



**The 13th Annual**

**Spring**

**Undergraduate**

**Research**

**Festival**

**Wednesday, April 19, 2017**  
**4:30pm-6:30pm**

University of Iowa  
University Capitol Centre  
2<sup>nd</sup> 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.**

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The Spring Undergraduate Research Festival is proud to showcase over **100 visual presentations** given by the University of Iowa's student researchers. Presenters work in over **40 different departments**, representing each of the senior, junior, sophomore, and freshman classes.

**Odd numbered posters will present from 4:30-5:30PM**

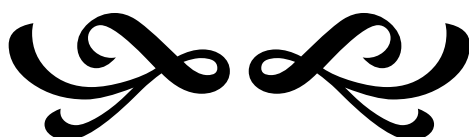
**Even numbered posters will present from 5:30-6:30PM**

**\*\*\*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 7th Annual Fall Undergraduate Research Festival!

**Programs with full abstracts are available on the ICRU website.**

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.



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# First Hour Presenters

## 4:30-5:30PM

(odd numbers only)

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### 1 - Hassan Ahamed

Major: Biomedical Engineering

Mentor: George Richerson (Neurology)

*Effect of Monoamine Reuptake Inhibitors on Seizures in DBA/1 Mice*

DBA/1 mice have a step-wise seizure progression beginning with wild running, which progresses to tonic-clonic seizures, and eventually seizure-induced respiratory arrest (S-IRA). For our present study, we used the SSRIs fluoxetine and escitalopram at high doses (0, 1, 3, 10, 30, and 100 mg/kg) to test their ability to completely protect DBA/1 mice from having seizures. We hypothesized that at high doses, both fluoxetine and escitalopram would be able to completely protect the mice from having seizures. At the dose of 100 mg/kg fluoxetine was able to completely protect DBA/1 mice from audiogenic seizures (n = 6 of 6). All other doses of fluoxetine were unable to protect the mice from seizures and S-IRA, except for one account at 1 mg/kg (n = 29 of 30). Escitalopram, at the same dose, was only able to completely protect some mice (n = 2 of 6), block tonic-clonic seizures (n = 1 of 6), and had no effect (n = 3 of 6). All other doses of Escitalopram were ineffective at stopping seizures and S-IRA (n = 26 of 26). These results suggest that fluoxetine may have off-target effects other than inhibiting reuptake of serotonin that give it strong anti-convulsive properties.

### 3 - Emily Anderson

Major: Human Physiology, Cell and Developmental Biology

Mentor: Yuriy Usachev (Pharmacology)

## *Examining the Role of Mitochondrial Calcium Uniport (MCU) in the Peripheral Nervous System using MCU Knockout Mice*

One of the roles of neuronal mitochondria is to buffer  $\text{Ca}^{2+}$  influx during excitation, and then release  $\text{Ca}^{2+}$  back into the cytosol, which helps regulate many  $\text{Ca}^{2+}$ -dependent neuronal functions such as excitability and neuronal survival. One of the  $\text{Ca}^{2+}$ -selective ion channels that are required for mitochondrial  $\text{Ca}^{2+}$  uptake is the mitochondrial calcium uniporter (MCU) and is found on the inner mitochondrial membrane. Through the use of Western Blot and cell culture, MCU has been found in numerous cell types including the expression of it throughout the brain and in dorsal root ganglion (DRG) neurons. Measuring  $\text{Ca}^{2+}$  concentration in the cytosol ( $[\text{Ca}^{2+}]_{\text{cyt}}$ ) and mitochondria ( $[\text{Ca}^{2+}]_{\text{mt}}$ ) of DRG neurons, it was found that MCU greatly contributes to the process of  $\text{Ca}^{2+}$  signaling in these cells. The data showed that MCU-KO completely blocked the mitochondrial  $\text{Ca}^{2+}$  uptake in response to weak depolarization, and the mitochondrial responses in MCU-KO neurons were ~5-fold shorter in comparison to WT neurons when given a strong depolarization. In order to examine the functional significance of MCU in neuronal function, we carried out a panel of behavioral tests such as roto-rod, grip strength and open field. No differences were found in the behavioral models of MCU-KO versus WT. However, using a model of electroshock-induced seizures, we found that MCU-KO produced a strong and significant anticonvulsant effect. We plan to further investigate the seizure model and other neurological models.

### **5 - Alexandra Bess**

Major: Biochemistry, Chemistry

Mentor: Jennifer Fiegel (Chemical and Biochemical Engineering)

*Analysis of the Protein Effects on Nanoparticle-Cell Association*

Bronchoalveolar lavage flushes a small portion of the bronchioles with saline and collects the fluids for medical examination. The proteins collected with this procedure are the same composition as regular lung fluid, however at a much lower concentration due to the saline flush. While in solution, proteins from this fluid interact with one another according to their composition and environment. By exposing carboxylated polystyrene nanoparticles to bronchoalveolar lavage fluid (BALF) proteins, the nanoparticle interactions change depending on what combination of proteins they interact with. With these previous interactions in mind, I study the effect the proteins in BALF have on the polystyrene nanoparticles' ability to adhere to the surface of animal cells. A549 cells are a monolayer tissue cell harvested from the bronchioles of human lungs. In nature, the protein composition of BALF would be highly relevant to the environment of the human lung where A549 cells reside, so testing those proteins' effect on the adherence of particles to A549 cell surface would simulate how particles would interact with these cells upon inhalation. These effects are compared to human serum proteins, which reside on the inner tissue environment of A549 cells.

## **9 - Katelyn Buhman**

Major: Biomedical Engineering

Mentor: Toshi Kitamoto (Anesthesia)

### *Genetic Screen for Seizure Suppressors Using a Fruit Fly Model of Epilepsy*

Epilepsy affects more than 65 million people worldwide, making it one of the most common neurological disorders today. There are effective anti-epileptic drugs (AEDs) on the market but nearly 30% of patients do not properly respond to the currently available drugs, creating an urgent need for new ways to control epilepsy. With this as a long-term goal, our lab carried out a genome-wide genetic

screen to search for genes that can modify seizure-like phenotypes of the *Drosophila* voltage-gated sodium channel mutant, Shudderer (Shu), a fly model of human epilepsy. Our extensive genetic screen, examining more than 300 deficiencies, led to the identification of several chromosome regions that may potentially contain genetic modifiers of Shu. A further analysis of one of the regions showed that the loss-of-function mutation in the Glutathione S-transferase S1 gene significantly reduced the severity of seizures in Shu. We have also analyzed the other regions in hope to find additional genetic modifiers. By utilizing smaller, molecularly defined deficiencies and assessing the degree of the seizure phenotype, I was able to narrow down a potential region to ~60Kb on the left arm of 2nd chromosome. These findings opened up a new area for discovery of novel AEDs.

## **11 - Yichong Cao**

Major: Psychology

Mentor: Edward Wasserman (Psychology and Brain Sciences)

### *Interaction of Supervision and Category Structure of Category Learning in Pigeons*

In the current study, we investigate the interaction of supervision and category structures in pigeons' category learning. Specifically, we test the role of supervision (high/ low) in category learning by using artificial categories (dense/sparse). Pigeons are expected to learn dense categories faster than sparse categories. High supervision helps the learning of sparse categories, but not the learning of dense categories.

## **13 - Akanksha Chilukuri**

Major: Neurobiology

Mentor: Hanna Stevens (Psychiatry)

## *Mice Exposed to Prenatal Stress Show a Decrease in Neocortex Size and Disrupted Cortical Organization*

Preeclampsia is a pregnancy complication characterized by systolic blood pressure 140 mmHg or diastolic blood pressure 90 mmHg and 24-hour proteinuria 0.3 g. To induce gestational hypertension, we prenatally exposed mice to a model of preeclampsia with continuous AVP administration. At P7, we collected brain samples, fixed them in PFA and sectioned them into 3¼mm thick slices using a cryostat. After mounting the sections, we used CTIP2 (1:250) to stain for deep-layer excitatory neurons. We then imaged these via fluorescent microscopy to measure the size of the frontal cortex and CTIP2- positive regions. With evidence from results at E18 and P0, we hypothesized that animals that are prenatally exposed to preeclampsia will have a smaller neocortex and disrupted cortical organization at p7. Understanding the causes of these morphological changes is the first step to devising treatment.

### **15 - Chris Coudray**

*Iowa's New Mammoth with Archaeological Potentials*

Major: Anthropology

Mentor: John Doershuk (Anthropology)

*Iowa's New Mammoth with Archaeological Potentials*

The Lake Red Rock mammoth was discovered in October of 2014 eroding from the lake shoreline. The site was partially excavated during May of 2016 by the University of Iowa Office of the State Archaeologist. The site is located in Marion County in the south-central part of Iowa approximately 25 miles southeast of Des Moines. The project is exploring whether there is any preserved association between the mammoth and humans existing in the area at the same time as the animal. The laboratory investigation seeks to establish how many animals, and of what species, perished at the site and what the ice age environ-



ment was like. The taphonomic processes resulting in the burial and preservation of the bones are being documented and the remains carefully examined for cut marks or other evidence of human modification. The adhering sediments returned to the lab with the bones are being subject to flotation processing to check for lithic microdebitage as a single stone (Solidified Sandstone) flake was recovered nearby the mammoth although not in secure association. My goal is to build a database for the Iowa region of proboscidean sites to further the efforts of others in the future to discover a location with preserved evidence of mammoth-human interaction

## **21 - Kylie Dolan; Hailey Billings**

Major: Psychology & Pyschology; Health and Human Physiology

Mentor: Jan Wessel (Psychological and Brain Sciences, Neurology)

### *Decreased Residual Awareness in Older Adults' Error Detection*

According to the dominant model, humans adapt their behavior after errors by slowing down motor responding (post-error slowing, PES) to avoid further errors. However, a key challenge to this model is the development of error processing over the life span. Older adults make more errors during fast-paced motor tasks, yet they show greater PES compared to younger adults. To explore whether the ability to consciously detect action errors could explain this discrepancy, we created a paradigm where participants of two distinct age groups participated in eye movement tasks. The tasks were intentionally difficult and error-inducing. We confirmed previous research findings that older adults exhibit an impaired ability to consciously detect their own action errors, and that they show increased PES when they do. Additionally, our new findings showed that younger adults show greater residual awareness of unperceived errors. This means that unperceived errors still often elicited error-related compensatory responses, which was confirmed by pupil dilation data.

### **23 - William Fuelberth**

Major: Physics and Astronomy, Mathematics

Mentor: Philip Kareet (Physics and Astronomy)

#### *HaloSat: The Missing Baryon Problem*

The universe has a missing baryon problem. Baryons account for about 5% of the total mass/energy of the universe. However, we have only been able to detect about half of the expected baryonic matter. Some can be found in cold or warm gasses and a small percentage can be found in galaxies, but we are still missing a very significant portion of this matter.

This project's goal is to determine whether these missing baryons are gravitationally bound to the galaxies or spread out throughout space, creating a warm-hot intergalactic medium. The Milky Way does have a halo of hot gas, but the unknown factor is whether this halo is extended or disk-like. In order to study this hot gas, we are measuring the x-rays emitted from oxygen atoms in the halo with the detector that our team has been designing and testing. These measurements will allow us to determine the geometry of the hot gas in the halo of the Milky Way. This will again be able to explain whether the baryonic matter in the halo is enough to account for the missing baryons and whether they are bound to galaxies or spread out.

### **27 - Michelle Grantman**

Major: Elementary Education

Mentor: Jessica Jensen (Mathematics Education)

#### *The Research Process: an Undergraduate Perspective*

When conducting research, it is imperative to do everything possible to remove bias from a study. Bias can come from many sources including the researcher, participants, and several other sources. The purpose of this presentation is to explain the research process in the context of

my role in helping to eliminate bias in the research of PhD candidate Jessica Jensen of the Mathematics Education Department. The research I partook in sought to answer two questions about how teachers' beliefs and prior knowledge of mathematical concepts affected how teachers asked questions during their mathematics classes. My primary role in this research involved eliminating bias, which included selecting lessons for analysis and coding the content of said lessons according to predetermined criteria. I also helped to organize data for analysis by transcribing interviews and surveys collected from the teachers. This presentation is meant to offer undergraduate students who are interested in pursuing research a look into what the research process entails.

## **29 - Salma Haider**

Major: Psychology

Mentor: Hanna Stevens (Psychiatry)

### *Preeclampsia Effects on Adult Brain in a Vasopressin-Induced Model*

Our focus in this project is to study preeclampsia as a possible risk factor for developmental disorders in children. The development of preeclampsia during pregnancy involves irregularity of hypothalamic secretion of vasopressin (AVP) causing elevated maternal high blood pressure. We hypothesized that preeclampsia plays a role in disrupting the functional and structural aspect of the neurodevelopment. We implanted an AVP pump into pregnant mice that imitates multiple aspects of preeclampsia including the elevated blood pressure effects. We tested offspring mice as adults on a modified social approach task and collected adult brain tissues, sectioned, mounted them and used immunohistochemistry to stain the sections with CTIP2, a deep-layer excitatory neuron marker, and GAD67, a marker for inhibitory neurons. Our last step was to image using the fluorescent microscope and measure the size of the cerebral cortex, and staining patterns of said markers. Our initial results suggest that social approach behavior is

impaired, the cerebral cortex is smaller, and deep layer neurons are particularly affected. We hypothesized that AVP exposure and cytokines also produced during preeclampsia and within our preeclampsia model were factors that lead to the changes in the neurodevelopment seen in the offspring.

### **31 - Sydney Hofferber**

Major: Health and Human Physiology: Health Promotion, Engaged Social Innovation

Mentor: Lucas Carr (Health and Human Physiology)

#### *Effect of a brief educational video on breastfeeding attitudes of undergraduate students*

Breastfeeding has been shown to be healthier for both mother and child in comparison to formula-feeding. Past studies have found that intention to breastfeed/support a partner breastfeeding before pregnancy can predict whether the individual will be successful breastfeeding. This study was designed to explore the effectiveness of a brief educational video on breastfeeding attitudes and knowledge in undergraduate students. We hypothesized watching the educational video would positively increase attitudes and knowledge. A total of 330 participants successfully complete the study. Once enrolled, participants completed a pre-intervention survey which asked about knowledge and attitudes towards breast feeding, watched a three-minute educational video that our team developed, and then repeated the knowledge and attitude survey. There was a significant increase in composite score for knowledge and attitudes pre-intervention to post-intervention (change=1.679 points, correlation =0.72, p=0.000). A positive association was observed between the pre-composite scores (entering attitudes/knowledge) and the change in composite scores from pre-intervention to post-intervention ( $r = 0.36$ ,  $p=0.001$ ). These findings suggest our three-minute educational video effectively improved these participant's knowledge and attitude towards breast feeding and was most effective for those with the lowest knowledge

entering the study. Future efforts will be aimed at disseminating this video.

### **33 - Mads Hoofnagle**

Major: Anthropology, Psychology

Mentor: John Doershuk (Anthropology)

#### *Wrestling with Ceramic Typologies: A Case for Holistic Analysis*

Ceramic analysis can be a field shrouded in mystery, where “instinct” and “inherent skill” are cited as often as any form of scientific analysis. Some argue for its abolishment in favor of purely quantitative measures such as statistical or chemical analysis, while others defend its current state of existence as a valuable and necessary form of artifact analysis. There is a compromise between the two, where our understanding of “ware types” and ceramic analysis can be structured around certain analytical pillars that are easily replicable and understandable by other researchers. These pillars consist of overall design themes, residue analysis results, and temper point counting results. In the case presented, that of Woodland period site 13DK96 in the Prairie Lakes Region of Iowa, the original ware type definitions turned out to be largely frustrating and a reconsideration of definitions and boundaries is proving fruitful.

### **35 - Madeline Judisch**

Major: Speech and Hearing Sciences

Mentor: Anu Subramanian (Communication Sciences and Disorders)

#### *Parent perspectives on effectiveness of speech language pathologists during home visits for early intervention*

Several studies across therapeutic domains have been conducted to investigate patient-clinician relationships (Kelley, Kraft-Todd, Schapira,

Kossowsky, & Riess, 2014; Plexico, Manning, and DiLollo, 2010). However, to date, no study has been conducted with speech language pathologists working in early intervention settings. It is important to determine if the factors mentioned in other areas of research, such as therapist competence, equality between therapist and parents, and caring, interpersonal relationships hold true for speech language pathologists in home settings as well. To investigate this, we interviewed two parents whose children received early intervention services. We were interested in their perceptions of the home-based early intervention process. With more work in this area, we hope that we can gain insight into what factors facilitate a positive parent-clinician relationship, which in turn could help train future speech language pathologists and improve the experience of early intervention for parents.

### **37 - Madison Kasperek**

Major: Human Physiology

Mentor: Teresa Marshall (Preventative and Community Dentistry)

#### *Feasibility and Application of ASA 24 in Dental Nutrition Research*

The ASA24 is an automated 24-hour recall tool developed by the National Cancer Institute for epidemiological research. Use of the tool to collect dietary could significantly improve the quality and consistency of dietary research. Objective: 1) To determine the feasibility of ASA24 to quantify nutrient intakes and caries risk variables and 2) To compare nutrient profiles of dietary records analyzed using ASA24 to nutrient profiles analyzed using Nutritionist Pro. Methods: A representative sample (n=25/age) of 24-hour dietary recalls previously analyzed by Nutritionist Pro were entered into the ASA 24 data system. Nutrient intakes were compared between programs using SAS 9.4 (Cary, NC); median differences were compared using the signed-rank test.

Results: In general, statistically significant differences in median intakes were noted between programs at each age. At 8, 16 and 36

months, a number of nutrients had significant differences. Furthermore, most differences exceeded an acceptable difference of 5%. Differences ranged from 0.2% for thiamin at 36 months to 185% for vitamin A at 8 months. Conclusion: The ASA24 is user friendly and nutrient analyses are appropriate for COD dietary research. However, the discrepancies between nutrient intakes of 24 hour recalls analyzed by Nutritionist Pro and ASA24 dietary data collection resources are extremely high, and the programs can not be used interchangeably to analyze dietary records within a study.

### **39 - Elise Kerns**

Major: English

Mentor: Matthew Gilchrist (Rhetoric)

#### *An Ethnographic Study to Understand the Cultures of Art House Cinemas*

The statistics education community is increasingly recognizing the need for changes in how we teach the subject, especially in foundational classes for undergraduates. One of these changes to statistics education is the use of gaming principles and interactive simulation environments to help students engage with the content and explore complex statistical concepts.

### **41 - Paige Kies**

Major: Microbiology

Mentor: Craig Ellermeier (Microbiology)

#### *Specialized Metabolites Affecting the Interspecies Interactions between Myxococcus xanthus and Bacillus subtilis*

In this poster session, I will focus on the results of the latest pilot study as well as provide opportunities for people to get hands-on experience with the apps. *Myxococcus xanthus* and *Bacillus subtilis* are soil dwell-

ing bacteria, both capable of a complex life cycle. *M. xanthus* is a predator that consumes a wide variety of prey by secreting harmful enzymes and non-essential secondary compounds (i.e. does not need to produce compound to survive). We found that *B. subtilis* is able to resist predation in the short term by secreting its own secondary compound, bacillaene. Prolonged predator-prey interactions induce the creation of a unique biofilm termed megastructure by *B. subtilis*. These megastructures provide long term protection from the predator. We hypothesize that megastructure formation is a specific stress response to predation by *M. xanthus*. Our data suggest that megastructure formation and induction is only found within the Bacillus and Myxobacteria species, respectively. We additionally have shown a secondary compound, mxyoprincomide, as necessary for successful *M. xanthus* predation. To better understand the role of secondary compounds during predation, we created mutations in *M. xanthus* genes whose products are involved in secondary compound production.

### **43 - Marcy Kreda**

Major: Marketing

Mentor: Bill Hedgcock (Marketing)

#### *Real vs. Imaginary Gambling*

Past research has had conflicting results about whether and how incentives affect decision making. Our study was designed to shed light on this topic. Participants were given the option to gamble on two rounds of twenty coin flips. If they invested and won, they received \$7.50. If they invested and lost, they received \$5.00. If they did not gamble, they received \$6.00. For one of the rounds, investments were real - participants were paid based on one of their randomly chosen decisions. In the other round, investments were imaginary - participants were told to imagine they would be paid based on a randomly chosen decisions. In addition to behavioral data, we collected physiological data including



skin conductivity and heart rate to see if these data correlated with behaviors. Initial results include participants gambled, on average, more times in the imagine version rather the real version. Participants switched their choices, i.e., originally bet on heads and then switched to bet on tails or to not gamble, more often in the real version than compared to the imaginary version. Also, skin conductivity response was higher in the real version when the participant saw the outcomes of their choices.

## **45 - Evan Lamb**

Major: Microbiology and Human Physiology

Mentor: Linda McCarter (Microbiology)

### *Communication and Chemotaxis in Pathogenic Vibrio parahaemolyticus*

Bacteria, like most other organisms, must seek out nutrients to survive. However, nutrients are not always readily available in their current environment. Therefore, many bacterial species have developed means of motility and mechanisms of sensing nutrients to transit within their environment towards more favorable conditions. *Vibrio parahaemolyticus*, a pathogenic species of bacteria, is able to produce multiple lateral flagella to "swarm" across surfaces and in viscous environments. The swarming process is group-mediated and directed by autoinducing pheromone signals. We have identified receptor proteins which we believe sense a communication molecule called the "S-signal". To assess the role of the S-signal and these receptors in swarming motility and bacterial communication, mutant strains for the receptors were engineered. These strains were then tested for competitive advantages in swarming, attraction to the S-signal, and complemented to restore wild-type (WT) phenotypes and examine effects of overexpression. It was concluded that the mutant strains for the receptor VPA1492 had faster swarm rates than their WT parental strains and that overexpression of the receptors via plasmid complementation resulted in repression of

swarming proficiency. These findings have laid a foundation for future investigation into bacterial chemotaxis and communication.

#### **47 - Kevin Lin**

Major: Human Physiology

Mentor: Dale Abel (Internal Medicine)

*Ketogenic diet attenuates cardiac hypertrophy but cannot maintain systolic function in pressure overload mice*

Healthy adult hearts utilize fatty acid, glucose and lactate as the major substrates. Amino acid and ketone bodies also contribute to the ATP generation in cardiomyocytes. Recently publication showed that ketone bodies are the preferred fuel in failing hearts. Ketogenic diet (KD) is composed of high fat and low carbohydrates and protein which promotes the liver to synthesize more ketone bodies. To investigate the effect of KD cardiac remodeling, we put eight-week old wild-type C57BL6/J mice on KD after transverse aortic constriction (TAC) surgery. Echocardiography was performed on the mice pre -and four weeks post - TAC surgery to examine cardiac function. The left ventricular mass was dramatically increased in the control diet group four weeks after the TAC surgery. The cardiac hypertrophy in the mice under the KD was attenuated compared to the control diet. To test the impact of the ketogenic diet on maintaining systolic function, twelve-week old wild-type C57BL6/J mice were fed KD post-TAC surgery. Ejection fraction was significantly decreased in both diet groups three-weeks post-TAC surgery and KD was shown not to ameliorate systolic dysfunction. In conclusion, KD attenuated the cardiac remodeling with preserved ejection fraction, but cannot prevent the systolic dysfunction in the pressure overload model.

#### **49 - Jean Kyung Park**

Major: Mathematics

## *TDA Mapper (Topological Data Analysis)*

We summarize a data analysis method called TDA Mapper--first proposed by Singh, Mmoli, and Carlsson in 2007--with a simple visual example to highlight its strengths. TDA Mapper reduces a high dimensional data set into a simplicial complex by inputting the original data points into a filter function. The result is a compressed representation of a data set which retains the data's topological characteristics. In addition, the TDA Mapper algorithm is coordinate free: If the data sets are collected from similar objects, TDA Mapper will produce similar outputs even if the data sets were created on different platforms using different techniques. Also, TDA Mapper is invariant under deformation: Stretching or bending the data's shape, for example, does not change its nature. Challenges in applications exist (for example, deciding which aspect of the original data is appropriate to focus on), but TDA Mapper is widely applicable. Producing a compressed representation of a data set while being coordinate free and invariant under deformation, TDA Mapper can be applied to a variety of data sets--political science data, economic data, etc.

### **51 - Carter Madler**

Major: Chemistry

Mentor: Betsy Stone (Chemistry)

#### *Seasonal Variation of Particulate Matter in an Urban Environment*

Fine particulate matter 2.5 micrometers or smaller in diameter (PM<sub>2.5</sub>) have detrimental impacts on human health. PM<sub>2.5</sub> can either be generated at the source as a primary aerosol or through chemical reactions of gases that form secondary aerosol. Aerosols can be emitted through natural, biogenic or anthropogenic means. Molecular tracers can be used to link PM to its source. This study uses molecular tracers as well as the ratio of organic carbon (OC) to elemental carbon (EC) to understand how the anthropogenic influence on PM<sub>2.5</sub> varies seasonally in

Atlanta, Georgia. Samples were collected daily from July 29 - August 27, 2015 for summer and January 19 - February 18, 2016 for winter. From n-alkane tracers, a carbon preference index (CPI) was calculated for both summer and winter; CPI values close to 1 indicate anthropogenic activity such as the use of fossil fuels or incomplete combustion. OC to EC ratios ranged between 4.7 - 37.6 during the summer and 4.8 - 17.2 during the winter, indicating a greater role of secondary organic aerosol formation in the summer. Work in progress includes analyzing tracers of biogenic and anthropogenic secondary aerosols.

### **53 - Sophia Mallaro**

Major: Computer Engineering

Mentor: Joe Kearney (Computer Science)

#### *Effect of Modality on Behavior in Virtual Reality Environments*

Pedestrian-vehicle collisions, often causing severe injury or death, are a growing concern. Studying pedestrian-vehicle interactions in real life is not possible for safety reasons, leaving researchers to find another way to study this behavior, such as virtual reality. For years, the Hank Virtual Environments Lab has been utilizing immersive, large-screen virtual reality displays (commonly called a CAVE) for these studies. Recent advances in head-mounted display technology create an incredible opportunity to study road-crossing behavior in an even more immersive virtual environment. Understanding the effect of modality (head-mounted vs. large screen display) on behavior to properly analyze data collected in virtual environments and draw appropriate and accurate conclusions. This study aims to compare pedestrian behavior in a head-mounted display with pedestrian behavior in a cave. Participants crossed a single lane of traffic twenty times in either the head mounted display or the cave. Gaps between cars ranged from 2.0 seconds to 5.0 seconds. We analyzed gap selection and movement timing in the two groups.

## **55 - Dylan Mann**

*The Reliability and Validity of Hand Function Measures in Patients with CMT*

Major: Biomedical Engineering

Mentor: Nivedita Jerath (Neurology)

Charcot-Marie-Tooth disease (CMT) is among the most prevalent inherited neurological disorder in the United States and one of the leading causes of inherited neuropathy. It affects as many as 1 in every 2500 people, and causes significant lifelong debilitation. Current industry gold standard for evaluating the progression of the disease and tracking changes involves a labor-intensive algorithm based upon multiple individual tests and an electromyography nerve conduction speed study. This process requires significant labor by hospital staff and submits the patient to an uncomfortable and sometimes painful procedure. Therefore, it is of benefit to identify an alternative method with which to track the progression of the illness to both save the hospital labor costs as well as spare the patients discomfort. In this study, we examined the autosomal dominant variant of the disease, CMT 1A, and evaluated how an established hand function exam, as an alternative method with which the progress of the disease might be tracked, corresponded to the gold standard. Statistical analysis of the change in patient performance between subsequent visits on the components of the accepted gold standard and the hand function exam provided correlations which gave insight on the reliability and validity of this alternative method.

## **57 - Russell Martin**

Major: Biomedical Engineering

Mentor: Robert Cornell (Anatomy and Cell Biology)

*Using Zebrafish to Test Drugs for Their Efficacy Against Epileptic Seizures*

Epilepsy is a seizure disorder whose primary symptom occurs when the brain spontaneously sends erratic signals throughout the nervous system, which can cause convulsions. The severity of these convulsions can range from inconvenient to life-threatening, yet there are currently very few options for medications that those with epilepsy can take. In our research, we use a drug library from a research group that screened for drugs that could normalize seizure-associated changes in gene expression levels in seizing hypothalamic cells. We test these drugs on zebrafish that have also been given Pentylentetrazol (PTZ) to induce seizures. The motility of each fish is tracked and quantified, with fast-speed movement signifying epileptic events. Our aim is to discover compounds that can abrogate epileptic-like behavior seen in PTZ-treated fish. An inherent issue when testing a drug's viability as an anticonvulsant is whether the drug is preventing convulsions or is slowing fish movement because of its toxicity. To account for this, we also take videos of the zebrafish movement and score each fish for convulsive-like behavior. The overall goal of this work is to learn more about what drugs can be used to prevent seizures, and ultimately might one day be used to treat epilepsy.

## **59 - Amy Meehleder**

Major: Art History, Anthropology

Mentor: Robert Bork (Art History)

*"Gothic" Historiography: Notes on Aesthetics and the Sublime*

This presentation considers the history of the Gothic as a label for artistic genres and cultural periods with a particular focus on the idea of the "sublime" as a term applied both to Gothic cathedral interiors "spaces of artificial infinities" and in reference to "sublime terror", particularly as applied in literary Gothic iterations of the eighteenth and nineteenth centuries. Elements of the Gothic are

drawn on as a way of informing critical discussion of contemporary art.

### **61 - Sam Mraz**

Major: Geoscience

Mentor: Emily Finzel (Earth and Environmental Sciences)

*Provenance of Upper Jurassic to Lower Paleocene strata near the Black Hills Uplift, South Dakota*

Our objective is to use detrital zircon U-Pb geochronology to determine the provenance of Upper Jurassic to Lower Paleocene strata deposited in the around the present day Black Hills.

### **63 - Jeffrey Nassif**

Major: Exercise Science

Mentor: Tori Forbes (Chemistry)

*A Method for Sensing Uranium on Polymeric Nanofibers in Combination with Surface Enhanced Raman Spectroscopy (SERS)*

After the close of WWII there was a dramatic increase of uranium mining in the four corners region of the United States. In these areas, uranium can be found in drinking water sources where it poses a public health threat due to its chemical and radiological toxicity. Current analytical "œgold standards" for detecting environmental aqueous uranium includes ICP-MS and alpha spectroscopy which obtain low detection limits but require laborious and time-consuming pretreatment steps, especially in complex chemical matrices. A new method for quicker and easier detection involves synthesizing polymeric nanofiber mats for uranium preconcentration from solution and detection of uranium on the mats with SERS. Uranium uptake on the nanofiber was verified using liquid scintillation counting (LSC) and a uranium-232 tracer which

was then compared with SERS. Two experiments were conducted to determine nanofiber mat viability. First, uranium uptake in varying aqueous environment containing either competing ions ( $\text{Ca}^{2+}$ ), ligands ( $\text{HCO}_3^-$ ) or a complex chemical matrix (synthetic urine). In addition, uptake was assayed kinetically by varying the amount of time isolated in a constant aqueous environment.

## **65 - Gocale Nicoue**

Major: Environmental Policy and Planning

Mentor: Kelly Baker (Occupational and Environmental Health)

### *Assessing Electronic Data Collection System for Public Health Surveillance Work in Limited Resource Settings*

Advancement in electronic systems allows various tools to be utilized for many purposes anywhere and anytime. The use of electronic systems is one of the tools that can be utilized to collect useful information from socioeconomic to environmental data for public health surveillance. The ubiquitous distribution of mobile devices provides the opportunity for its use to obtain evidence that can assist researchers and stakeholders in implementing necessary strategies, regulations, and policies. A risk assessment was conducted with an institution which regulates water and sanitation throughout The Gambia to determine whether electronic data collection and management platforms are acceptable and cost-efficient alternatives to traditional data collection systems. Employees who monitored water quality and sanitation systems throughout The Gambia were trained to utilize FieldLogs (FL), a data collection application, as part of their standard environmental monitoring protocol. Employee's knowledge, attitudes, and perception of FL's efficiency were assessed before and after its use. Some of the limitations of the project include limited time to complete numerous field visits and the need for internet service for completing certain parts of data collection. Results indicate the



use of FL is more efficient compared to traditional paper-based collection systems used for water quality and sanitation monitoring.

## **67 - Taryn Nishimura**

Major: Biology, Human Physiology

Mentor: Donna Santillan (Obstetrics and Gynecology)

### *Maternal Plasma Leptin and Activity during Pregnancy*

Obesity in pregnancy is associated with adverse outcomes including gestational diabetes, preeclampsia, gestational hypertension, and c-section delivery. It is unclear why some obese pregnancies result in complications, whereas others are healthy. Leptin, an adipocytokine important for the regulation of energy homeostasis and other neuroendocrine functions, is higher in obese individuals. Previous studies have demonstrated an inverse association between maternal activity and plasma leptin. We hypothesized those pregnant women who have greater activity will have lower leptin and experience fewer adverse outcomes, including preeclampsia. We measured plasma leptin throughout gestation by ELISA and activity using triaxial accelerometers. Average steps for each trimester, respectively, were  $5523.77 \pm 3720.33$ ,  $5667.62 \pm 4029.63$  and  $4979.32 \pm 3138.37$ . Average plasma leptin concentrations for each trimester, respectively, were  $17,833.65 \pm 1,816.71$ ,  $15,033.01 \pm 1,854.25$ , and  $24,183.28 \pm 2,781.54$  pg/mL. We examined leptin and activity in preeclampsia as an adverse outcome. Preeclamptics took significantly fewer steps ( $5656.59$  vs.  $3586.72$ ,  $P=0.05$ ) during the 1st trimester and had a significantly higher BMI ( $39 \pm 6$  vs.  $27 \pm 7$ ,  $P=0.02$ ) and rate of chronic hypertension ( $67\%$  vs.  $6\%$ ,  $P=0.001$ ) than controls. In summary, our data demonstrate that plasma leptin tends to decrease as activity increases. In addition, significant differences exist between activity levels and pregnancy outcome.

## **69 - Claire O'Connell**

Major: Biomedical Engineering

Mentor: Michael Schnieders (Biochemistry)

### *Accelerating Computational Protein Design via Advanced Thermodynamic Paths*

Free energy simulations are an emerging approach to support computational protein design efforts, and are currently largely based on fixed partial charge force fields such as Amber99SB, which are known to suffer from accuracy limitations. Dual force field methods have been shown to improve the accuracy of small-scale simulations by correcting thermodynamics to those of a more advanced force field such as AMOEBA, in a fraction of the time that would be taken by directly running those simulations using AMOEBA. Our "dual environment switching" approach attempts to perform these corrections on much larger systems than have been previously studied, extending the reach of dual force field corrections to biologically relevant systems such as protein-ligand binding. We converge a 648-atom system, about 15 times larger than those previously studied, in simulations of less than 10 nanoseconds, and show an approximation that should extend the reach of the method to arbitrarily large systems.

## **73 - Alexandra Pagano**

Major: Marketing

Mentor: Mark Winkler (Marketing)

### *Segmentation of Air Force ROTC Cadets*

The purpose of this study is to identify target personas for the typical Air Force ROTC cadet. In doing so, this survey will reveal similarities that can be used when recruiting in the future and evaluating potential members to the organization. The demo-

graphic and psychographic similarities will help focus recruiting efforts and use only the most effective messaging. The latter part of this study is conducting focus groups which discuss the channel and messaging that initially attracted them to the program and what activities or involvements kept them in the program. This deeper analysis will help recruiters while they are interviewing potential cadets and give them an idea of what to say in the future. This survey was distributed throughout the Air Force ROTC at the University of Iowa and across other Big Ten units that have similar size and area make ups, to give it a more comprehensive picture of the typical Air Force cadet.

## **75 - Madeline Peters**

Major: Human Physiology

Mentor: Maurine Nieman (Biology)

### *Do Parasites Help Drive Life History Variation in Natural Populations?*

Natural selection should favor timing of life events that maximize the number of surviving and successful offspring. These "life history" traits are among the most important predictors of fitness, suggesting that life history trait variation should be low. The existence of extensive life history trait variation in nature defies this prediction and remains unexplained. One potentially important explanation for life history variation is variable susceptibility for attack by parasites, which can impose strong selection favoring rapid growth and early reproduction if individuals are vulnerable to infection during their lifetimes. We are using *Potamopyrgus antipodarum*, a New Zealand snail, to evaluate this hypothesis. *Potamopyrgus antipodarum* is ideally suited to study parasite-life history connections because we have already documented wide variation in life history characteristics and because some, but not

all, populations of *P. antipodarum* experience high levels of infection by a sterilizing parasitic worm, *Microphallus*.

**77 - Mackenzie Phillips**

Major: Marketing

Mentor: Bob Walker (John Pappajohn Entrepreneurial Center)

*Analyzing Impacts of Short-Term Service Learning Abroad in Belize*

The purpose of the study is to analyze the University of Iowa's short term service learning model to consult microenterprises in Southern Belize. It is priority to ensure the students in Belize are delivering valuable intellectual capital to the business partners and communities they work in. Mackenzie Phillips traveled to Punta Gorda and San Pedro Columbia in November of 2016 to meet with business owners that previous University of Iowa groups have worked with as consultants in the past. The goal of the trip was to assess the impact of the students serving as consultants in the communities and lives of the Belizean people, evaluate the sustainability of the businesses, and make recommendations on how to improve the program to assure quality deliverance of intellectual capital.

**79 - Alexandra Redfern**

Major: Speech and Hearing Sciences

Mentor: Elizabeth Walker (Communication Sciences and Disorders)

*Exploring Depth of Vocabulary Knowledge in Children who are Hard of Hearing*

Children with hearing loss typically have smaller vocabularies than age-matched peers with normal hearing, which can make speech perception more difficult, particularly in complex listening envi-

ronments, like background noise. It can also lead to cascading negative effects in reading and academic achievement. Prior research on vocabulary knowledge in children with hearing loss has focused entirely on their breadth of knowledge, (how many words they know). While the breadth of one's receptive vocabulary is important to measure, it does not fully capture the quality of understanding of those words. Furthermore, only examining vocabulary breadth implies that knowing a word is all-or-nothing. However, research with typically-developing children and children with specific language impairments has shown that depth of vocabulary knowledge is as important to reading and academic performance as breadth. The present study sought to investigate whether children with hearing loss demonstrate delays in their depth of vocabulary knowledge, relative to age-matched hearing children, and what factors might predict individual differences in vocabulary depth. The hypothesis was that improved auditory access would lead to a generally deeper understanding of words. The results reflected our hypothesis; there were delays in the hard of hearing group, and auditory access predicted depth of knowledge.

## **81 - Jade Rivera**

Major: Human Physiology

Mentor: Mahmoud Abou Alaiwa (Internal Medicine)

### *Effect of pH on mucus behavior*

Cystic Fibrosis (CF) is an inherited disorder caused by mutations in the cystic fibrosis transmembrane conductance regulator (CFTR) gene. CFTR is an anion channel permeable to  $\text{Cl}^-$  and  $\text{HCO}_3^-$  ions. In CF, loss of CFTR-mediated  $\text{HCO}_3^-$  secretion acidifies the airways and modifies physical properties of mucus. Mucus is a viscoelastic gel secreted by specialized cells in the airways. Normal mucus has optimal biophysical properties that allow for efficient transport. In

CF and other airway disorders, changes in mucus properties result in a mucus that is difficult to clear. We have shown previously that lowering mucus pH will increase its viscosity. Since the viscous and elastic properties of mucus are important for its transportability, we examined the effect of changing pH on mucus viscosity and elasticity. We used gastric pig mucus and observed the Brownian motion of individual fluorescent tracers mixed in the mucus network, calculating their mean squared displacement (MSD). Changes in MSD with time depends on the mucus viscoelastic properties. From the MSD, we can derive the complex viscoelastic modulus and derive both viscosity and elasticity. Determining the effect of changes in pH on the behavior of mucus is essential in understanding mechanisms of mucociliary transport and developing therapeutics.

### **83 - Emma Robertson; Mikaela Mallin**

Major: Dance; Biomedical Science, Dance

Mentor: Rebekah Kowal (Dance)

#### *Dance as an agent of political, economic, and social change*

While many consider dance a form of entertainment, our research explores dance as an agent of change. We examine how introduction of international dance to Postwar America initiated political, economic, and social changes. Meaningful analysis of such changes requires understanding of the initial climate surrounding each facet. Our research to date has achieved this: World War II caused global shifts in political ideologies. Serge Lifar, Director of the Paris Opera during the German Occupation, utilized his "de-terretorialized" identity as a political asset. This was concerning to US citizens, who boycotted his US performances. Secondly, the Eisenhower administration made significant economic changes surrounding foreign trade. Eisenhower enacted many policies that regulated all trade under the theme of "collective security" allow-

ing the United States to extend their status as a world superpower, under the guise of protection from Communism. Finally, the US maintained strict immigration policies throughout this period, including the Immigration Act of 1924, limiting entrance of immigrants to discriminating quotas. These quotas were supported by the public view that “others” were incapable of assimilation to white culture. Further investigation of how dance worked to alter these climates will be incorporated into Rebekah Kowal, PhD’s in-progress book, “Dancing the World Smaller”.

## **85 - Sharon Serper**

Major: Speech and Hearing Science

Mentor: Alison Lemke (Communication Sciences and Disorders)

### *The Case of the Boy with Anomia: Contribution of Visual Processing in Naming Errors*

This case study examines types of picture confrontation naming errors observed in an 8 year old child with a history of right hemisphere brain tumor and resection. The child was thought to either have language functions located his right brain hemisphere (switched dominance), or to have mixed hemispheric dominance for language, and so represents an atypical case. A period of intensive language therapy utilizing approaches aimed at strengthening semantic networks for word-retrieval was completed. The child showed progress on goals related to semantic network strengthening, but formal test scores using picture stimuli indicated marginal improvement. Further analysis of test error types was completed, revealing a continued high percentage of errors that were visually related. Visually related naming errors would be more typically expected after right hemisphere damage, reflecting a visual agnosia. Conclusions about this child’s individual brain organization are reached. Implications for assessment and treatment of word-retrieval and/or vocabulary learning deficits in cases

of switched or mixed language dominance are discussed. Potential influences of visual processing on semantic access are also discussed.

**87 - Cole Toovey**

Major: Psychology

Mentor: Jason Radley (Psychological and Brain Sciences)

*Chronic Stress-Induce Alterations of Dendritic Spines in Female Rats*

The hypothalamo-pituitary-adrenal (HPA) axis is activated in response to stress, and in the acute epoch is central to adaptations in response. However stress in the chronic epoch has been known to show adverse effects on physiology and behavior as a result of overactivation of this system (circuit). Previous research has shown that prolonged stress leads to changes in structure of dendritic spines of pyramidal neurons located in the medial prefrontal cortex (mPFC). This study examines spine morphology and density in the mPFC of female rats that underwent 14 days of chronic variable stress (CVS). CVS involved either two brief or one sustained stressor. Stressors were presented in semirandomized order, and at unpredictable times. The brief stressors included open-field exposure, forced swim, and cold exposure. Sustained stressors included overnight exposure to wet bedding, or isolation. On the 15th day the animals were perfused and the brains harvested. Each brain was then fixed in a paraformaldehyde solution. Post fixation brains were blocked and tissue was sectioned coronally using an oscillating tissue slicer. Those slices were then cell loaded with dye, and 2D renderings were created using confocal laser scanning microscopy. From this reconstruction, a dendritic spine analysis was made.

**89 - Akshaya Warriar**

Major: Microbiology, Human Physiology



Mentor: Eric Devor (Obstetrics and Gynecology)

*p53 mutation status is a primary determinant of placenta-specific protein 1 expression in serous ovarian cancers.*

Placenta Specific Protein 1 (PLAC1) is a protein that is normally expressed only in cells of the placenta. This protein plays an essential role in establishing the placenta during the early stages of pregnancy and maintaining it right up to the onset of labor. Lately, it has been shown that PLAC1 is also expressed in a variety of human cancers and performs the same invasive and proliferative functions. A higher expression of PLAC1 leads to the formation of more aggressive and invasive tumors. PLAC1 has two promoters, termed P1 and P2, that initiate gene transcription. In placental tissues, the P2 promoter drives transcription of PLAC1, whereas in cancer, P1 drives expression. A study using cancer cell lines showed that the tumor suppressor p53 blocks the P1 promoter which inhibits PLAC1 expression. p53 is highly mutated in ovarian cancers and we determined in a panel of 38 patient tumors that PLAC1 expression is significantly influenced by p53 mutation status. Specifically, mutant p53 is unable to block PLAC1 transcription. Further, we observed that higher PLAC1 expression leads to a worse prognosis on ovarian cancer patients.

## **91 - Raelyn Webster**

Major: Marketing & Finance

Mentor: William Hedgcock (Marketing)

*Say Cheese: An Analysis of Olympic Medalists' Smiles*

Past research has shown that counterfactual thinking heavily influences Olympic medalists' displays of emotion, that is, a comparison between medalists' actual finish and what could have been. Follow up research suggested that these results were not influ-

enced by thinking about what could have been, but rather the counterfactual expectations they had set for themselves. Our research aimed to clarify which, if either, of these factors actually influenced medalists' emotions. We collected photographs of athletes on the medal stand from the Olympic Multimedia Library and Getty Images, and used Facet facial encoding software to analyze the athletes' emotions. We found that both factors have importance when controlled for, and other variables, like race and gender, also influence medalists' displays of emotion.

### **93 - Carter Worth**

Major: Psychology/Pre-med

Mentor: Peggy Nopoulos (Psychiatry)

#### *Determining the Effect of Blood Transfusions on Premature Infants*

Premature infants often deal with a condition known as anemia of prematurity after they are born. This condition means that they have a decrease in the concentration of hemoglobin, the protein in our red blood cells (RBC's) responsible for transporting oxygen. The common solution to this decrease in hemoglobin is to perform a blood transfusion. However, blood transfusions, while increasing premature infant survival rate, have been shown to have some potential negative effects on their neurological development. To determine the best way to transfuse premature infants, and therefore decrease potential negative neurodevelopmental outcomes, infants were split into two transfusion conditions. These infants were then cognitively tested, and the results of those tests were used for a comparison to transfusion condition for this study.

### **95 - Elliana Yap**

Major: Human Physiology

Mentor: Michael Schultz (Radiology)

## *Enhance MC1R Receptor-targeted therapy in Human Metastatic Melanoma by FDA-approved drugs*

Melanocortin subtype 1 receptor (MC1R) is a G-Coupled Receptor found in most human melanoma. MC1R is responsible for regulation of melanocyte proliferation. It is highly expressed in metastatic melanoma cells compared with normal cells. Many bi-functional ligands have been developed based on the MC1R natural ligand. Alpha-melanocyte-stimulating hormone ( $\pm$ -MSH).  $\pm$ -MSH specifically binds to melanoma tumor surface MC1R receptors and deliver radionuclides for diagnostic radiological imaging or therapy. Studies on MC1R receptors have been previously conducted using murine melanoma cells, or mice melanoma cells (cell line B16). This is because B16 is a stable cell line known for having high MC1R expression. While Murine B16 cells express high levels of MC1R receptors, human melanoma cell lines have varied levels of MC1R expression. This creates an obstacle for further application of MC1R-targeted reagent and withholds them from transient to clinical use. Due to this fact, no study has been done to show efficacy in human melanoma cells using MC1R-targeted therapy. Therefore, we propose to explore the potential of using FDA-approved drugs to specifically upregulate the MC1R in human melanoma cells and enhance the efficacy of MC1R-targeted diagnostic imaging and therapy.

### **97 - Tsun Ming Yuen**

Major: Chemical Engineering

Mentor: Nobutoshi (Charles) Harata (Molecular Physiology)

*Destinations of endocytosed particles in cultured brain neurons and astrocytes*

Biological cells communicate with their environment through multiple types of interactions. One is endocytosis active transport of

molecules that are present in the extracellular space or on the plasma membrane into the cells. Endocytosis contributes to important cellular processes such as the uptake of cholesterol and iron, and abnormalities lead to diseases such as hyper-lipidemia and Alzheimer's disease. Endocytosed molecules are transported to intracellular organelles, including endosomes and multi-vesicular bodies. However, it remains unclear whether the organelles are targeted with the same efficiency. This is a fundamental phenomenon in brain cells (neurons and their supporting cells, astrocytes), and the details need to be clarified. Here we addressed three related questions: Q1) To what extent do intracellular organelles differ in terms of the efficiency of targeting? Q2) Do the targeting efficiencies differ by neuronal compartment (dendrite, soma, axon)? Q3) Do the targeting efficiencies differ between neurons and astrocytes? We visualized endocytosis of a single type of molecule in primary cultures of rat brain cells. We found considerable differences among organelles (Q1), compartments (Q2) and cell types (Q3). We expect our results to be key to understanding physiological differences in the endocytosis of various types of molecules in more complex systems.

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## **Second Hour Presenters**

**5:30-6:30PM**

**(even numbers only—boards will be turned around)**

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### **2 - Aparna Ajjarapu**

Major: Biochemistry

Mentor: Mark Santillan (Obstetrics and Gynecology)

*Assessing the Potential Role of Vasopressin in Intrauterine Growth Restriction (IUGR)*

Intrauterine Growth Restriction (IUGR) is defined as fetal weight below the 10<sup>th</sup> percentile for gestational age and can lead to long-term pulmonary, cardiovascular and neurological complications for the baby. Key to the etiology of IUGR may be poor placental development. Arginine Vasopressin has shown to be predictive of other maternal diseases with poor placentation and copeptin can serve as a stable surrogate marker for Arginine Vasopressin. The current study aims to determine whether copeptin is significantly associated with IUGR. 21 participants diagnosed with IUGR were identified in the Maternal Fetal Tissue Bank in this nested case control study. 21 controls for the IUGR cases were age-matched to study participants by maternal and gestational age of maternal blood sample. Maternal plasma copeptin concentrations during each trimester were measured using a commercial enzyme-linked immunosorbent assay (ELISA) specific for human copeptin. Additionally, samples were measured for creatinine and total protein to assess maternal kidney function. Results were analyzed using Student's t-test and Chi square analysis as appropriate. No significant differences were observed in the maternal plasma concentration of copeptin and creatinine of IUGR pregnancies compared to the control pregnancies. This preliminary study did not identify an association between copeptin and IUGR.

#### **4 - Terryl Bandy**

Major: Geoscience

Mentor: William Barnhart (Earth and Environmental Sciences)

*High Resolution Topographic mapping of active faults in Southern California with Satellite optical imagery*

Digital elevation models (DEMs) play a range of important roles in the study of active and Quaternary faults. These topographic models provide a core input for mapping active structures, querying and generating digitized maps, characterizing local and regional tectonic geomorphology, and quantifying co-seismic displacements. Traditionally, local and regional DEMs are derived from three sources: digitization of topographic maps, space-borne

radar systems (i.e. the Shuttle Radar Topography Mission, SRTM), and airborne LiDAR surveys (i.e. the B4 LiDAR project). Topography models derived from these sources suffer from several shortcomings that limit their utility in the study of active landscapes: spatial resolution (~30 m ground resolution for radar-derived DEMs), spatial coverage (highly limited with LiDAR), and repeatability following an earthquake (space-borne surveys are often not repeated while LiDAR acquisitions may be cost prohibitive).

## **6 - Christina Blomquist**

Major: Speech and Hearing Science, Psychology

Mentor: Bob McMurray (Psychological and Brain Sciences, Communication Sciences and Disorders)

### *Lexical Competition During Spoken Word Recognition by School-Aged Children*

Spoken word recognition involves accessing the target word in the mental lexicon. As acoustic information in the speech signal unfolds over time, similar-sounding lexical candidates compete amongst each other until the listener perceives disambiguating information. At the point of disambiguation, the activated target word then inhibits similar-sounding competitors. This lateral inhibition between words in the lexicon has been demonstrated in adults during spoken word recognition. Through the use of an eye-tracking paradigm, we observed that this lexical competition process is also exhibited by school-aged children during spoken word recognition. 7- to 8-year-old children and 12- to 13-year old children made less fixations to the target picture when the onset of the target word (e.g., cap) came from a competitor word (e.g., ca(t)p) than from a nonword (e.g., ca(ck)t). This suggests that activation of the competitor led to inhibition of the target word, resulting in less activation of the target word. We also observed differences in target activation across the age groups, sug-

gesting that lexical competition undergoes developmental change even in the later years of childhood.

## **8 - Christine Buchanan**

Major: Spanish and Human Physiology

Mentor: Mariko Sato (Hematology/Oncology)

### *Analyses of Quality of Life Survey of patients and parents with Pediatric Brain Tumor*

*Introduction:* The outcome of patients with pediatric brain tumor (PBT) has improved last two decades due to advances of imaging, surgery technique, and intensified treatment. However, patients experience various complications. Long-term consequences can affect patient well-beings and caregivers negatively. Studies about Quality of life (QOL) of these children has been reported and showed a poorer QOL in patients with PBC. *Objective:* To understand QOL of patients with PBT at University of Iowa Stead Children's Hospital in order to improve care for patients and caregivers. *Method:* We conducted the QOL survey using PedsCancer Module Version 3.0 for patients and family members with PBT. Patients and parents were asked independently at 3-6 months and 1 year post therapy completion. *Results:* 53 patient and 59 parent QOL surveys were analyzed. 16 patients answered the survey at 2 different time points, with a total of 108 surveys analyzed. Both patients and parents scored the highest in the questions regarding cognitive problems followed by procedure anxiety. *Conclusion:* Higher scores in cognitive problem questions were expected and it will be interesting to combine QOL scores with future neurocognitive assessment. Our QOL survey revealed the important and frequent QOL matters among off therapy patients with PBC that were not usually discussed in the clinic visit. PBT clinic could provide future resources for patient and parent concerns.

## **10 - Aaron Buelow**

Major: Biomedical Engineering

Mentor: James Ankrum (Biomedical Engineering)

*Investigation into the factors for the modification of PLGA nanoparticles*

The use of nanoparticles as a vector for drug delivery is becoming one of the most versatile and potentially revolutionary mechanisms for targeted prolonged drug delivery to biological tissues. Unfortunately, the fabrication of these nanoparticles requires significant effort to optimize their effectiveness in vivo and in vitro. Variables such as size, surface chemistry, formulations, charge and encapsulation rates must be carefully controlled to ensure reproducibility and utility. The focus of my research has been working on characterizing the factors that affect size and optimizing our procedure to produce particles that consistently meet our exact specifications. I have developed a protocol for particle optimization that was informed by differences discovered during the modification of organic evaporation time, liquid suspension formulation, stir speeds and the timing of these variables. In conjunction with the chemical factors we also investigated varying the effects of physical agitation via probe sonication and tissue homogenization. Through modifying and controlling for these and other parameters, I have been able to achieve reproducibility in both particle size and polydispersity that we desire. This produces a strong platform for our lab's interest in delivering a controlled drug dose to specific tissues.

## **12 - Mallory Carr**

Major: Speech and Hearing Science

Mentor: Patricia Zebrowski (Communication Sciences and Disorders)



*Child and parent perspective of effective and ineffective therapeutic alliance during treatment for stuttering*

Children who stutter can suffer from increased anxiety, worry, and poor self-image. These negative social and emotional consequences require more than fluency therapy alone. Effective therapy includes adequate fluency therapy, as well as social and behavioral therapy. In typical social and behavioral therapy, a theory called therapeutic alliance has been studied. Therapeutic alliance can be described as a collaborative, healthy, and trusting relationship between the client and the clinician. Therapeutic alliance can be established based upon agreement in goals of therapy, shared understanding of the therapy process, as well as the characteristics of both the client and the clinician. The current study seeks to discern what CWS and parents view as positive and therapeutic alliance, as well as understand if their perspectives are aligned. Interviews were conducted with the CWS and their parents. Thematic analysis was used to analyze the data.

**14 - Gina Chieffo**

Major: Psychology, Engaged Social Innovation

Mentor: Charles Jennissen (Emergency Medicine)

*Trauma Informed Care: Screening and Referral Process in the University of Iowa Emergency Department*

**16 - Yiwen Chu**

Major: 3D Design

Mentor: Monica Correia (Art and Art History)

*Design and Office Art: The Egg Family*

The Egg Family is composed of a series of plywood table ornaments that are shaped after egg forms and aim to be fun and connect with people. The inspiration comes from various person-

alities around us and the desire to create an object that visually links with groups of people from the same family or environment. The form of an egg seemed to create the needed visual narrative to symbolize life. Each egg is designed and given a distinct expression to portray 9 different personalities, thus people can relate the eggs to themselves or people around them, enjoying the resemblance with happiness. The creative design process was comprised of sketching, development and testing phases. The sketching phase started by determining the personalities that would be portrayed and was followed by sketching with several revisions. Nine personalities were picked: formal, committed, charming, positive, happy, sarcastic, hungry, crazy and bossy. After that, drawings with Illustrator software were transferred to Auto CAD software to prepare files for CNC (Computer Numerical Control) cutting. Full-size tests were done with ¼" birch plywood board and hand sanded. Acrylic paint was applied to reinforce the characteristics and finished with a sealer. The project is currently in final phase.

## **18 - Alexis Brannan**

Major: Human Physiology, Psychology

Mentor: Catherine Chenard (Internal Medicine)

### *How do Diets of Individuals with Multiple Sclerosis Measure Up?*

This study analyzed how the usual diets of six participants with Relapsing Remitting Multiple Sclerosis compare to dietary guidelines and average Healthy Eating Index (HEI) scores of America. Participants selected were currently enrolled in a study comparing the Swank and Wahls Diets. After training, each individual completed a seven day weighed food record detailing their entire usual day's food and drink intake. Records were entered into the NDSR nutrient database. Nutrient intake and food group servings were calculated for each. HEI scores for the six participant's diets

were calculated along with average daily intakes of 17 different nutrients and macronutrients fat, carbohydrates, and protein. In completion, the overall HEI scores averaged 63.4 (52.2 to 79.7) in comparison to the US average of 57.4. Five of six participants had mean adequacy ratios (% recommended daily values) 92%, the outlier averaging 77%. The macronutrients were within the Acceptable Macronutrient Distribution Range 50% of the time. In total, the MS participants averaged a moderately fit diet when compared to the average American diet and US dietary guidelines, but did show substantial room for improvement. This baseline nutritional adequacy can later be compared to new values once starting either the Swank or Wahls diet.

## **20 - Liam Crawford**

Major: Computer Science, Philosophy

Mentor: Juan Pablo Hourcade (Computer Science)

### *The 3Cs and StoryCarnival: Constructively Integrating Technology into Early Childhood 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 these children's 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 pursuit of this, we have proposed a design approach which focuses on what we call the 3Cs: Creating, Connecting, and Communicating. StoryCarnival, the set of applications we are developing based on this evidence-based approach, is aimed at supporting creative activities that connect preschool age children with their social and physical environment while emphasizing communication. Findings from our preliminary "play sessions"□

have guided our design as we continue to iteratively develop StoryCarnival to support specifically targeted sets of behavior, such as the development of self-regulation.

## **22 - Callie Ginapp**

Major: Neurobiology

Mentor: Gordon Buchanan (Neurology)

### *Dorsal Raphe 5HT2A receptors in acidosis induced arousal from sleep*

Arousal from sleep in response to CO<sub>2</sub> is a protective mechanism relevant to diseases such as obstructive sleep apnea. Previous work from our lab indicates that chemosensitive serotonin (5-HT) neurons in the midbrain dorsal raphe (DR) are necessary for arousal to inspired CO<sub>2</sub> and cause arousal when directly stimulated with acidosis. CO<sub>2</sub>-induced arousal occurs through a 5-HT<sub>2A</sub> receptor mechanism. The purpose of this study was to begin to locate the site of 5-HT<sub>2A</sub> receptor activation. Our hypothesis is that such 5-HT<sub>2A</sub> receptor activation occurs at a downstream target site. Dialysis of the 5-HT<sub>2A</sub> agonist TCB-2 to the DR was not sufficient to induce arousal from sleep in wildtype or 5-HT neuron deficient mice, and dialysis of 5-HT<sub>2A</sub> antagonist MDL 11,939 into the DR concomitant with acidosis was not sufficient to prevent acidosis induced arousal in wild type mice. These data suggest that the site of 5-HT<sub>2A</sub> activation is not within the DR, consistent with the original hypothesis. Because our preliminary data shows increased c-fos expression in the lateral hypothalamus (LH) with DR acidosis and colocalization of 5-HT<sub>2A</sub> receptors with orexin neurons in the LH, we further hypothesize that the LH is a site of DR 5-HT projections in acidosis induced arousal.

## **24 - Monica Derby**

Major: Nursing

Mentor: Stephanie Gilbertson-White (Nursing)

*Impact of friends' and family members' experiences with cancer on patients' expectations and self-management in advanced cancer*

*Purpose and Background/Significance:* The purpose of this study is to obtain a better understanding of how the expectations of patients living with advanced cancer are influenced by their friends' and family's prior experiences with cancer. *Methods:* Patients with advanced cancer were recruited from three cancer centers in Iowa. Inclusion criteria: 18 years, non-curable diagnosis, and receiving any anti-cancer treatment. Semi-structured interviews were conducted. Interviews were recorded and transcribed verbatim. Two independent readers then coded the transcripts. Descriptive qualitative analyses were conducted to identify themes related to patients' prior experience with cancer via friends and family. Descriptive statistics of the sample (i.e., age, sex, cancer type, clinic) were generated. *Results:* N=16 adults (62.5% male, mean age = 69 years, range 57-81 years) with advanced cancer were interviewed. Cancer types included lung (5), breast (4), colorectal (3), GI (2), and prostate (2). Themes identified include patient understanding of cancer treatments, and the realization that cancer affects everyone differently, so no expectations were formed. *Conclusions:* Understanding how patients' previous experiences with cancer are influencing patients' own expectations can identify patients' high-priority concerns, and lead to optimization of strategy selection, goal setting, decision making, and engaging in behavior change surrounding patients' own disease management.

**26 - Caroline Emory**

Major: Speech and Hearing Science, Psychology

Mentor: Inyong Choi (Communication Sciences and Disorders)

*Effect of neurofeedback training for auditory selective attention on speech in noise performance.*

Selective attention modulates the neural representation of the auditory scene, enhancing the representation of a target sound and suppressing others. Previous studies showed that measured attentional modulation of electroencephalographic (EEG) signals are sufficiently robust that they could be used to control brain-computer interfaces (BCIs). We envision that attention-operated BCI could be used for post-implant training of cochlear implant (CI) recipients who have communication difficulty in noisy environments. We will present two concurrent and repeated streams of the monosyllabic words "up" and "down" along with a distracter noise; listeners will then be asked to selectively attend to one of the monosyllabic streams. We previously found that such cortical responses could be fit as a weighted sum of event-related potentials (ERPs), each of which was modeled by the ERP evoked by a single word. We will use this template-matching classification scheme to classify single-trial EEG signals. Analysis of pilot data, showed that with our normal-hearing subjects, we could determine which stream the subject was attending to significantly better than by chance, even without subject-specific learning of the classifier parameters. Moreover, classification accuracy of pilot subjects increased throughout the experiment, which indicates that users trained themselves to operate the EEG decoder more accurately.

## **28 - Katherine Giles**

Major: Chemical Engineering

Mentor: Julie Jessop (Chemical and Biochemical Engineering)

*Shining a Light on the Irradiance and Wavelength Properties of Light Emitting Diodes in Dental Applications*

Light curing units (LCU) are used in dental applications in order to photopolymerize resin based composites applied during dental restorations. Characterizing the light emitting diodes (LED) used in the LCU will provide crucial information on the uniformity and power provided to the restoration during curing. In the dental field, in-depth characterization of LCUs is not typically done but characterizing the LCU and determining how the output affects the cured resin is necessary to understand the curing process. This fundamental study investigates performing two-dimensional spatial mapping on the irradiance and wavelength emitted by a given LCU. This research develops and validates a method for characterizing LCUs that can be applied to any LCU. This method and the data obtained from the study will be used in future research to spatially map the cure of a dental resin system illuminated by the LCU and determine the best practices for curing these systems.

### **30 - Jesse Gray**

Major: Human Physiology

Mentor: Ryan Lalumiere (Psychological and Brain Sciences)

*Activation of the infralimbic cortex using a SSFO attenuated cocaine seeking during reinstatement only following extinction training*

Previous research has revealed the infralimbic cortex (IL), a sub region of the medial prefrontal cortex, as an important node in mediating extinction learning and the suppression of cocaine seeking. Thus, our experiment focused on stimulating the IL using a Stable Step-function Opsin (SSFO, a modified channelrhodopsin) to provide a general enhancement of this region during reinstatement. Rats received surgical implantation of jugular catheters and IL-aimed fiber optics. Following this, animals underwent cocaine self-administration training where lever presses resulted in a cocaine infusion as well as a 5-second light and tone cue. Following

withdrawal, rats underwent two distinct reinstatement tests, cue-prime and cocaine-prime tests; the IL was optogenetically stimulated prior to both tests, although there was no observed behavioral effect. Next, rats underwent extinction training, during which lever pressing no longer delivered cocaine infusions, and then experienced another round of cue and cocaine-prime tests. IL activation reduced cocaine seeking during both of these tests. These data suggest that it is possible to reduce cocaine seeking by stimulating the IL, and that the ability of the IL to reduce cocaine seeking depends, at least in part, on having undergone extinction training.

### **34 - Lauren Schutz**

Majors: Biomedical Engineering, Dance

Mentor: Salam Rahmatalla (Civil and Environmental Engineering)

*Identifying and Understanding Risk Factors for Dance Injury: A Biomechanical Analysis and Comparison of the Foundation Demi-Plie to Functional Movement*

Dance as an occupation is based on the physical body, and the ability to maintain a performance career is dependent on the ability to maintain physical health; in other words, to remain injury free. Despite career dependence on health, this population is unlikely to seek medical care. This could be based on a fear of losing training time, potential job loss, or a poor health insurance policy, especially considering most professional dancers work freelance moving from job to job with periods of unemployment. In this study participants, college students pursuing a BA, BFA, or MFA in Dance at the University of Iowa, performed common training and functional dance movements. The participants wore an XSens suit, which integrates data from accelerometers, 3D gyroscopes, and magnetometers to generate accurate positioning data of the body in space. The skeletal alignment and weight distri-



bution of participants during the tasks was analyzed using Visual3D software. Discrepancies in the data between the tasks were identified. Analyzing such discrepancies can help identify risk factors for potential injury or suggest further or modified training exercises for dancers.

### **36 - See Tsun Joey Ho**

Major: English and Creative Writing

Mentor: Donna Brooks (International Writing Program)

*Roots: The Origins of Hong Kong's Being*

My creative project invites twelve writers and artists from Hong Kong to each create a piece of work in whatever art form they wish that explores and interprets the notion of 'roots' in relation to their home city. Hong Kong is a place of mixed identities, still hovering in the post-colonial space trying to find its place; one foot standing in China, the other struggling for democracy and freedom. Hence, I wish to explore the idea of "rootlessness" that exists within the city. The writers and artists participating in the project encompasses several generations; their ages range from 21-67. I am interested in seeing how the idea and interpretation of "roots" change through generations. I envision the final product to be an anthology of writing and art pieces created by the current, living and breathing citizens of Hong Kong, discoveries of their roots, and the roots of their city.

### **38 - Emma Husar**

Major: English, Creative Writing

Mentor: Barbara Eckstein (English)

*Research and Writing for the Digital Humanities: The Peoples' Weather Map*

The Peoples' Weather Map is an interactive, digital map of Iowa initiated by my professor in the English Department, Prof. Barbara Eckstein. This interdisciplinary project unites work in the humanities, geography, environmental studies, GIS and more recently, computer science. My work include researching and writing about severe weather events in different Iowa counties, both historical and contemporary, in order to draw a large, diverse audience into a conversation about climate change. This work in the digital humanities has been important for our group to examine the most effective way to tell these stories and show climate and geographic data through the medium of the web. This new medium affects how I construct the stories I write. The principal stories I have been compiling for Tama County, IA have been envisioned and formatted in a way to be rhetorically impactful on the viewer-juxtaposing stories on a timeline to show how changes to the environment by westerners impacted the culture of the Meskwaki as well as their physical landscape, changes that happened over time. In doing so, we seek to keep their story alive in the larger Iowa narrative and envision a non-western relationship to severe weather and climate change.

#### **40 - Dylan Jones**

Major: Finance and Management

Mentor: Amrita Nain (Finance)

#### *Industry Life Cycle and Acquisition Performance*

Industry Life Cycle has been written about extensively in other business disciplines, but lacks extensive discussion within finance. Through my research, I explore the success of mergers and acquisition transactions in relation to the industry life cycle of the target and acquirer.

#### **42 - Clarice Kelling**

Major: Theatre Arts, Elementary Education

Mentor: Janalyn Moss (Library Administration and Studies)

*The Role of Research and Librarians in Preparing Primary and Secondary Grade Students for National History Day*

The University of Iowa Libraries offer programs and services to many persons including faculty, students, and members of the community not affiliated with the University. One nontraditional program offered to a select group of community members is National History Day. This program allows students preparing for National History Day to learn how to find and collect primary and secondary resources for their presentations. To aid in this program, my role in this research has been to create knowledge bases, aid in research days, and learn how our program aids in the overall competition by judging at the local regionals. By studying our National History Day program the libraries can fine tune their assistance as well as create new opportunities to mentor students of all ages.

**44 - Heather Kemp**

Major: Computer Science

Mentor: Sheila Barron (Statistics)

*Developing an Interactive Statistics Learning Environment Using Computer Simulations*

An understanding of statistics is of ever-growing importance in our data-driven society. The number of statistics courses offered on campus as well as the number students taking statistics courses continue to grow. At the same time, statistics continues to be a course many students dread, and a common comment from former students is that they have forgotten most, or all, of what they learned. The statistics education community is increasingly recognizing the need for changes in how we teach the subject, especially in foundational classes for undergraduates. One of these changes to statistics education is the use of gaming principles and interactive simulation environments to help students engage with the content and explore complex statistical concepts. For this pro-

ject, we have focused our efforts on developing online apps that allow students to explore statistical concepts like the Central Limit Theorem, sampling bias, and correlation. Through an iterative process involving pilot testing and revision, we continue to work to optimize the usability of the apps as well as their educational potential. In this poster session, I will focus on the results of the latest pilot study as well as provide opportunities for people to get hands-on experience with the apps.

#### **46 - Rachel Kessler; Sarah Small**

Major: Chemical Engineering; Human Physiology

Mentor: Matthew Potthoff (Pharmacology)

#### *Mechanisms Regulating FGF21 Sensitivity in Adipose Tissue During Obesity*

For this project, we have focused our efforts on developing online apps that allow students to explore statistical concepts like the Central Limit Theorem, sampling bias, and correlation. Through an iterative process involving pilot testing and revision, we continue to work to optimize the usability of the apps as well as their educational potential.

#### **48 - Michael Klemme**

Major: Biology

Mentor: Daniel Lusche (Biology)

#### *High-Throughput Assay Analysis of Monoclonal Antibodies Provides Possible Alternative Cancer Drug Therapy*

Previously, we developed a method for recapitulating tumor formation in vitro using 3D-Matrigel and 3D reconstruction software for analyses of cancer cell behavior. This approach led to our discovery of coalescence, a phenomenon that has never before been described and one that may contribute to tumor formation in can-

cer patients [1, 2]. During coalescence, cells form aggregates which are brought together by building bridges and cables between them that then contract, pulling the aggregates together. Therefore, the tumor grows through the process of coalescence. We then developed a method to record coalescence in 96 well plates using Matrigel as a 3D substrate. We applied this assay to test monoclonal antibodies (mAbs) for inhibition of coalescence. The Developmental Studies Hybridoma Bank (DSHB), a national resource housed at the University of Iowa, director Dr. David Soll, has a collection of over 4400 monoclonal antibodies that we are currently testing in our assay. We discovered multiple antibodies that have the potential to inhibit breast cancer and melanoma cells from coalescing in 3-D models [1-5]. Here we describe the assay design and give examples of positive outcomes. This approach provides a major opportunity for providing new cancer drugs.

## **50 - Stephen Kruse**

Major: Biomedical Engineering

Mentor: Gordon Buchanan (Neurology)

### *Norepinephrine and Serotonin in the Reduction of Seizure-Induced Respiratory Arrest*

Sudden unexpected death in epilepsy (SUDEP) is the leading cause of death in patients with refractory epilepsy. Seizure-induced respiratory arrest (S-IRA) is thought to contribute to SUDEP. Serotonin has been implicated in S-IRA and SUDEP due to its role in seizure modulation and breathing regulation. However, other neurotransmitters, such as norepinephrine, are also affected by seizures and modulate breathing. We hypothesized that norepinephrine also plays a role in S-IRA and SUDEP. Wild-type mice with and without noradrenergic neuron depletion with DSP-4

neurotoxin, and serotonin neuron deficient *Lmx1bf/f/p* mice were subjected to maximal electroshock seizures with ECG, and breathing measurement following treatment with pharmacological agents that manipulated the serotonin and norepinephrine systems. Increased available norepinephrine levels through reuptake inhibition prevented S-IRA and death. This effect was abolished by pretreatment with a  $\hat{I}\pm 1$  receptor antagonist. Blockade of the  $\hat{I}\pm 1$  receptor similarly prevented the protective effect of the selective serotonin reuptake inhibitor (SSRI), fluoxetine, in wild-type and *Lmx1bf/f/p* mice. A more selective SSRI, citalopram, did not prevent S-IRA and death in DSP-4 treated mice. These data suggest that an  $\hat{I}\pm 1$  mediated mechanism is activated downstream of serotonin neuron activation to prevent S-IRA. These findings may contribute to development of prevention strategies for SUDEP.

## **52 - Olivia Lewis**

Major: Human Physiology

Mentor: Hanna Stevens (Psychiatry)

*Effect of prenatal stress on mouse embryonic neural and placental redox biology*

Prenatal stress (PS), a risk factor for neuropsychiatric disorders, may influence cellular function through oxidative stress, dysregulation of the production of free radicals. We examined the effect of one day of PS on neural and placental gene expression of the antioxidant genes GPx, *Sesn1*, *Sesn3*, and Trx in embryonic mice to see how changes in cellular function related to PS may arise initially. Effects of PS must be passed from mother to embryo through the placenta. PS expression of Trx increased in male and female ventral telencephalon and placenta, suggesting that PS increases the antioxidant ability of the thioredoxin reductase enzyme. Sex modulated the stress response in the other three genes. Female neural expression of GPx, *Sesn1*, and *Sesn3* was unchanged. In female placenta, *Sesn1* and *Sesn3* decreased with PS,

but GPx was unchanged. Male neural Sesn3 expression increased with PS but remained unchanged in male placenta. Neural expression of Sesn1 and GPx increased in males, whereas placental expression decreased with PS. Male placental Trx and Sesn3 were positively correlated, and GPx and Sesn1 were negatively correlated. PS caused sex-dependent changes in several important antioxidant genes. Changes in redox biology may explain increases in risk for neuropsychiatric disorders after PS.

#### **54- Sirui Li, Yijie Xu**

Major: Finance; Mathematics

Mentor: Isabel Darcy (Mathematics)

#### *Tax rates forecast by TDA mappers*

Our project focuses on forecasting the trend of tax rates for companies based on tax rates data of S&P 100 from 2012-2015 so that companies can get better predict tax expense and generate more cash (liquid) to invest or operate companies. We use the TDA algorithm to visualize the mappers about dataset and found that TDA mapper cannot output a specific numerical prediction; instead, it can help to predict short-term trends with a range of tax variation. In addition, we separate some special type of companies that have further tax rates by finding outlier from TDA mapper outputs, which can be as a reference for other similar type companies to calculate their tax expense.

#### **56 - Morgan Lohr**

Major: Biology, Health and Human Physiology

Mentor: Toshi Kitamoto (Anesthesia)

*The Role of Nrf2 Signaling in Seizure-like Phenotypes of the Drosophila Voltage-gated Sodium Channel Mutant, Shudderer (Shu)*

Genetic mutations in ion channels, such as the voltage-gated sodium (Nav) channel, are known to cause certain epilepsy syndromes. However, ~30% of epilepsy patients fail to improve with anti-epileptic drugs. To help discover novel therapeutic targets for epilepsy, our lab seeks to identify genetic and environmental modifiers of seizure-like behavior using the *Drosophila* Nav channel mutant, Shudderer (Shu), a fly model of epilepsy. We recently found that a loss-of-function mutation in the Glutathione S-transferase S1 gene (*GstS1*) significantly reduces the severity of the Shu phenotypes. Since removal of *GstS1* increases levels of 4-hydroxynonenal (4-HNE), a byproduct of oxidative stress, which may activate the Nrf2-Antioxidant Response Element (ARE) signaling pathway, we hypothesized that activation of Nrf2 signaling would lead to the improvement of Shu's seizure-like phenotypes. To test this hypothesis, we introduced a hypomorphic allele of *Keap1*, a negative regulator of Nrf2, into the Shu background. Our preliminary result indicated that reducing *Keap1* levels significantly suppressed Shu phenotypes. Currently, we are using the Gal4/UAS system to understand how the Nrf2-ARE signaling pathway suppresses Shu phenotypes. These future experiments are expected to provide us with a better understanding of the role of the antioxidant system in epilepsy syndromes.

## **58 - Mikaela Mallin**

Major: Biomedical Science, Dance

Mentor: Robert Cornell (Anatomy and Cell Biology)

### *Investigating the roles of *Tfap2* and *Kctd15a* in melanocyte differentiation*

The development of melanocytes from neural crest (NC) is regulated by gene regulatory networks (GRNs). Disturbances in these GRNs are responsible for pigmentation disorders and melanoma. Previous work has shown that the transcription factor *Tfap2* paralogs act in the GRNs gov-



erning NC induction and melanocyte differentiation. Inhibition of Tfap2 activity by Kctd15a has been well established in NC induction, but the role of this interaction is less clear in melanocytes, where both proteins are also expressed. We cloned kctd15a with a C-terminal  $\hat{I}\pm V5$  tag into the melanocyte-specific expression vector miniCoopR. Melanocytes expressing kctd15a appeared smaller and more dendritic than melanocytes in controls. Immunostaining for  $\hat{I}\pm V5$  verified the presence of Kctd15a in these cells, suggesting Tfap2 is essential for proper differentiation of melanocytes. Next, we knocked out both kctd15a and tfap2b in zebrafish using CRISPR/Cas9 and detected mutations in F0 founders. Finally, we identified a potential Tfap2-dependent enhancer of kctd15a. We cloned the sequence into a GFP-reporter vector and injected it into zebrafish embryos. GFP expression revealed activity of this enhancer in melanocytes at 36hpf. Altogether, these findings suggest that Tfap2 is necessary for melanocyte differentiation and that its activity is controlled in part by Kctd15a in a negative feedback loop.

## **60 - Ashley Morris, Solomon Wilharm, Oliver Stroh**

Major: Industrial Engineering

Mentor: Priyadarshini Pennathur (Industrial Engineering)

*Hospital Scheduling: Improving Communication between Physicians and Nurses to Reduce Patient Delirium*

In the cardiac surgical unit at the University of Iowa Hospitals and Clinics (UIHC), there is a communication breakdown between physicians and nurses that is causing delirium. Delirium is a complication that can lead to extended hospital stays and delays in patient healing. Under further investigation and preliminary root-cause analysis, we pose to investigate methods to reduce sleep-wake distributions that are caused by lack of communication between healthcare professionals. It is well-known in the healthcare industry that there are challenges with communication between varying professions in the field. However, we hope to find a unique solution to help bridge this gap in the cardiac surgical unit at UIHC. By conducting a survey, shadowing nurse rotations, and following up

with interviews, we plan to discover inconsistencies that we believe can be resolved by introducing a new online “chalkboard” tool for healthcare professionals to interact with. Data collection is ongoing.

**64 - Austin Moss**

Major: Accounting and Finance

Mentor: Samuel Melessa (Accounting)

*Does management’s tone reveal information about their confidence in earnings forecasts?*

This paper investigates if the tone of earnings conference calls reveal information regarding management’s confidence in their earnings forecasts. Managers have many incentives to boost their company’s stock prices; therefore, to the extent that they do not open themselves up to legal liabilities, they avoid negative language when addressing investors. Due to the incentives that shape manager’s decisions and tone, I predict that management’s earnings forecasts will be more accurate when accompanied by higher degrees of negative tone. Further, this paper will investigate how analysts and investors react to conference call tone and if they correctly interpret the tone of earnings conference calls.

**66 - Madison Owen**

Major: Psychology

Mentor: Ryan Lalumiere (Psychological and Brain Sciences)

*Blocking D1 receptors in the agranular insular cortex reduces cued and cocaine-prime reinstatement in rats*

Given the pervasive nature of relapse for drug addicts, recent research has focused on uncovering the neurobiology underlying relapse behaviors with the hopes of developing more successful

treatments. Inactivating the dorsal agranular cortex (AId), a region of the lateral prefrontal cortex, reduces cue-induced reinstatement, but has no effect on cocaine-primed reinstatement. However, the mechanisms mediating this influence are unclear. One system that may be involved are D1 and D2 neurons given the AId receives a significant dopaminergic innervation from the ventral tegmental area. Specifically, blocking dopamine D1 receptors in the AId reduces cocaine self-administration; however, this activity has not been examined during cocaine-seeking reinstatement. Using rats, we investigated dopamine's influence on cocaine-seeking in the AId by blocking these D1 receptors during various reinstatement tests. Rats had jugular catheters inserted and cannulae implants into the AId. After 12 days of 2-hour self-administration, rats underwent extinction followed by reinstatement testing. Reinstatement consists of cued and cocaine-primed reinstatements. By blocking D1 receptors in the AId, we reduced both cued and cocaine-primed reinstatements. In contrast, blocking D2 receptors had no effect. These results suggest dopamine activity in the AId is responsible for mediating cocaine seeking during cued and cocaine-primed reinstatement.

## **68 - Yanyu Zhang**

Major: Accounting

Mentor: Kevin Markle (Accounting)

### *Manufacturing Tax in the U.S and China*

The research focuses on manufacturing tax in the U.S. and China. China is called the "World Factory" because of its cheap labor fee, and many companies build their factories in China in order to minimize the manufacturing expense. However, Chinese manufacturing tax, especially the value-added tax, has been criticized by business executives and scholars for a long time. A Chinese business owner even choose to build a new factory for his company in

the U.S. He claims that the tax expense in China is too expensive and the U.S. manufacturing tax is friendlier to factory owners. I became interested in his claim and started to research about manufacturing tax in China and in the U.S. My research focuses on the composition of manufacturing tax in these two countries. By comparing these two different tax systems, I want to be able to provide advice to businesses planning to build factory in China or in the U.S.

## **70 - Pooja Patel**

Major: Biomedical Sciences, Human Physiology

Mentor: Dr. Sarit Smolikove (Biology)

*Analysis of non-homologous end joining pathway through the use of rpa-2, polq-1, and ku-70 mutants in C. elegans*

Meiosis is an important event that occurs in all sexually reproducing organisms. It is the mechanism that enables the production of new organisms due to its production of gametes. The major event that takes place in meiosis, which helps increase the amount of diversity, is called crossing over. Crossing over is the exchange of DNA between homologous chromosomes. This exchange occurs through the breakage and repair of DNA. If the DNA is not repaired, then abnormalities can arise within the gamete, which can result in the formation of mutations or cancerous cells. The DNA is repaired through homologous recombination (HR). If HR has been deactivated, then non-homologous end-joining (NHEJ) can be used, but this often leads to the imperfect joining of the strands of DNA. NHEJ was the pathway examined in this experiment.

## **72 - Danielle Pellack**

Major: Human Physiology

Mentor: Michael Anderson (Physiology)

*Does energy insufficiency influence size-selective cell loss 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 determine the range of normal variation in RGC number, we collected retinæ and optic nerves from Diversity Outbred mice. Corresponding to the high degree of genetic variability in Diversity Outbred mice, we found large phenotypic variability between mice. 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. Studies on the effect of *Ppp2r2b* mutation on *nee*-mediated RGC loss are ongoing.

#### **74 - Makenzie Putz**

Major: International Studies

Mentor: Katie Hassman (University of Iowa Libraries)

*Declare Yourself To Be : Word Reclamation in 1970's Iowa City*

Word reclamation is the process of “reappropriating” pejorative terms used to identify a group of people. One well known example of reclamation is the use of the word “queer” by the LGBTQ

community. Historically, queer was considered a pejorative term but was intentionally reclaimed by the LGBTQ community in the 90's. By emphasizing the existence of homophobia, this reclamation project sought to confront the derogation their community faced while asserting their right to self-identify (Brontsema). Reclamation projects can vary by goals, risks, and relative success. Brontsema's reclamation framework puts forth three main perspectives of reclamation that help describe differences in reclamation projects. First is the opposition to reclamation on the grounds that pejoration is inseparable from the term. The second perspective is supportive of reclamation viewing pejoration as separable. The third perspective describes projects that use inseparable pejoration to the advantage of reclamation efforts. The Iowa City Women's Press (active 1972-1985) was a location of reclamation for gay/lesbian groups and feminist communities during the 70's and 80's. Using primary source research of Iowa City Women's Press collections, differences in reclamation projects are described using Brontsema's framework.

## **76 - Apoorva Raikwar**

Major: Anthropology

Mentor: Jon Winet (Art and Art History)

### *HIV/AIDS advocacy and awareness through art and narrative*

HIV/AIDS is a very multifaceted healthcare issue as it presents as both a health and social issue, due to the nature of the stigma surrounding the disease. Our research team uses alternative and creative means to mass communication to tell the stories of those affected by HIV/AIDS and increase awareness of the disease in the surrounding community. We use outreach, narrative, and digital art to more effectively engage the public. An event like the Annual December 1st, World AIDS Day Reading of Names of individuals who have passed from AIDS invites the community to actively par-

ticipate in awareness and advocacy with us. Furthermore, the app we are working on "AIDS Quilt Touch" provides access to an archive of the 48,000 panels that make up the Quilt. We are currently interviewing individuals with some connection to HIV/AIDS and/or the AIDS Memorial Quilt to add to the app as an example for future users who may be interested in sharing their own story. These narratives give the quilt panels, and thus those who have passed away from AIDS, a voice that is powerful for advocacy and awareness.

## **78 - Alexandra Redfern**

Major: Speech and Hearing Sciences

Mentor: Shawn Goodman (Communication Sciences and Disorders)

### *Effects of Medial Olivocochlear Reflexes on Basilar Membrane Vibration*

Despite decades of research on the biomechanics of the cochlea, much remains unknown. In the mammalian cochlea, the basilar membrane vibrates in response to sound. The total vibration pattern results from a combination of linear passive mechanics and an active, nonlinear biological amplifier. Basilar membrane vibrations increase non-linearly as sound level increases because of the interplay of the two resolution mechanisms, and the location of maximum vibration amplitude shifts basally at high levels. Animal experiments show that despite the non-linear amplitude changes, the "temporal fine structure," or delay at which the zero-crossings of the vibration occurs, remains nearly constant. It is unknown whether this observation holds under all listening situations. In particular, it is possible that the activation of efferent brainstem auditory feedback pathways may change the temporal fine structure by altering the mechanics of the basilar membrane. This study explored the effects of stimulus intensity and activation of

the efferent auditory system on basilar membrane vibration. The hypothesis was that intensity changes alone would not affect the temporal fine structure, but that activation of the efferent system would, such that the delays of vibration would get shorter upon activation.

## **80 - Kiara Rivera**

Major: Speech and Hearing Sciences

Mentor: Meredith Saletta (Communication Sciences and Disorders)

### *Do Illustrations Influence Reading Comprehension in Adults with Intellectual or Developmental Disabilities?*

Much of the education provided to individuals with intellectual or disabilities (IDD) focuses on living skills rather than teaching how to read and write at an age-appropriate level. Little is known about appropriate reading materials and instruction to assist adults with IDD. This population needs more systematic and structured methods of teaching literacy, as for example, by integrating illustrations into literacy education to facilitate comprehension. Our study focuses on whether illustrations influence reading comprehension, and if so, which types of illustrations are best. Fifty adults with IDD were presented with a reading passage and comprehension questions, along with one of three types of illustrations portraying the content of the story: color photographs, black and white line drawings, or control images consisting of random swirling patterns. A linear regression indicated that individual reading skills predicted reading comprehension; however, a one-way ANOVA revealed no effect of condition. We are therefore performing a second sequence of data collection in which we will fine-tune our original paradigm; this iteration is currently in progress.



## **82 - Ben Soll**

Major: Ethics, Public Policy, and Political Science

Mentor: David Soll (Biology)

### *A Novel Strategy to Normalize Cancer Cells and Cure Cancer*

PTEN is a protein expressed by cells that suppresses tumor formation. If it mutates, tumors form. In the past, scientists have tried to reintroduce the normal PTEN gene into cells that have a mutated PTEN, and thus form tumors. This method has failed. Here we describe a novel approach, which may reverse the effects of a mutated PTEN in tumor-forming cells. Because there are other genes in the human genome, that may be able to act as PTEN, the possibility exists that overexpressing these genes will suppress the effects of a mutated PTEN and cure cancer. This approach is novel and we previously demonstrated that it works in a model system. Here, we show that overexpressing one of these PTEN-like genes in a mutated PTEN human cell cures it and thus blocks the cell from generating a tumor in a lab model. This approach, never before used, has far reaching implications for curing many types of cancer. We present here data which confirm this strategy is plausible.

## **84 - Amanda Solomon**

Major: Environmental Science, Science Education

Mentor: Leslie Flynn (Science Education)

### *Infusing Innovation and Entrepreneurial Thinking into the STEM Classroom*

The nation's interest in STEM innovation and entrepreneurship is increasing as jobs of the future require a vastly different set of academic and career skills. What academic opportunities prepare students to thrive in a 21st Century global economy? STEM Inno-

vator is a teacher professional development program to assist engaging students in innovation and entrepreneurial thinking. Students work in teams collaborating with community partners to demonstrate competencies through authentic tasks similar to those expected in career settings and post-secondary education. A longitudinal case study design is employed to understand how teacher implementation of STEM Innovator resources and tools impact student outcomes. Composite data from 42 students was analyzed using linear mixed models. Results indicate the STEM Innovator classroom increases students' overall competencies ( $p=0.000$ ) with statistically significant growth ( $p<0.05$ ) demonstrated in 31 of 34 student innovation and entrepreneurial skills and in 10 of 10 team problem-solving skills. No growth was indicated in the innovation and entrepreneurial skills of delegator ( $p=0.15$ ), leadership ( $p=0.08$ ), and setting future goals ( $p=0.13$ ), suggesting students need more leadership opportunities in the STEM Innovator classroom. This research suggests STEM Innovator resources and tools provide students opportunities to gain skills in innovation and entrepreneurship essential to post-secondary success.

## **86 - McKinzee Steve**

Major: Speech and Hearing Science, Spanish

Mentor: Katherine Gordon (Speech and Hearing Science)

### *Word Learning in Preschool Aged Spanish L1-English L2 Bilinguals*

Past research focuses on children's ability to remember a word immediately after training, but not their ability to retain words. Additionally, most research asks children to identify the trained object when presented with the target word (Which one is the dax?), but not to identify the word when presented with the object (What is this called?). In the present study, seven Spanish L1-English L2 preschoolers were given six exposures to six unfamiliar

objects paired with six novel words constructed with English phonotactics. They were asked to identify the word for each object when given: the target form, a minimal pair of the target, and another trained form. 5 bilingual children performed above chance immediately after training, but only 2 performed above chance 48 hours later. Children were also given a free recall (What is this called?) and cued recall test (Starts with da). Children performed near floor in the free recall test. In the cued recall test, children produced an average of 4.86 forms at the immediate test and 4.14 forms at the delayed test, demonstrating retention. This suggests that bilingual children can learn and retain English forms after few exposures, but may require more training to retain them long-term.

## **88 - Maja Sunleaf**

Major: Anthropology

Mentor: Heidi Lung (Anthropology - Museum Studies)

### *Digitizing a Museum's History*

The University of Iowa has been offering courses in museum studies since 1910. Student participation in collection care and exhibit design in the University's museums has continued since then to the present day. While the museum studies program and the Museum of Natural History (MNH) both have had momentous impacts on the University of Iowa's campus, information about these endeavors is difficult to come by. This project has included the creation of a database of information pertaining to the museum studies program and MNH currently housed, without documentation in the department, in the University's Special Collections. Additionally, an online tool is being developed in order to allow the general public access to the rich history of the museum, with a timeline of events, a digital exhibit walkthrough, and quotes from former MNH curator George Schrimper available for digital visi-

tors to peruse. The hope is that this online tool will lend itself to becoming a future display in the University's Mobile Museum to increase the spread of the program and museum's story.

## **90 - Rebekah Truhan**

Major: Anthropology

Mentor: James Enloe (Anthropology)

### *Fire-Cracked Rock: A Technological Approach to FCR*

Fire cracked rock is an artifact category that has not received much attention, normally reduced to counts and weights. However, fire cracked rock is a dynamic material that undergoes a specific sequence of changes. In this poster, the authors propose different "stages" corresponding to different hot rock technologies and features, such as hot rock cookery, hearths, and limestone temper. An experiment is designed to identify the physical and geochemical changes that occur during hearth construction and maintenance, and a methodology is proposed to identify those changes in the archaeological record. Using the archaeological assemblage of fire cracked rock from Woodpecker Cave, a Late Woodland rock shelter, we are able to use physical and geochemical changes combined with ethnographic analogy to show the sequence of maintenance behaviors performed on a hearth feature.

## **92 - Ashten Sherman**

Major: Biomedical Engineering

Mentor: Natalie Denburg (Neurology)

### *Effects of Age and Cognition on Investment Decisions*

A sample of healthy, community-dwelling older adults (Mage = 73.4; SD = 6.6; range 60-86 years) were presented with a new task, referred to as the Coin Flip Task (Beranek, Bechara, & Hedgcock,

2015), which approximates real-life investment decisions. A group of University of Iowa undergraduates also completed Coin Flip. In this computerized task, participants are given the option to invest or not invest \$1 on each coin flip, for a total of 20 actual coin flips. A single coin flip is chosen at random at the end of the task for incentive purposes. One advantageous approach to this task, taking into consideration expected value, would be to invest at each opportunity. In our preliminary data, when comparing younger and older adults, we found that younger adults switched from heads to tails (or vice versa) more often and also invested less often than their older counterparts. Among just the older adults, who had received extensive cognitive testing, preliminary data indicated that older adults with higher intellect displayed a more advantageous approach than their lower intellect counterparts: they invested more often and switched between heads and tails less often. The implications of our findings will be discussed.

#### **94 - Maegan Tyrrell**

Major: Health and Human Physiology - Health Promotion

Mentor: Jon Winet (Art and Art History)

#### *The Passport Project Colloquium: Teaching Students How to Teach Students*

Colloquium is a class of 14 Peer Mentors enrolled to help lead The Passport Project, a First-Year engagement seminar that introduces students to the rich cultural and scholarly offerings of the university and Iowa City. Peer Mentors lead bi-weekly breakout groups of 10 students helping to guide them through their first semester. Our research focuses on the ongoing development of Colloquium. Colloquium is experimental - new methods are constantly explored to find best practices for learning. Classroom space that encourages collaboration and active learning is key. The structure of the Colloquium curriculum is also essential to its success and to

Passport: developing a balance between planned and improvised activity; how it best supports participants; exploring issues critical to First-Year experience including homesickness for international and domestic students alike; and the challenges of transitioning from high school to college academic and social expectations. We are revising Colloquium to include example lesson plans for Peer Mentors, as well as a more structured approach to encourage focused discussion. These changes result from feedback with last year's Colloquium participants. Further developments of The Passport Project will also be previewed in the research.

## **96 - Nathaniel Weger**

Major: Mechanical Engineering

Mentor: Albert Ratner (Mechanical Engineering)

### *Gasification and Combustion of Miscanthus*

Gasification is the process of heating biomass in the absence of oxygen, producing gases similar to natural gas, and biochar, a porous form of solid carbon. The combustible gases, comprised of hydrogen and carbon monoxide, can be burned to power a steam turbine and produce electricity. The biochar can be mixed with soil to improve nutrient absorption, resulting in healthier plants. I am researching the gasification of Miscanthus, a fast-growing prairie grass, because it is a clean and affordable source of fuel that doesn't require any refurbishments to current coal-fired plants. If the gasification of Miscanthus produces high amounts of combustible gases and biochar with high porosity, it would indicate that Miscanthus could be an inexpensive and easy source of clean energy. The possible benefits of Miscanthus and gasification are still being explored, but the prospects of using the grass as an alternative fuel source appear valuable.

## **100 - Freya Yu**

Major: Cinematic Arts, minor: Theatre Arts

Mentor: Teresa Mangum

*Documentary film: "Take it to the Streets"*

The Obermann Graduate Institute is a one-week interdisciplinary institute in which UI graduate students from across campus and at any point in their graduate studies explore how public engagement can enhance teaching, research, and creative work. Last year was the tenth anniversary of Graduate Institute on Engagement and the Academy in Obermann Center for Advanced Studies. I was involved in the post-production of a documentary film *Take it to the Streets* as an assistant editor from May to August 2016. I worked with Anna Swanson, a former Graduate student in Cinematic Arts and senior fellow of 2016 Graduate Institute, on editing, color correction and sound design. The film had been screening in Iowa City Public Library this year in March. It is also released on Obermann website and Vimeo.com.

## **102 - Christian Zvokel**

Major: Biochemistry

Mentor: Ned Bowden (Chemistry)

*Fabrication of Spincoated Epoxy Membranes for the Separation of Organic Molecules*

**Again, a huge “Thank You” to all of our wonderful student presenters, mentors, judges, and supporting departments. Together, we are shaping the future of research one project at a time.**



