeks after tamoxifen injection, which was accompanied by impaired autophagy as evidenced by a decreased ratio of LC3II/LC3I and increased accumulation of p62 and NBR1 in cOPA1 KO mice. Loss of OPA1 leads to ER stress, impaired autophagy, impaired mitochondrial function leading to heart failure and premature death.

10 - Geoff Collins

Major: Biochemistry

Mentor: Meng Wu (Pharmaceutical Sciences and Experimental Therapeutics)

The formation and tracking of 3D breast cancer cellular spheroids in a high throughput format

In contrast to 2D cell cultures, 3D spheroid cell cultures are much better at replicating in vivo environment for breast cancer. Here, we developed a high throughput (automation) compatible protocol for the formation and tracking of 3D multicellular tumor spheroids (MCTS) in two breast cancer cell lines, SK-BR-3 and 4T1, as an in-vitro platform for mechanistic and therapeutic interrogation of breast cancer. The density of the spheroids can be modulated by the addition of a basement membrane extract (BME) and can be monitored by high content imaging in live cell condition. Timelines of both SK-BR-3 and 4T1 are established and will be used to determine the kinetics of formation of MCTS's future research. The established protocol will be used in high-throughput screening for the drug discovery and potentially in precision medicine.

12 - Cody Crawford

Major: Biology

Mentor: Cindy Opitz (Pentacrest Museums)

Revitalization of the University of Iowa's Bird Egg Collection after 100 Years of Dormancy

The UIMNH egg collection spans many avian orders, 6 continents, and over 160 years. However, this collection of approximately 17,000 egg specimens has remained disorganized and underutilized for most of its history. Since the 1870s to 1910s, when the majority of the eggs were collected, most of them have been separated from the cards which recorded their data. Much of the current project revolves around reuniting eggs and data cards. We scanned over 2,000 egg cards, crowdsourced transcriptions of the handwriting, and verified the accuracy of each transcription. We are using the cards, data written on the eggs, and many books and websites to match eggs with egg cards and integrate the data into our database. The eggs are then placed in new cabinets and relabeled. Each egg set will be photographed and georeferenced if possible. At the end of this project, these records will be integrated into biodiversity repositories such as VertNet to be downloaded and used by researchers globally, as our bird, mammal and insect collections already are. Most of the work is carried out by a team of volunteers and interns, usually undergraduate students, without whom this project would not be possible at its current pace.

14 - Mackenzie Cross

Major: Anthropology

Mentor: James Enloe (Anthropology)

Analyzing the Faunal Assemblage Produced by Woodland Hunters

In 2017, excavations to "Level 10" at Woodpecker Cave produced a substantial faunal assemblage. Using quantitative measures such as the number of identified specimens (NSIP), the minimum number of elements (MNE) and the minimum number of individuals (MNI), a greater understanding of species representation was gained. Additionally, examination of bone processing provided information on these people's diets.

16 - Victoria Cunningham

Major: Human Physiology

Mentor: Susan Lutgendorf (Psychological & Brain Sciences)

Familial Characteristics of Urinary Chronic Pelvic Pain Syndrome (UCPPS) in the MAPP Research Network Data

Urinary Chronic Pelvic Pain Syndrome (UCPPS) includes two disabling conditions involving pelvic pain, urinary frequency and urgency: Interstitial

Cystitis and Chronic Prostatitis. Previous studies have shown that a family history of this condition could be a factor in the development of UCPPS. This study aimed to identify differences between participants with and without a family history of the disease using the Multidisciplinary Approach to Chronic Pelvic Pain (MAPP) Research Network database. The MAPP enrolled 424 UCPPS patients, 39 of whom reported a family history of the condition. The information from these participants was compared against those without a family history using statistical analyses to determine differences between the groups. The majority of variables examined including sex, prevalence of comorbid disorders, local vs. widespread symptoms, levels of anxiety and depression, and inflammatory and cortisol profiles showed no differences between those with and without family history of UCPPS. The only factors that were different between the groups were duration of symptoms and years since diagnosis. In conclusion, data from this large-scale study did not support previous findings of differences between patients with and without a family history of UCPPS with the exception of age of diagnosis and symptom duration.

18 - Riley Deutsch

Major: Biomedical Engineering

Mentor: Jessica Sieren (Radiology)

An Ex Vivo Staining Technique for Enhanced Image Contrast of Tissue Samples in Micro Computed Tomography

Currently, histological staining provides the standard for characterizing the composition of tissue samples. While histology provides an accurate profile of tissue structure, the technique involves permanent alteration of a sample and provides 2D data that may not reflect whole-sample trends. Micro computed tomography (micro-CT) is an imaging modality that combines X-ray computed tomography with novel optics to produce a 3D dataset with image resolution of less than one micron. While this resolution is comparable to that achieved through histology, soft tissue inherently generates poor X-ray contrast. The goal of this study was to develop a protocol for enhancing image contrast by applying a heavy metal contrast agent to ex vivo tissue samples. Due to its preferential interaction with collagen, phosphotungstic acid (PTA) was determined to be the best candidate for glean structural information. A parallel stain and fixation protocol was developed and data was collected on a Siemens SOMATON Force CT scanner and an Xradia Versa 720 micro-CT scanner. Histology was performed with both an H&E and a Masons Trichrome Stain in order to correlate features to micro-CT. It was shown that PTA staining does lead to an increased signal-to-noise ratio in micro-CT.

20 - Alayna Dieter

Major: Biochemistry

Mentor: Marcelo Correia (Internal Medicine)

Skeletal Muscle-Specific DRP1 Deficiency Alters Autophagy, Increases ER Stress and Apoptosis and Reduces Force Generation in Skeletal Muscle

Dynamin Related Protein (DRP) is a mitochondrial fission protein that works in conjunction with other proteins to maintain the morphology and size of mitochondria in cells. Skeletal muscle of type 2 diabetics exhibits mitochondrial dysfunction linked to increased mitochondrial fragmentation. The purpose of this research was to study the effects of muscle-specific DRP1 deficiency on systemic metabolism, muscle function and markers of autophagy, ER stress and apoptosis. A mouse colony was generated with a removal of the DRP1 gene to be compared to wild type mice for experiments. Our observations were focused on the differences between DRP1 deficient and wild type mice in their size, glucose tolerance, exercise performance, and protein expression. Through these assessments skeletal muscle-specific DRP1 deficient mice appear to be reduced in total lean mass and force generation compared to the control wild type mice. These findings suggest that DRP1 could regulate ER stress and autophagy; the absence of DRP1 may induce programmed cell death in skeletal muscle.

22 - Gabrielle Duncan

Majors: Human Physiology, Cell & Developmental Biology

Mentor: Gen Shinozaki (Psychiatry)

Epigenetic Investigation of Military Sexual Trauma in Post-Traumatic Stress Disorder

The disturbing reality is that many servicewomen in our military experience high levels of trauma during their service, not only from combat but also from sexual assault from fellow service members. In fact, over 30% of veteran women report being sexually assaulted during their service, around 10% of them resulting in posttraumatic stress disorder (PTSD). In our lab at the Department of Psychiatry, we are exploring if epigenetic marks on DNA (DNA methylation) obtained from servicewomen are correlated with their exposure to sexual trauma. We are also investigating if such biomarkers are associated with risk for PTSD. Finally, we aim to identify DNA methylation changes predictive of treatment responses. Our goal is to find such an epigenetic biomarker that can identify individuals susceptible to PTSD, and ultimately predict treatment response so that the best treatment option can be selected for Veterans suffering from these conditions.

24 - Caroline Emory

Majors: Speech & Hearing Science, Psychology

Mentor: Shawn Goodman (Communication Sciences & Disorders)

Efferent Auditory Feedback During Human Vocalization

Most mammalian auditory systems contain two peripheral feedback loops: 1) the middle-ear muscle reflex (MEMR) and 2) the medial olivocochlear reflex (MOCR). Presently, the function of these reflexes, especially the MOCR, is not entirely known. A prevalent hypothesis in the literature is that these reflexes activate to protect our ears from loud sounds. However, from an evolutionary standpoint, prior to the industrial revolution it is doubtful that any external auditory stimuli would have necessitated the development of such reflexes. Another hypothesis is that the reflexes activate during self-vocalization, turning the sound level down internally, to prevent overexposure from one's own voice. Prior research using animal models have established that the reflexes do activate during vocalization. However, to our knowledge, no published studies have examined the effect of reflex activation on sound levels recorded in the human ear during vocalization. Thus, the purpose of the present study is to measure the effects of MEMR and MOCR activation during self-vocalization.

26 - Zhiting (Jack) Feng

Majors: Biochemistry, Ethics & Public Policy

Mentor: Leonard MacGillivray (Chemistry)

Boronic ester coordination enables [2+2]-photodimerizations in the solid state - a green chemistry approach for the synthesis of useful building blocks

The ability to make covalent bonds in the organic solid state impacts fields ranging from organic synthesis (e.g. synthesis of new molecules) to green chemistry (e.g. solvent-free synthetic methodologies) to materials science (e.g. information storage). In our research, we use boronic esters as auxiliary molecules to direct the formation of covalent bonds in solids to produce thiophene-containing molecules, which are important building blocks for materials with conductivity properties. Both hydrogen-bond and coordination-driven self-assembly are used to position olefins in supramolecular assemblies in solids to achieve [2+2] photodimerizations.

The project is based on the principle of [2+2] photocycloaddition: it generally entails the formation of new molecules by the reaction of two unsaturated molecules via two atoms from each molecule (hence "[2+2]â€). As a photochemical reaction, the use of UV light is required, as opposed to a conventional thermal process. Boronic esters are easily obtained by reacting boronic acids and catechol in solution. After that, the coordination between boronic esters and thiophene-containing olefins was observed to happen in the solid-state. Subsequent exposure to UV-light revealed the solids to be photoreactive as confirmed by a combination of combing ¹H-NMR spectroscopy and X-ray diffraction techniques.

28 - Rebecca Frederick

Majors: Psychology, English

Mentor: Cathleen Moore (Psychological & Brain Sciences)

What's in front? Measuring figure-ground segregation across the visual field

Perceptual organization is necessary to integrate visual elements into a unified whole, and parts of the retinal image into objects within the scene. Figure-ground segregation is a type of perceptual organization in which regions in the visual field are represented as either foreground (figure) or background (ground). One tendency is for convex regions to be represented as figure and concave regions to be represented as ground. Recently it was discovered that this convexity bias increases with the number of regions present, something known as the convexity-context effect (CCE). In the current study, we hypothesized that figure-ground segregation does not function the same way in peripheral vision as in central vision. If true, then the CCE should decrease with increasing eccentricity. We measured the CCE for stimuli at variable eccentricities, scaling the size of the stimuli to control for stimulus-quality differences. Results so far support the hypothesis that perceptual organization occurs differently in the periphery of the visual field in that the CCE changed with eccentricity.

30 - Diana Garcia

Major: Anthropology

Mentor: James Enloe (Anthropology)

Stone Tool Manufacture at Woodpecker Cave: Results from Raw Material Analysis

Woodpecker Cave (13JH202) is an excavation site located in Johnson County Iowa, its locality is influenced by the Southern Iowa Drift Plain, the plain has resulted in the discovery of numerous types of lithic, both focal and diffuse raw material. The findings range from local materials which include State Quarry, Rapid and Stoner. There has also been found secondary raw material that is from other locations. Non-local material includes lithics such as Wapsipinicon and Scotch groove which indicate that these lithics were either collected or picked up from other areas.

I also analyzed the distribution maps created of the lithics found on the site, looking at the correlation between where these lithics were found and possibly how they were used in that geological context and using that information to gain an understanding on how the raw material was utilized and why some raw material was favored or more commonly used for tool manufacture.

32 - Austin Greenough

Major: Accounting

Mentor: Cristi Gleason (Accounting)

A Comparison of the Critical Accounting Policies Between Significant U.S. Companies and Their Chinese Counterparts

The purpose of this research project is to provide an overview regarding how intermediate layers of a trained neural network recognizes input images by extracting and examining of a selected layer's output. In this research, I selected two input datasets due to their complexity. The first dataset I used is a popular handwritten digit dataset known as MNIST dataset. The Convolution Neural Network I created for this dataset owns 8 hidden layers, which is basic but with a 90%+ accuracy. Next, I built a lasso model to fit the output images as numpy arrays for MaxPooling layer (the third hidden layer after two ConvNets). The result of model provides me with a lot of useful information, for example, in the output of intermediate layer, which output "images" as a feature are mostly correlated with the result (for example, 6 and 9, since the Lasso model is binary).

34 - Ye Guo

Majors: Finance, Business Analytics & Information Systems

Mentor: Tong Wang (Business)

Interpretable Models for Explaining and Assisting Convolutional Neural Networks

The purpose of this research project is to provide an overview regarding how intermediate layers of a trained neural network recognizes input images by extracting and examining of a selected layer's output. In this research, I selected two input datasets due to their complexity. The first dataset I used is a popular handwritten digit dataset known as MNIST dataset. The Convolution Neural Network I created for this dataset owns 8 hidden layers, which is basic but with a 90%+ accuracy. Next, I built a lasso model to fit the output images as numpy arrays for MaxPooling layer (the third hidden layer after two ConvNets). The result of model provides me with a lot of useful information, for example, in the output of intermediate layer, which output "images" as a feature are mostly correlated with the result (for example, 6 and 9, since the Lasso model is binary).

36 - Cameron Hauser

Major: Human Physiology

Mentor: Gordon Buchanan (Neurology)

Role of locus coeruleus noradrenergic neurons in CO₂-induced arousal from sleep

CO₂-induced arousal is a vital protective mechanism involved in diseases such as obstructive sleep apnea, sudden infant death syndrome, and sudden unexpected death in epilepsy. Serotonin (5-HT) and dorsal raphe (DR) 5-HT neurons are necessary for arousal to CO₂ though the potential downstream structures involved are unknown. We hypothesized that chemosensitive DR 5-HT neurons project to and activate locus coeruleus (LC) noradrenergic (NA)

neurons to activate higher-order brain structures causing arousal. C57BL/6J mice were treated with LC NA neuron toxin DSP4 or saline, implanted with EEG/EMG electrodes, and exposed to room air or 7% CO₂ during NREM to measure arousal latency. A decreased but non-abolished responsiveness to CO₂ was observed indicating remaining LC NA neurons are sufficient for CO₂-induced arousal or the involvement of other structures signaling for arousal.

38 - Kaelynn Heiberg; Rachel Maller

Major: Sociology, Ethics & Public Policy; Sociology

Mentor: Sarah Bruch (Sociology)

Equity Implemented: A Research-Practice Partnership with the Iowa City Community School District

In this project, we work with the Iowa City Community School District to improve the equitability of school experiences and outcomes for students. We begin by examining how 5th-12th grade students in ICCSD perceive their school environments using an extensive survey that asks students about several aspects of their experiences. From this data, we assess the extent of disparities between students with different characteristics such as race, gender, sexual orientation, and parent education. We then facilitate a task force of students, teachers, and community members who consider several evidence based recommendations to reduce these disparities. Finally we evaluate the programs the district adopts to assess whether they are being effective in reducing the disparities in student experiences and outcomes. Evidence from these evaluations suggests some positive changes in teacher knowledge and awareness of implicit bias and restorative justice practices.

40 - Elise Heitmann

Major: Anthropology

Mentor: James Enloe (Anthropology)

Don't be so Dense: The Creation of Density Contour Maps

Density maps allow archaeologists to analyze artifact distribution within archaeological sites. Density contour maps show us where high concentrations of specific artifacts are so, when the artifact contours are overlaid, we can analyze site layout. I have worked at Woodpecker Cave, which is a site in Johnson County, Iowa that has been excavated by a University of Iowa field school since 2012. Archaeological sites are excavated in grids and artifacts are recorded based on their location on that grid and their depth from a specific point at the site. Level 5 of the Woodpecker site has a cooking hearth on the far site east, but lower strata seem to have concentrations of fire cracked rock in other areas, which tells us that different parts of the site were used for different purposes at different times when the site was inhabited. To create density contour maps, that data is organized in an excel sheet and uploaded

into a contour mapping program. That data then needs to be compared with level notes and artifacts to make sure it is accurate. Once each level is finished, the contour maps will be compared to see how the site changed over time.

42 - Brenda Herrera

Major: Global Health

Mentor: Julie Reynolds (Dentistry, Public Policy Center)

Mechanisms Impacting Oral Health Equity in an Expanded Medicaid Program: Narratives from Program Members and Dentist

Introduction: In 2014, Iowa implemented the a public dental insurance program to provide dental coverage to the Medicaid expansion population. Using a previously published conceptual model as the foundation for this project, the aim is to summarize and describe dentist and consumer narratives about mechanisms connecting Medicaid expansion to oral health equity within the Medicaid expansion population.

Methods: We use data from two surveys administered in fall 2016 - one to program members and one to dentists. Open-ended comments were analyzed qualitatively to identify common themes.

Results: The most common themes among members' narratives were related to oral health status and needs, availability of dentists who accept Medicaid, and Medicaid coverage for oral health care. Among dentists, the themes cited most frequently were administrative burden, reimbursement, and coverage for oral health care.

Discussion: We identified several components of the conceptual model that were most salient with members' and dentists' experiences. There were also a considerable proportion of comments covering themes not included in the conceptual model, including lack of awareness about enrollment or coverage.

44 - Joshua Hjelmaas

Major: Business Analytics and Information Systems

Mentor: Andrew Hosmanek (Management & Organizations)

State Surveillance Using Quantum Processor-Backed Cryptography: The Future of Electronic Privacy Law

Current asymmetric encryption algorithms that rely on integer factorization or discrete logarithms in public-private key generation, such as RSA and Diffie-Hellman, are extremely vulnerable to decryption by a quantum computer with the processing power necessary to execute Shor's algorithm. Federal agencies will almost certainly have access to this technology before a consumer-grade version becomes available to most US citizens, which represents a major growth in the power of the government to surveil Americans through mass collection and decryption of electronic communication. This issue is exacerbated by the outdated statutory protections offered in the Electronic

Communications Privacy Act and resistance in the judiciary to reinterpretation of the third-party doctrine in a digital environment. Drawing on contemporary research into photonic quantum information processing, asymmetric encryption standards and electronic privacy law, this paper advocates for updated legal standards that restrict the ability of the state to surveil a citizen's private electronic communications while our society transitions to end-to-end quantum networking and lattice-based encryption standards that are resistant to attacks from a quantum processor.

46 - Zachary Juron; Mohamad Abdullah Mohd Kamal

Majors: Mathematics; Statistics, Mathematics

Mentor: Isabel Darcy (Mathematics)

Implementing TDA Mapper on Chicago Cub Baseball Team's Players

Topological data analysis is an area of applied mathematics that utilizes techniques from topology to analyze large complex datasets. The primary motivation of TDA is to study the shape of the data and gain understanding from those shapes. In order to do this, one must combine algebraic topology and different tools from mathematics to create a rigorous mathematical study of "shape". The most widely utilized tool is the TDA mapper package within R and Python Mapper. Mapper does not place any conditions on the clustering algorithm and thus any domain-specific clustering algorithm may be used. Our research is centralized around the Chicago Cubs Baseball Statistics. We utilized an 18-dimensional Euclidean space with 47 datasets. The 18 variables we chose to analyze for the 47 players are: games played, at bat, runs scored/allowed, hits scored/allowed, doubles hit/allowed, triples hit/allowed, home runs hit/allowed, runs batted in, stolen bases, caught stealing, bases on balls/walks, strikeouts, total bases, double plays grounded into, times hit by a pitch, sacrifice hits, sacrifice flies, intentional bases on balls.

48 - Khaled Kayali

Major: Biomedical Engineering

Mentor: Hanna Stevens (Psychiatry)

Effects of Cypermethrin on the Morphology and Number of Microglia in the Embryonic Brain

Alpha-cypermethrin is a type II pyrethroid that is found in commonly used household insecticides. It has also been recommended for use by pregnant women to prevent the transmission of the Zika virus by mosquitos. Studies have shown that prenatal exposure to alpha-cypermethrin is a risk factor for altered neurodevelopment in children, however little is known about the exact mechanisms through which this occurs. We studied, how prenatal exposure to alpha-cypermethrin affects the morphology of microglia in the embryonic

brain, as microglia play critical roles in the processes of neurogenesis, synaptic maturation, and brain wiring during development. The morphology of microglia is important because it indicates how far in development the cells are. Pregnant CD1 mice were administered alpha-cypermethrin via oral gavage at doses of 0 mg/kg or 10 mg/kg daily from embryonic day 11 to 14. Dams were sacrificed on embryonic day 14.5 and embryonic brains were stained with Anti-Iba1 to identify microglia. We used fluorescent microscopy and stereology to assess the microglia. It appears as if alpha-cypermethrin alone does not influence the morphology of microglia, as the percentage of each morphology remained the same before and after administering the alpha-cypermethrin. Further research could involve studying microglia with higher dosages or with other factors such as stress.

50 - Katelyn Kelly

Majors: Anthropology, Psychology

Mentor: James Enloe (Anthropology)

Use and Discard: Analyzing Piece Plotted and Screened Artifacts from Woodpecker Cave

At Woodpecker Cave in Coralville, Iowa, a team of archaeologists collected an assortment of artifacts ranging from bone, ceramic, fire-cracked rock, lithic, and shell. I compiled all of the data from our artifact inventory sheets and level photos for each level and plotted each artifact that was shot in at the site onto an Adobe Photoshop mosaic grid. After creating the Photoshop mosaic grids for each artifact that was individually plotted and were able to be shot in their precise location, I overlaid each artifact grid with a corresponding density map of the aggregate counts of the significantly larger number of artifacts recovered from the screening process of each 10 centimeter level from every 1x1 m² square. After examining the combined individually plotted artifact maps overlaid with the corresponding density maps, we can examine the relationships between the larger plotted artifacts and the smaller screened artifacts and how these relationships could be indicative of patterns of behavior in the use and discard of the variety of artifacts found at Woodpecker Cave.

52 - Breanna Kramer-Riesberg

Major: Microbiology

Mentor: Al Klingelutz (Microbiology)

Ebola Virus Infection of Skin

The 2014 Ebola virus (EBOV) outbreak provided evidence for skin being a route of transmission of the virus. We hypothesize that EBOV infects skin cells and that this is important for transmission and/or pathogenesis of the virus. In collaboration with a BSL4 facility, it was demonstrated that EBOV-GFP virus

productively infected human skin explants. To begin to address what specific cell types in skin support EBOV, we are using a BSL2 replication competent recombinant virus (EBOV GFP-rVSV) that expresses the EBOV envelope glycoprotein to infect different cell types that are found in the skin. Human skin keratinocytes (epidermis), fibroblasts (dermis), and adipocytes (hypodermis) were productively infected by EBOV GFP-rVSV. In studies with keratinocytes, the VSV recombinant virus initiates an innate response that inhibits infection and causes partial resolution of infection. The use of soluble B18R, an interferon antagonist, allows for more robust infection of keratinocytes, indicating that the innate response to the VSV recombinant virus is mediated by interferon. Further studies are needed to determine how the innate immune system in keratinocytes responds to BSL4 EBOV infection. These studies will be important for determining how EBOV is transmitted through skin and could lead to better strategies to reduce EBOV transmission.

54 - Yunyi Li

Major: Business Analytics

Mentor: Tong Wang (Management Science)

Self-exciting risk modelling for predicting next location of series crimes

The purpose of my research project is to develop a crime prediction model to optimize the distribution of police power in the areas that most need it. The machine learning and data mining algorithms I have utilized in my research include Bayesian Personalize Ranking, Self-Exciting Point Process, and Kernel Density Estimation. The tools I used in my research are R, Python, High-Performance Computing, QGIS, and MATLAB. Topics included in this research are spatial analysis, machine learning, and data mining.

56 - Carter Lilly

Major: Human Physiology

Mentor: Terry Wahls (Internal Medicine)

Comparing the Impact of Modified Paleolithic Diet and Low Saturated Fat Diet on Motor Function in the Setting of Fatigued Relapsing-Remitting Multiple Sclerosis Patients

Multiple Sclerosis is a neurodegenerative disease with symptoms such as pain, fatigue, and decreased motor function. Diet modification may improve these symptoms. We will measure and compare the effects of two dietary interventions on motor function. The Wahls Elimination diet restricts the intake of dairy, eggs, and grains, while emphasizing an increase of fruits and vegetables. The Swank diet limits saturated fats consumed to 15g per day and recommends 4 servings of grain daily. We hypothesize that both diets will improve completion times in the 9-hole peg test and 6-minute walk test. Participants will consume their usual diet for 12 weeks and then be randomly

assigned to an intervention diet. Motor function will be assessed at baseline and at 12 and 24 weeks on the assigned diet. No outcomes will be analyzed until the completion of the study.

58 - Lingyi Liu

Majors: Chemistry, Biochemistry

Mentor: Lei Geng (Chemistry)

Probing Molecular Transport in Nanoporous Silica Particles by Single-Molecule Spectroscopy

Nanoporous materials have found wide applications in many fields of chemistry and biomedicine, including chemical separations, drug delivery, biosensing, catalysis and environmental remediation. Although these applications are very diverse in their objectives and requirements, the functional properties are all controlled by the molecular transport in the nanopores: the wetting of the nanopores, the diffusion of molecules in the pores, and the adsorption and partition of the solute molecules on the pore surface.

In this work, single molecule spectroscopy is used to probe these molecular processes in order to understand their fundamental mechanism. The advantage of using single molecule spectroscopy is that the dynamic processes of molecular transport of individual molecules reveal the population heterogeneity in the nanopores. A statistical population of single-molecule photon-bursts data collected from 100 locations in 19 silica particles was built to analyze the adsorption, diffusion, and local concentration of rhodamine 6G molecules in nanopores. Structural heterogeneity on the nanopore surface is discovered through analyzing the transport parameters. The insights obtained through single molecule spectroscopy are valuable and essential in guiding the optimal design of functional applications of the nanoporous particles.

60 - Leigha Meredith

Major: Environmental Science

Mentor: Heather Sander (Geography)

Characterizing Urban Forest Communities through Tree Surveys and Soundscape Recordings

This study attempts to utilize emerging methods and perspectives of ecology to understand interactions of living things and their environment in relation to human development in Iowa City. It combines urban ecology, a newer discipline in that studies wildlife and habitats in the context of cities, with soundscape ecology, a novel branch that examines these aspects from an acoustic lense. Field tree surveys were conducted on survey points at varying levels of urban density as well as recreational parks and natural areas, collecting species identity, size measurements, and site variables. In a fraction

of points in these same sites, 15 minute audio recordings were taken using an H4N Handy recorder during the hours after sunrise when songbirds are most active. Recordings are qualitatively dissected for biogenic and anthropogenic sources of noise as well as analyzed in R to determine species richness data. Results of the sound recordings are compared with data collected in tree surveys and past bird surveys to investigate relationships between the organisms and to determine its efficacy as a wildlife monitoring method

62 - Alissia Milani

Major: Chemistry

Mentor: Elizabeth Stone (Chemistry)

Lake Michigan Ozone Study: Characterization and Sources of Airborne Particles

Air pollution in coastal regions affects nearly one-third of all Americans. It is important to study fine airborne particles and ozone because of their negative impact on human health and climate. Along the Lake Michigan coastline, elevated levels of tropospheric ozone are consistently observed in the spring and summer. The sources contributing to ozone formation are not well understood but can be inferred through the study of airborne particles. During the 2017 Lake Michigan Ozone Study, fine particles were collected onto filters and chemically characterized. Elevated levels of elemental carbon, emitted by fuel combustion, coincided with elevated ozone concentrations during air pollution events. Fuel combustion also releases reactive gases and particles that can produce secondary pollutants upon reacting with other chemical species in the atmosphere. This suggests these gases may play a significant role in the formation of tropospheric ozone. Elevated levels of ammonium, sulfate, and nitrate were also observed with high ozone concentrations. These particles are formed in the atmosphere from reactions of gases. Through identifying the major sources of air pollution, strategies to reduce air pollution can be developed and evaluated.

64 - Prince Morkeh

Major: French

Mentor: Sarit Smolikove (Biology)

ATL-1, the C. elegans ATR homolog, is required for maintaining chromosomal integrity in aging germline

ATR is an ATM related kinase highly conserved in eukaryotes that has a function in regulating cell-cycle, by activating checkpoint in response to DNA damage. ATL loss of function in mammals is associated with cancer. In the nematode *Caenorhabditis elegans* the ATL-1 is the homolog of ATR. Previously it was shown that ATL-1 is required for fertility of *C. elegans* and controls S-phase checkpoint activation in response to ssDNA accumulation during

replication. We observed that germline chromosomes of *atl-1* mutants that appear normal in young nematode, progressively deteriorate with age leading to massive chromosomal fragmentation. To identify the cause of these defects we analyzed the accumulation of ssDNA by the localization of the ssDNA binding protein RAD-51. We found that RAD-51 foci accumulate progressively in *atl-1* mutants. Since ATL-1 was implicated in activation of S-phase checkpoint we asked whether the proportion of S and M cells is altered in *atl-1* mutants. Using markers for both cell cycle phases (pH3 and PCN-1) we identified that the proportion of S, but not M phase nuclei is increased in *atl-1* mutants. This data suggested that replication is progressively deteriorating with age in *atl-1* mutants, leading to chromosomal fragmentation.

68 - Margaret Mungai

Majors: Biology, Neuroscience

Mentor: Antenor Hinton (Internal Medicine)

MFN-2, a mitochondria-associated endoplasmic reticulum membrane protein may be important for the formation of insulin mediate ER-Mitocontacts

Disruption of mitochondria-associated endoplasmic reticulum membranes (MAMs) integrity contributes to muscle insulin resistance. One MAM protein, an outer mitochondrial membrane protein, mitofusin-2 (MFN-2) has been shown to decrease in skeletal muscle of murine and human models of type 2 diabetes. Additionally, MFN-2 mediates tethering of mitochondria to endoplasmic reticulum to enhance calcium communication in the mitochondria. We therefore hypothesized that insulin stimulation increases MFN-2 protein levels and mitochondrial respiration by increasing ER-mitocontacts in skeletal muscle cells. To investigate the role of insulin on mitochondrial dynamics and ER-mitocontacts, Cre-LoxP technology was used to ablate MFN-2 from fibroblasts and skeletal muscle cells isolated from floxed MFN-2 mice. Confocal microscopy and MitoTracker orange was employed to obtain three-dimensional images of mitochondria networks and transmission electron microscopy (TEM) was used to analyze ultrastructure of Mito-ER contacts. Four hours of insulin treatment increased MFN-2 protein levels, promoted mitochondrial fusion, elevated mitochondrial respiration, increased ER-mitocontacts and decreased the distance of ER-mitocontacts in skeletal muscle cells. Depletion of MFN-2 blocked the metabolic effects of insulin stimulation and the formation of ER-Mitocontacts. Together, ablation of MFN-2 alters metabolic responses to insulin through the disruption of MAMS in skeletal muscle cells.

70 - Matthew Murry

Major: Biology

Mentor: Quan Jiang Zhang (Internal Medicine)

Autophagy protects cardiomyocytes against palmitate-induced death

Autophagy is an intracellular autodigestive process, by which a cell may maintain the integrity of its function and structure. This study sought to investigate the role of autophagy in protecting cardiomyocytes exposed to palmitate (Pal) to model lipotoxic cardiomyopathy. Results: Incubation of H9c2 cells with 500 μ M Pal, progressively and time-dependently increased autophagy relative to vehicle-treated cells. Pal incubation decreased Akt1 phosphorylation at S473 and T308, which was accompanied by increased Atg13 abundance in Akt1 immunoprecipitates from Pal-incubated H9c2 cells relative to vehicle-treated cardiomyocytes. Relative to scrambled siRNA-transfected cardiomyocytes, silencing Akt1 decreased basal levels of autophagy in the vehicle-treated cardiomyocytes and markedly attenuated Pal-induced autophagy as evidenced by LC3-II levels. Pal incubation for 6 hr did not induce cardiomyocyte death as measured by MTT. However, when either Akt1 or Atg5 was silenced to suppress autophagy initiation, Pal incubation progressively and time-dependently decreased cardiomyocyte survival approximately by ~40% at 6 hr time point. Pal-induced cardiomyocyte death by autophagy suppression was accompanied by an increase in apoptosis, evidenced by increased levels of cleaved Caspase 3 and cleaved PARP. Conclusion: Pal incubation dephosphorylates Akt1 and promotes its interaction with Atg13 to initiate autophagy, which promotes cardiomyocyte survival likely by inhibiting apoptosis.

72 - Danielle Nauman

Major: Speech & Hearing Sciences

Mentor: Jerry Moon (Communication Sciences & Disorders)

The effects of vocal effort on bilabial contact pressure and intraoral air pressure

Following surgical removal of the larynx, patients choose an alternate speech-production mechanism. One substitute sound source option is an electrolarynx. However, removal of the larynx alters speech production. The lung driven pressurized airstream used to articulate speech is not available. Increasing global effort and exaggerating speech movements have been suggested, but the relationship between an individual's "effort level" and aerodynamic and kinematic correlates of exaggerated speech movements is not understood. This study compared effects of varying speaking effort when using laryngeal speech on speech aerodynamics and kinematics to the same parameters exhibited during electrolaryngeal speech. Participants produced three bilabial consonants using conversational, clear, and electrolarynx speech modes. Bilabial contact pressure (BCP) peaks, intraoral air pressure (IOAP) peaks, and their durations were measured. BCPs and BCP durations increased from conversational to clear to electrolaryngeal speech, for all phonemes

studied. IOAP did not differ significantly as a function of speech mode, while IOAP duration was significantly lengthened during electrolarynx speech. Speech produced with an electrolarynx is different from laryngeal speech and appears associated with greater effort than conversational or clear speech. These results can be generalized to clinical instruction for electrolaryngeal speakers to produce clearer and more intelligible speech.

74 - Nhan Nguyen

Major: Biomedical Engineering

Mentor: Fang Lin (Anatomy & Cell Biology)

Wnt5b is required for endoderm morphogenesis

The endoderm is the deepest germ layer that contributes to the inner lining of the gut and the associated organs. In zebrafish, during early segmentation (1-12 somites), endoderm undergoes convergence and extension movements (C&E movements) and transform wide endoderm sheet into a narrow endodermal rod or gut anlagen. Non-canonical Wnt/Planar cell polarity (Wnt/PCP) signaling has been implicated in gut morphogenesis in mouse, frog and zebrafish. The underlying cell and molecular events, however, are not clear. During early segmentation, endodermal cells increasingly polarize along embryonic mediolateral axis and intercalate (shuffle) with neighboring endoderm cells as they undergo C&E movements. As a result, wide endoderm sheet transforms into a narrow endoderm sheet (at 12S) that later form gut anlagen. *Wnt5b* mutants but not *wnt11* display a wide endodermal sheet at 12. This result suggests that *wnt5b* is required for endodermal C&E movements. In another project in Dr. Lin's lab, similar results were observed in *wnt* co-receptor Receptor-like tyrosine kinase (RyK) morphant embryos. Currently, we are investigating whether *Wnt5b* control planar cell polarity in endoderm via RyK.

76 - Aleisha Norton

Majors: Biology, Psychology

Mentor: Susan Lutgendorf (Psychological & Brain Sciences)

Psychosocial Well-Being and Depression in Ovarian Cancer Survivors

This study aimed to explore the relationship between psychological wellbeing (PWB) and depression in ovarian cancer survivors and explore whether PWB buffers the effects of perceived stress on depression. Data was drawn from three studies of ovarian cancer patients. All participants (N=147) had completed primary treatment and completed psychosocial assessments. PWB was assessed as a total score and four subscales: environmental mastery, personal growth, purpose in life, and self-acceptance. The Center for Epidemiological Studies Depression scale (CESD) was utilized to assess depression. A hierarchical regression was used to determine whether PWB has

an inverse relationship with depression after adjusting for covariates (age, marriage, current disease status, cancer recurrence, years since diagnosis). The interaction between wellbeing and current stress was tested to determine whether PWB moderates the relationship between stress and depression. Higher levels of PWB were associated with less depression ($r = -.610, p < .001$). This was also true of each PWB subscale: environmental mastery ($r = .510, p < .001$), personal growth ($r = .208, p = .031$), purpose in life ($r = .207, p = .012$), and self-acceptance ($r = -.272, p = .002$). Next, a significant interaction between PWB and perceived stress was found, $F(8,138) = 15.65, p < .001$, indicating that PWB was protective against the effects of perceived stress on depression. Implications for these results include interventions targeting well-being in cancer survivors.

78 - Danielle Pellack

Major: Human Physiology

Mentor: Michael Anderson (Molecular Physiology & Biophysics, Ophthalmology & Visual Sciences)

Is Mitochondrial Fission Protective in Glaucoma

Glaucoma is a leading cause of irreversible blindness caused by a loss of retinal ganglion cells within the eye. This project utilizes mouse genetics to examine normal variation in retinal ganglion cells (RGCs) and their axons, and to test the hypothesis that RGCs are susceptible to glaucomatous damage due to energy insufficiency. To test the hypothesis that energy insufficiency contributes to RGC death in glaucoma, we used the *nee* mouse strain, which has early-onset high-pressure glaucoma and RGC death. This strain was crossed to a second strain with a *Ppp2r2b* mutation that increases the efficiency of mitochondrial-mediated energy production. Longitudinal baseline study of retinæ and optic nerves was performed for each strain independently. The *nee* model of glaucoma has a large degree of RGC death and axon loss between 6-8 weeks old. *Ppp2r2b*-mutant mice have a trend toward elevated RGC and axon number at 6 weeks old. Intraocular pressures for *nee* mice are extremely high while pressures among all genotypes for *Ppp2r2b* were relatively similar and low. Studies on the effect of *Ppp2r2b* mutation on *nee*-mediated RGC loss are ongoing.

80 - Marissa Roseman

Majors: Biology, Environmental Science

Mentor: Maurine Neiman (Biology)

Do parasites help drive life history variation in natural populations?

Different organisms use a variety of life history strategies, and disease-imposed natural selection should influence the evolution of these critically important traits. We aim to address whether variation in selection imposed by

a parasite disease can explain striking variation in life history traits in *Potamopyrgus antipodarum*. This New Zealand freshwater snail is characterized by wide variation in life history traits and spatial variation in infection frequency by a sterilizing parasite, *Microphallus livelyi*. Founding females field-collected from three high-infection lakes/habitats and five low-infection lakes/habitats were isolated in cups and checked weekly for G1 offspring. G1 females were photographed and measured weekly to determine growth rate and checked weekly for G2 offspring to determine the time until reproductive maturity, and size at maturity was measured. Results suggest that earlier reproduction is associated with a faster growth rate, while time until reproductive maturity was not strongly correlated with adult size. Data showed a strong influence of lake of origin on life history values, far more so than level of infection. This suggests local adaptation and/or neutral population divergence may be contributing more than disease to life history variation. It poses the question: what sort of costs may be associated with rapid growth and earlier reproduction that encourage the persistence of variation?

82 - Alexi Rubin

Major: Nursing

Mentor: Terry Wahls (Internal Medicine)

Analyzing the Effect of the Wahls and Swank Diets on Fatigue, Mood, and Cognition in Multiple Sclerosis Patients

Multiple sclerosis is a debilitating disease of the nervous system. Most individuals experience decreased mobility, pain, and fatigue. Restricting certain foods in the diet may alleviate some of these symptoms. Our study compares the modified Paleolithic (Wahls' elimination) diet and the Swank diet. The Wahls diet excludes dairy, eggs, grains, legumes, sugar, and nightshade vegetables, and recommends 6 cups of vegetables and meat daily. The Swank diet is low in saturated fat (<15 grams) and recommends 4 servings of grains per day. Eligible participants have relapsing-remitting multiple sclerosis and moderate to severe fatigue (Fatigue Severity Scale score of 4). Participants will follow their usual diet for 12 weeks and then be randomized. The study dietitian will train the participant on the assigned study diet and provide 4 weekly coaching calls to help the participant adopt and sustain the study diet. The primary outcome is change in Fatigue Severity Scale score. The secondary measures are changes in mood (Hospital Anxiety and Depression Score), cognition (Symbol Digit Modalities Test) and diet quality (3-day weighted food records and food frequency questionnaire). Assessments will be completed at baseline and weeks 12, 24 and 36. Data analysis will be completed at study conclusion.

84 - Eli Schmidt

Major: Psychology

Mentor: Shaun Vecera (Psychological & Brain Sciences)

The guidance of visual attention through learned feature probabilities

Attention can be influenced through statistical learning of information in the environment. Over time, visual patterns relevant to the current task can be selectively attended to in order to guide attention. Within a visual search paradigm, statistical learning of a location has been shown to be quickly learned and rather robust. What has not been conclusively demonstrated is long-term learning of a relevant feature dimension (e.g. color or shape). In the present study, participants searched for an orientated letter embedded within either a circle or a square. During the training period, the letter was within a single shape on 75% of the trials and in the other shape on remaining trials. After a prolonged training period, the contingency was removed such that the target was equally likely to appear in either shape (testing phase). To summarize the results, the participants learned to preferentially attend to the relevant shape and that preference remained during the testing phase. This suggests the learning of the critical shape was a long-term bias as the preference to attend to the previously relevant feature persisted when feature was no longer predictive of the target location.

86 - Victoria Shihadah

Major: Speech & Hearing Science

Mentor: Bob McMurray (Psychological & Brain Sciences)

Framing Expectations: The Effects of Transient Degraded Speech Conditions on Competition in Spoken Word Recognition

Speech changes continually in time. Consequently, for listeners to recognize spoken words, they must piece together the incoming message over time. As a listener hears a word like sandwich, they immediately activate multiple candidates from their mental lexicon with similar onsets (sandwich, sandal, santa). They then integrate further auditory input as it arrives, to favor or disfavor these candidates. This competition takes different forms under degraded listening conditions, for example in listeners with cochlear implants. However, it is unclear whether these differences arise from the degraded input itself, or if listeners refine this competition to adapt to poor input. Thus it was investigated how word recognition unfolds in conditions when the target word is clear, but listeners believe they are listening in noise. For the purposes of this study, a new type of noise, referred to as framed noise, was developed, in which a carrier sentence is presented along with background noise (e.g., now click on the...), but the target word (...ball) is clear. This was compared to conditions of complete-noise and no noise. Lexical competition was measured using an eye-tracking paradigm. Normal Hearing adults matched a spoken word (e.g., sandal) to one of four pictures on the screen (sandal, sandwich, etc.). Fixations to each picture were recorded, revealing participants' early interpretations. Data collection is underway and preliminary results will be presented at SURF.

88 - Katie Sinwelski

Major: Nursing

Mentor: Catherine Cherwin (Nursing)

Evidenced-Based Interventions for Chemotherapy-Induced Dysgeusia

Research has shown that patients receiving chemotherapy experience dysgeusia. Dysgeusia has been shown to negatively affect one's weight, nutritional intake, and quality of life. Research on interventions for chemotherapy-related dysgeusia are limited due to outdated sources of summaries of evidence. The purpose of this poster was to produce a more time-relevant summary of evidence on interventions for patients experiencing dysgeusia. Results from the studies have revealed things such as cryotherapy, education, cognitive therapy, and miracle fruit supplementation as helpful with chemotherapy-related dysgeusia. The little research that has been done has revealed the need to further research about interventions for taste alteration. Further research and use of this summary will help inform the practice of cancer healthcare providers

90 - Zach Theiler

Majors: Biochemistry, Chemistry

Mentor: Scott Daly (Chemistry)

Homoleptic Neodymium(III) and Uranium(III) Phosphinodiboranates

The problematic nature of nuclear energy production has reduced its potential for long-term energy solutions to support a growing global population. Modern nuclear waste remediation processes like transmutation conceivably hold tremendous potential to close the nuclear fuel cycle and meet increasing energy demands. Nuclear waste remediation requires ligands that selectively extract actinides from lanthanides, and our work focuses on synthesizing and characterizing new actinide and lanthanide complexes to understand and exploit differences in f-element bonding. A new homoleptic neodymium(III) phosphinodiboranate complex, $\text{Nd}_2(\text{H}_3\text{BPtBu}_2\text{BH}_3)_6$, was discovered and compared to an isostructural uranium phosphinodiboranate complex, $\text{U}_2(\text{H}_3\text{BPtBu}_2\text{BH}_3)_6$. The $\text{Nd}_2(\text{H}_3\text{BPtBu}_2\text{BH}_3)_6$ complex was prepared by adding three equivalents of $\text{K}(\text{H}_3\text{BPtBu}_2\text{BH}_3)$ to a suspension of NdI_3 in diethyl ether. The uranium and neodymium complexes were characterized using nuclear magnetic resonance (NMR) and IR spectroscopy, and the results revealed that the complexes exist as an equilibrium mixture of monomer/dimer in solution. The monomer/dimer concentrations and solubility depends on the identity of the metal, which may afford new methods to separate lanthanides and actinides.

92 - Maegan Tyrrell

Major: Health Promotion

Mentor: Jon Winet (Art & Art History)

Initial Qualitative Assessment of The Passport Project

The Passport Project is a First-Year seminar dedicated to introducing students to the cultural and scholarly offerings of The University of Iowa and Iowa City. The class consists of three components that work in congruence to create a unique class experience. Students attend 12 events across seven predetermined categories and participate in large group guest lectures opposite of Breakout groups, which pair approximately 10 First-Year students with an older undergraduate peer mentor. At the end of the Fall 2017 semester, an anonymous questionnaire was administered to students as the first stage in a new assessment plan for the program. The questionnaire consisted of three open-ended questions asking students about their takeaways from the class, suggestions for improvement, and ideas for future presenters. Out of 121 students, 103 responses were received. The overarching themes in the takeaway data indicate students were learning about campus, themselves, and continuing learning beyond college. Suggestions for improvements were mixed in response, but there was some agreement that there should be changes made to the event categories and course assignments. Conclusions drawn from this project will be used to refine the Fall 2018 rendition of the course and the next stage of the assessment plan.

94 - Allison Vaske

Major: Chemical Engineering

Mentor: Chad Grueter (Internal Medicine)

Role of CDK8 Activity in Cardiovascular Disease

Myocardial fibrosis is described by an excess in the extracellular matrix (ECM) deposited in the cardiac muscle, and has been observed in virtually all forms of cardiovascular disease. Injury induces the transformation of cardiac fibroblasts (CFs) to myofibroblasts, characterized by the increased proliferation and expression of pro-fibrotic factors, including collagens and pro-inflammatory cytokines. Excess collagen within the cardiac tissue generates myocardial stiffness, interferes with electrical signal conduction, and ultimately leads to accelerated progression of heart failure. Cyclin-dependent kinase 8 (CDK8) associates with the mediator complex, resulting in complex transcription regulation through mechanisms that produce either an activating or inhibiting response. It has been demonstrated that treating CFs with Ang II induces the expression and kinase activity of CDK8, suggesting that CDK8 is involved in myofibroblast transformation. Previous in vitro models of Angiotensin II-induced hypertrophy of cardiomyocytes suggest that the CDK8 kinase inhibitor, Senexin A, is effective in inhibiting hypertrophy of these cells. Here, we will explore the effects of CDK8 kinase inhibition with Senexin A in CFs. It is hypothesized that inhibition of CDK8 will directly effect CFs and avert amplified proliferation and transcription of pro-fibrotic and pro-inflammatory genes in CFs potentially reducing the harmful effects of cardiac fibrosis.

96 - Sophia Vogeler

Major: Biochemistry

Mentor: Charles Brenner (Biochemistry)

Maternal NR supplementation during lactation promotes NAD metabolism for milk production and neonatal development

NAD⁺ is an essential metabolite that serves as a cofactor and a substrate for many cellular enzymes, including the sirtuins. Homeostasis of the NAD⁺ metabolome is challenged during DNA damage, certain disease models, and during normal tissue aging but can be reversed by the administration of nicotinamide riboside (NR), an NAD⁺ precursor. Interestingly, many previous rodent studies were done using male mice. Little is known about how NR affects female systems. Lactation is a highly energy demanding process that requires coordination between multiple organ systems to generate protein, fatty acids, lactose, and vitamins for milk production. NAD precursors such as NR and nicotinamide (Nam) have previously been found in milk, but NAD regulation during lactation has never been investigated. Here we study the effect of boosting NAD levels in female mice during lactation and found that NR promotes milk biosynthesis, maternal weight loss, and neonatal growth, motility, and liver maturation.

98 - Olivia von Gries

Majors: Studio Art, Art History

Mentor: Veronica Rose Smith (Museum of Art)

#getsmART! - A Digital Art Series

This research focuses on creating content for the #getsmART Digital Art Series, which is a part of the Legacies for Iowa Project. The Project aims to bring the University of Iowa Museum of Art's (UIMA) collection to the people of Iowa. For the #getsmART Digital Art Series, the researcher connected objects and artists within the UIMA collection to holidays for every day of each month. The research fellow researched these artists, objects, and holidays and wrote 300- to 500-word posts that were published on various UIMA social media accounts and included in an online Art of the Day calendar on the UIMA website. The posts were written to be informative but took an informal tone so that non-art historians could be engaged by their content. The purpose of the Legacies for Iowa Project is to preserve the UIMA collection and create a legacy for the future of art in everyday life, which is partially accomplished by the #getsmART Digital Art Series. Overall, the objective of the #getsmART Digital Art Series is to make learning about artwork within the state of Iowa enjoyable and interesting.

100 - Jesse Weiss

Major: Nursing

Mentor: Debra Brandt (Obstetrics & Gynecology)

Introducing e-consents in a Clinical Setting

Preeclampsia (PE) is a multiorgan hypertensive-disorder in pregnancy that causes significant maternal-fetal mortality and morbidity. The diagnostics and therapeutics for PE are limited due to its unclear etiology. Using the UI Maternal Fetal Tissue Bank, our lab has demonstrated that copeptin is robustly predictive of PE. To investigate copeptin further, we developed the Rule Out Pre-Eclampsia Study (ROPE). The ROPE study recruits women admitted to Labor and Delivery for evaluation of PE. Women are admitted for PE evaluation at all hours. Research team members are not available at all times to obtain consent which limits recruitment. Our project aimed to develop an electronic informed consent (e-IC) that is compliant with the Federal Regulation for Human Research Protection and is easy to use and readily understood by study participants. After obtaining IRB approval, simulated patients were given an iPad on which to read and evaluate the e-IC using a validated questionnaire, the Quality of Informed Consent (QuIC). Based on the QuIC, the e-IC was modified and re-tested. Participants demonstrated good comprehension of the e-IC as evidence by QuIC scores ranging from 61 to 96. Based on our results, the e-IC is an effective and efficient method for the Informed Consent process.

102 - Michaela Wiltgen

Major: Nursing

Mentor: Debra Brandt (Obstetrics & Gynecology); Donna Santillan (Obstetrics & Gynecology)

Identifying risk factors for preeclampsia in subsequent pregnancies in women with a history of preeclampsia

Preeclampsia (PE) is a prevalent hypertensive disorder of pregnancy that causes significant maternal-fetal mortality. It has been reported that 60% of maternal mortality can be prevented. Studies have demonstrated that nursing has the ability to influence the mortality rates by providing proactive and competent care. Part of proactive, competent care is to identify those women at the highest risk for PE. Multiple studies have identified a history of PE as a significant risk factor for PE in future gestations. We conducted a nested case control study with our Rule Out Pre-Eclampsia (ROPE) cohort to identify comorbidities most likely to lead to recurrent PE. A total of 116 women underwent evaluation to rule out PE. Demographic and comorbidity data was obtained. Descriptive statistics, bivariate analyses, and logistic regression were performed as indicated with $\alpha=0.05$. PE developed in 88 of 116 women (75.6%). Characteristics were analyzed for the prediction of the development of PE in order of importance. Recognition of these risk factors will be of value to nurses when counseling and assessing women regarding PE.

104 - Arthur Wold

Major: Anthropology

Mentor: James Enloe (Anthropology)

The Shellfish Informant: Using Bivalve Remains to Reconstruct Ancient Environments

Bivalves are an underutilized resource in archaeology, especially compared to the amount of research on them that has gone on in other fields, like ecology. Much of the ecological information and preferences of specific species can be used by archaeologists to reconstruct elements of past aquatic environments, allowing us to better understand the world ancient peoples lived in. Research has found that many species have starkly different success in rivers surrounded by forest versus rivers surrounded by grasslands, and this information is applied to Woodpecker Cave to discover information about the ancient environment of the nearby Iowa River. Additionally, information on glochidia host species for the species of bivalves present is applied to find likely fish inhabitants of the river.

106 - Audrey Wood

Major: Speech & Hearing Science

Mentor: Meredith Saletta (Communication Sciences & Disorders)

Beyond the Text: Using Illustrations and Text Readers to Support Reading Comprehension in Post-Secondary Students with Intellectual or Developmental Disabilities

For individuals with intellectual and developmental disabilities (IDD), pedagogy typically tends toward emphasizing functional skills over academic skills, limiting opportunities to develop age-appropriate reading comprehension skills. This has negative implications for this population's access to literature like print media and medical information, educational and vocational opportunities, and personal well-being. The present study explored two possible methods of facilitating reading comprehension for adults with IDD in a postsecondary educational setting. First, existing research indicates that including different types of illustrations can support reading comprehension, so we alternately added colored photographs, black-and-white drawings, and a control nonsensical pattern to a passage. We tested participants' comprehension of the passage. In each of three separate iterations, we found no differences between conditions. Subsequently, we explored assistive technology utilizing the Universal Protocol for Accommodations in Reading (uPAR), an automated diagnostic assessment that measures students' comprehension at their independent level and when using additional reading accommodations. We investigated whether the same subject group could benefit from a text reader or a recorded human voice. Subjects performed at a significantly higher grade level with both the human

audio and the text reader than independently, suggesting value in pursuing assistive technology interventions.

108 - Cole Wymore

Major: Human Physiology

Surveying Parents at a Health Fair About Attitudes and Practices Related to Helmet Use

Over one-quarter of all-terrain vehicle (ATV) related ER visits involve injury to the head and neck. Evidence has shown that ATV helmets could reduce the risk of fatal head injury by 40% and of non-fatal injury by 60-80%. Our pilot study was designed to determine behaviors and attitudes related to helmet use among riders of ATVs and bicycles. The survey was administered to attendees at the 2017 UI Health Fair who had at least one child under the age of 18 living in the home. Our study population (n=98) was 78% female, had a mean and standard deviation (SD) for age of 40 (6.3) years old, and two-thirds had more than one minor child in the home. More respondents rode bicycles (66%) than ATVs (19%). ATV riders more commonly reported they never wore helmets as compared to bicycle riders (68% vs. 20%). Interestingly, there was no difference in the level of importance assigned to helmet use for ATVs and bicycles. Pilot studies showed similar attitudes toward the importance of helmet use but much lower use among respondents who rode ATVs. Further research should be conducted to better understand the social and environmental influences that shape individuals helmet attitudes and practices.

110 - Yuanxi Zhang

Majors: Accounting, Finance

Mentor: Cristi Gleason (Accounting)

Failure to Timely Remediation of ICFR Weaknesses and Audit Pricing

Section 404 of Sarbanes-Oxley Act (SOX) is still in the center of the debate over cost and benefits. While the audit fee is the largest part of compliance cost, my research paper focuses on the relationship between the ICFR opinions and audit fees. Past research papers have examined this topic in multiple perspectives: companies have higher audit fees with material weakness disclosures than those without; the more severe the weaknesses are, the higher the audit fees; companies have lower audit fees in the year following remediation. My research paper adds another parameter to this topic: number of consecutive years in which companies disclose ineffective ICFR opinions. While companies with material weaknesses are considered with poor internal control, does number of years with weaknesses make a difference? I am going to answer this question with sample companies who have disclosed three consecutive years of material weaknesses.

112 - Shiwen Zhou

Majors: Psychology, Communication Studies

Mentor: Jodie Plumert (Psychological & Brain Sciences)

Parent-child Conversations about Road-crossing Safety in an Immersive Virtual Environment

Unintentional injury is one of the leading causes of childhood death and disability in the U.S. The current study looked at the role of parents in preventing unintentional injuries in children. Specifically, we looked at parent-child conversations about safety while parents and children were engaged in a potentially risky activity, crossing roads with traffic. Using an immersive virtual environment, parents and children repeatedly crossed a virtual roadway together. Analysis of the parent-child conversations revealed that parents suggested more gaps for crossing with the younger than older children, and parents were more likely to communicate about the chosen gap prior to its arrival than children (e.g., "let's take the next one"), particularly at the younger ages. Overall, this strategy of anticipatory gap selection predicted safer road-crossing behavior. Greater use of this strategy was associated with increases in the gap size chosen for crossing, more precise timing of entry into the roadway, and more time to spare when exiting the roadway. In conclusion, this study provides a rare glimpse into parent-child safety conversation in a naturalistic setting and its relation to actual safety behaviors, and provides new information relevant to developing injury prevention strategies associated with parent-child conversations.

