The 13th Annual
Spring
Undergraduate
Research
Festival

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

University of Iowa
University Capitol Centre
2nd floor South Atrium
Iowa City, Iowa
This event is hosted by the
Iowa Center for Research by
Undergraduates.

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

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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.
1 - Hassan Ahamed
Major: Biomedical Engineering
Mentor: George Richerson (Neurology)

Preventing Seizures In A Mouse Model Using Anti-Depression Drugs

DBA/1 mice have generalized seizures due to audiogenic stimulation that conclude in seizure-induced respiratory arrest (S-IRA). In the present study, we used two anti-depression medications; fluoxetine - more commonly known as Prozac, and escitalopram - more commonly known as Lexapro. These selective serotonin reuptake inhibitors (SSRIs) are conventionally used to treat depression by keeping serotonin availability high in the brain. At a very high dose (100 mg/kg), both of these drugs exhibited protection of seizures in our mouse model. It was seen, however, that fluoxetine was much better at protecting mice from seizures. This suggests that fluoxetine may have effects other than just stopping reuptake of serotonin. These effects enable fluoxetine to be a much better anti-seizure drug as compared to escitalopram.

3 - Emily Anderson
Major: Human Physiology, Cell and Developmental Biology
Mentor: Yuriy Usachev (Pharmacology)

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

One of the roles of mitochondria found in neurons is to help regulate many neuronal functions such as neuronal survival and excitability in signaling transmission through calcium regulation. One of these channels that help facilitate these processes is the mitochondrial calcium uni-
porter (MCU). Through various tests, we found that MCU is distributed throughout numerous neuronal cells in the brain and other parts of the nervous system. By measuring calcium concentrations differences in and out of the mitochondria, it was found that MCU greatly contributes to calcium signaling in neuronal cells. We also looked at various behavioral tests such as roto-rod, open field and grip strength, and used a seizure mouse model. No differences were found between normal mice and mice that did not express the MCU. However, we found that MCU-KO has a strong anticonvulsant effect. Thus, our findings suggest that MCU plays important roles in neuronal signaling, and point to MCU as a potential new therapeutic target for treating seizures and epilepsy.

5 - Alexandra Bess  
Major: Biochemistry, Chemistry  
Mentor: Jennifer Fiegel (Chemical and Biochemical Engineering)

**How Proteins Impact Nanoparticle Interactions with Cells**

When inhaling an aerosol drug, the drug particles travel through the throat and lungs on their way into the body. Using epithelial cells from the alveoli of human lungs and polystyrene particles to simulate drug particles, cells were exposed to these simulated drug particles in a controlled environment, using saline, and two more natural environments: a dilute lung fluid called broncheolalveolar lavage fluid (BALF) and a sample of human serum. The difference in these experiments is the proteins present in the exposure fluid, which in BALF consist of the protein composition of a typical human lung and human serum contains proteins native to blood. Proteins are macromolecules that serve important molecular functions in the body. Different parts of the body, such as fluids from different organs, have somewhat different protein compositions that help that particular organ serve its purpose on a molecular level. Analysis of the effect lung proteins and blood proteins will have on the interactions between lung tissue cells and a
simulation drug particle describes how that drug particle may interact within the body, and what interactions in particular can be attributed to the proteins alone.

**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. Although effective anti-epileptic drugs are on the market, nearly 30% of patients do not benefit from the currently available drugs, creating an urgent need for new ways to control epilepsy. Interestingly, recent studies of human genomes revealed that severity of seizures could be drastically different among patients carrying the exactly same epilepsy-causing mutation. This is most likely due to gene-gene interactions where certain genes suppress or enhance the effects of the epilepsy-causing mutation. Our lab uses the fruit fly Drosophila melanogaster and tries to identify genes that can reduce the severity of seizures in a fly model of human epilepsy. Since the molecular and cellular mechanisms underlying the basic neurobiological processes are extremely similar between flies and humans, our findings in Drosophila are expected to provide fundamental insights into genes that may modify seizure severity in human epilepsy and to help develop new strategies for prevention and treatment of refractory epilepsy.

**11 - Yichong Cao**  
Major: Psychology  
Mentor: Edward Wasserman (Psychology and Brain Sciences)
How supervision affect pigeons' category learning

Category learning can help people to understand the world. Through category learning, people can organize the information they already gained, and group the new subjects. Animals have similar ability as human beings. The result indicated that pigeons learned the categories with interrelated dimensions faster than learning category with irrelevant features. In supervised category learning, researchers give pigeons a stimuli and then they provide correct feedback to pigeons. In unsupervised condition, pigeons will not get feedback, they will get food no matter what they have responded. From the result, pigeons are benefited by learning sparse categories associated with high supervision.

13 - Akanksha Chilukuri
Major: Neurobiology
Mentor: Hanna Stevens (Psychiatry)

Neurodevelopment Has Been Found to be Disrupted in Mice Exposed to Prenatal Stress

Preeclampsia is a medical condition during pregnancy that is characterized by high blood pressure and protein in the urine, or proteinuria. Clinical studies, as well as our own study of behavior in mice, have shown that preeclampsia has been linked to increased neurodevelopment delays such as anxiety like behavior and a decrease in learning through repetition. Currently, we are trying to understand whether these behavioral abnormalities are also reflected in altered offspring brain morphology across development. We have sectioned the brains into thin slices and labeled particular cell subsets with antibodies in a process called immunohistochemistry. We then imaged these via fluorescent microscopy to measure the size of the cerebral cortex and stained regions. Looking at the brains of mice prenatally
exposed to preeclampsia across multiple time points, we have found an increase in the size of the cortex. In addition, specific parts of the cortex are more affected than others. Understanding the causes of these morphological changes is the first step to devising treatment.

15 - Chris Coudray
Major: Anthropology
Mentor: John Doershuk (Anthropology)

_Iowa’s First Archaeological Excavation of a Mammoth_

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, southeast of Des Moines. The project is exploring whether there is any 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 environment was like. The fossilization 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. Additionally, the soils removed from the bones are being analyzed for minute stone chips/flakes resultant from tool making. A single stone flake was recovered nearby the Mammoth, although not necessarily related. My goal is to build a database for the Iowa region of proboscidean sites toward further studies of locations with potential evidence of Mammoth-human interaction.

21 - Kylie Dolan; Hailey Billings
Major: Psychology & Psychology; Health and Human Physiology
Mentor: Jan Wessel (Psychological and Brain Sciences, Neurology)
Error Detection and Age

During everyday behaviors, humans often make errors. Successful behavior depends on the ability to detect the occurrence of errors and to subsequently adapt ongoing behavior. 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. Essentially, older adults show seemingly stronger error-related behavioral adaptations, yet these seem to be ineffective in avoiding errors. Why is that? In this research, we used eye tracking and eye movement tasks to explore whether the ability to consciously detect action errors could explain this discrepancy. 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. Our new finding, however, was that younger adults show greater residual awareness of unperceived errors, which still elicited error related compensatory responses. This was confirmed by pupil autonomic responses of pupil dilation to errors. In contrast, older adults showed almost no residual awareness on unperceived errors. In summary, we suggest that decreasing motor accuracy in older age could be explained by this specific deficit in error detection.

23 - William Fuelberth
Major: Physics and Astronomy, Mathematics
Mentor: Philip Kareet (Physics and Astronomy)

HaloSat: The Missing Baryon Problem

The visible universe is made up of atoms that can produce and absorb light. This is called “normal” matter. When astronomers compare
the amount of normal matter that was present when the universe was young, they find a problem: about half of the matter has gone missing. Astronomers suspect that the missing matter has eluded their telescopes because it is very hot, so hot that it makes X-rays. It has been suggested that the missing matter is in hot halos of gas surrounding galaxies, including our own Milky Way galaxy. HaloSat will be the first CubeSat funded by NASA built to do astronomical observations of objects beyond our solar system. HaloSat is being built now and is scheduled to launch in 2018. This satellite will measure X-rays from hot gas surrounding the Milky Way and address the question: Is there a massive, extended, hot halo around the Milky Way?

27 - Michelle Grantman
Major: Elementary Education
Mentor: Jessica Jensen (Mathematics Education)

The Research Process: an Undergraduate Perspective

Often times undergraduate students believe that research participation is limited to Master’s and PhD candidates when that’s simply not the case. The purpose of this presentation is to explain the research process from an undergraduate perspective in the context of my work with PhD candidate Jessica Jensen of the Mathematics Education Department. Through this process we sought to answer questions about how elementary teachers’ prior knowledge and beliefs affect the questions they ask during different types of mathematics lessons. My primary role in this research was to remove bias. The process of removing bias included selecting lessons for analysis and coding the content of said lessons according to predetermined specifications. 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 interested in research a look into what that process entails.
**Preeclampsia Effects on Adult Brain in a Vasopressin-Induced Model**

Our focus in this project is to study preeclampsia which is a risk factor for the development of developmental disorders in children. The development of preeclampsia during pregnancy involves irregularity of hypothalamic secretion of vasopressin (AVP) causing maternal high blood pressure. We study how preeclampsia may have these effects because it is a complication of at least 5% of pregnancies which results in many affected children [1]. Preeclampsia may alter cortical growth which may contribute to the irregular neurodevelopment in the offspring. We chose to study adult behavior and mouse brains from a model using AVP infusion which was created to imitate maternal preeclampsia effects. We tested mice on a social task and collected brain tissues, sectioned, mounted them and used immunohistochemistry to stain for specific cell types within the brain. Our last step was to image and measure the size of the cerebral cortex. Data collection is still underway, but our initial results suggest that the social behavior is altered and cortex is smaller after preeclampsia exposure. We hypothesized that AVP exposure is a factor that leads to the changes in the neurodevelopment seen in the offspring.

**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. They have found that indication of intention to breastfeed/support a partner breastfeeding before pregnancy can predict whether the individual will be successful breastfeeding. There has been a lack of interventions in a quick, online-setting that could reach college students effectively. An intervention was created and tested for efficacy in undergraduate student in positively changing breastfeeding attitudes and knowledge. There were 330 participants who completed a pre- and post-intervention survey and watched the 3-minute intervention video. From their surveys, it can be seen that the intervention did positively change their knowledge and attitudes from their baseline scores. In addition, those who started with the most negative beliefs on breastfeeding had the greatest positive change in breastfeeding beliefs.

33 - Mads Hoofnagle
Major: Anthropology, Psychology
Mentor: John Doershuk (Anthropology)

*Identifying Ceramic Vessels in Iowa’s Prairie Lakes Region: A Case for Holistic Approaches*

Archeologists have depended on ceramic analysis as a way to understand subsistence strategies, habitation patterns, and cultural features. However, ceramic analysis can be a field shrouded in mystery, where an analyst’s “instinct” is often as important as scientific analysis. Archaeologists have differing opinions; some argue in favor of quantitative measures such as statistical or chemical analysis, others defend current qualitative measures as necessary forms of artifact analysis. A compromise exists: Our understanding of “ware types”, or identifiable forms of pottery that are geographically specific, can be structured around analytical pillars that are easily replicated by other researchers. These pillars include design themes, chemical analysis of residues, and petrographic approaches such as temper point counting. This approach is currently being applied to 13DK96, a Woodland period site in
the Prairie Lakes Region of Iowa, where application of existing ceramic ware types proved frustrating and a reconsideration of definitions 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

Multiple research studies across a variety of fields have investigated the relationship between therapist and parent (Kelley, Kraft-Todd, Schapira, Kossowsky, & Riess, 2014; Plexico, Manning, and DiLollo, 2010). However, currently no one has investigated this relationship in regards to parents and the speech language pathologists who treat their young children. It is important to determine if the factors that contribute to a positive relationship in other situations apply to this situation as well. To investigate this, we interviewed two parents whose children received home-based services at or before three years of age. We were interested in their perceptions of this 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 Kasparek  
Major: Human Physiology  
Mentor: Teresa Marshall (Preventative and Community Dentistry)

Feasibility and Application of ASA 24 in Dental Nutrition Research
Background: 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 (p<0.05). 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)

Independent Cinema Creates Community

Showcasing noncommercial, cult, and foreign films, independent cinemas like Iowa City’s Film Scene provide a unique film-going experience unlike that of mainstream theaters. This experience with cinema unites its audience by fostering a community based in its members’ shared interest in unconventional film. This relationship complicates and en-
riches experiences with cinema, primarily because it generates a distinct inner community with its own subculture. My research looked at three Cities of Literature: Edinburgh, Dublin, and Iowa City, and analyzed the relationship between independent cinemas and their audiences. I noted how these cinemas use space, how the audiences interact in those spaces, and the ways the routines of their subculture changed their experience with film. While all of these cities generate a distinct culture surrounding independent cinema with their own customs and conventions, the diversity and inclusivity within these communities varied. I found that, ultimately, the most successful independent cinemas generate their own community while also branching outward and connecting that subculture with the community at large.

41 - Paige Kies
Major: Microbiology
Mentor: Craig Ellermeier (Microbiology)

Secondary Compounds Affecting the Bacterial Interactions Between Myxococcus xanthus and Bacillus subtilis

*Myxococcus xanthus* and *Bacillus subtilis* are soil dwelling 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, bacilaene. 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, *mxyoprin* comide, as necessary
for successful \textit{M. xanthus} predation. To better understand the role of secondary compounds during predation, we created mutations in \textit{M. xanthus} genes whose products are involved in secondary compound production.

\textbf{43 - Marcy Kreda}
Major: Marketing
Mentor: Bill Hedgcock (Marketing)

\textit{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.

\textbf{45 - Evan Lamb}
Major: Microbiology and Human Physiology
Mentor: Linda McCarter (Microbiology)

\textit{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 social and directed by pheremone 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 alternatively restored to wild-type (WT) traits 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 a possible therapy for early stages of failing hearts*
Heart failure is a condition in which the heart is unable to pump enough blood to the rest of the body. Our study aimed to control the enlargement of the heart in heart failure. We investigated the findings of a recent publication that showed the preference for ketone bodies as the primary fuel source for failing hearts. Ketone bodies are produced from the liver and are a source of fuel during periods of low carbohydrate intake. The study used nongenetically-modified mice as a model. They underwent surgery to simulate the effects of heart failure and were placed on either a ketogenic diet (KD) or a control diet (CD). Echocardiograms of the mice’s hearts were taken pre- and post-surgery for
comparison. We found the increase in heart size to be less in the KD mice than in the CD mice. An additional colony of mice was used to test the heart’s ability to pump blood on KD. The results showed no improvement in the heart’s ability to pump blood but reduced the enlargement of hearts in mice on KD.

49 - Jean Kyung Park  
Major: Mathematics

TDA Mapper (Data Visualization)

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 graph (dots and connecting lines). The result is a compressed representation of a data set which retains the data’s basic shape 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)

Human Influence on Airborne Particles in an Urban Environment
Fine particles 2.5 micrometers or smaller in diameter (PM2.5) are hazardous to both human health and the environment. These particles can be emitted as a primary aerosol, directly from a source as particles such as dust or smoke, or as a gas that reacts in the air to form a secondary aerosol. Specific molecules known as tracers can be used to link PM to its sources. This study uses established primary tracers to measure the seasonal variance of human activity in Atlanta, Georgia and explores new tracers of secondary aerosol. Air samples were collected daily from July 29 - August 27, 2015 during the summer and January 19 - February 18, 2016 during the winter. Chemical analysis of these samples show that there is an identifiable difference in the composition of air between summer and winter with respect to vegetative sources.

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
Major: Biomedical Engineering
Mentor: Nivedita Jerath (Neurology)

The Effectiveness of Hand Function Exams in Patients with CMT

Charcot-Marie-Tooth disease (CMT) is among the most common 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. The progression of the disease is currently tracked with the use of several physical tests along with an electromyography (EMG) nerve conduction speed study to create a CMT neuropathy score. This process is complicated and the EMG nerve conduction study can be uncomfortable or even painful for the patient, so it is of benefit to both the hospital and the patient to find an alternative method in order to save labor costs and patient 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 current method. Using statistical analysis of the change in patient performance between subsequent visits on these tests, we searched for correlations between the established method and the hand function exam in order to provide evidence for the effectiveness of the alternate 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 are testing a list of compounds that showed promise as anticonvulsants. Zebrafish are treated with a drug inducing seizures in conjunction with our potential anticonvulsant, and using a computer tracking program, we measure how much each fish moves. Our goal is to find a compound that can lessen or negate the effects of the pro-seizure drug. An inherent issue that arises when testing a drug’s viability as an anticonvulsant is whether the drug is preventing convulsions or simply making the fish sickly and therefore slowing their movement. To account for this, we also take videos of the zebrafish movement and score each fish for convulsive-like behavior. The overall aim 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” Through the Ages: 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 infinites” 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)

*Origin of the Black Hills*

This research project was conducted in order to determine the origin of the sediment that makes up the Black Hills in South Dakota.

63 - Jeffrey Nassif
Major: Exercise Science
Mentor: Tori Forbes (Chemistry)

*A New Method for Detecting Uranium In Water*

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 “gold standards” for detecting environmental uranium in water require potentially hazardous, laborious, and time-consuming pretreatment steps. A new method for detection involves synthesizing polymeric nanofiber mats which are capable of extracting uranium from a solution. Mats with bound uranium can then be then be measured using an analytical technique called SERS. Uranium uptake viability on the mats was tested by using complex water systems and evaluating time of removal. The hope of this new method is to reduce the time and difficulty of detecting uranium in drinking water to help mitigate risks of communities in the four corners of the US.
65 - Gocale Nicoue
Major: Environmental Policy and Planning
Mentor: Kelly Baker (Occupational and Environmental Health)

*The Use of Electronic Data Collection System for Collecting Environmental Surveillance Data*

Today mobile devices connect people globally from receiving daily news about local and global events to guiding our navigation from one place to another. The use of electronic tools like mobile devices is becoming valuable in the collection of data for public health surveillance. The availability, popularity and rising access to mobile devices provide the opportunity for its use to obtain evidence that can assist in implementing necessary strategies, regulations, and policies for improving the environment and the well-being of others. An evaluation was done with an institution that regulates water and sanitation throughout The Gambia to determine whether electronic data collection and management platforms are acceptable and cost-efficient alternatives to traditional paper-based data collection systems for improving monitoring capacity. Employees who monitored water quality and sanitation systems throughout The Gambia were trained to utilize a general smartphone application for their standard protocol used for environmental monitoring. Employee’s personal experience was assessed before and after the use of the smartphone application for data collection. Despite various challenges like unreliable internet access and phone malfunctions, the pilot project of the use of mobile data collection system for doing public health surveillance was successful.

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 several adverse outcomes such as gestational diabetes, preeclampsia, gestational hypertension, induction of labor, and delivery via Cesarean section. While some obese pregnancies result in complications, others are healthy. The reason for this difference is still unclear. Leptin is a hormone that is found in higher levels in obese individuals, including obese pregnant women. Higher levels of leptin have been associated with an increased risk for delivery via Cesarean section and a decrease in uterine contractility. Previous studies have shown that leptin levels are lower in women who are more active during pregnancy.

In order to determine whether there is a relationship between maternal activity, plasma leptin concentrations, and pregnancy outcomes, we measured the amount of leptin in the plasma of pregnant women throughout their pregnancies and measured their daily step counts using Fitbits, and gathered clinical data from their medical record. Our data demonstrate that plasma leptin tends to decrease as activity increases. In addition, significant differences exist between activity levels and pregnancy outcomes, including the development of preeclampsia.

69 - Claire O’Connell
Major: Biomedical Engineering
Mentor: Michael Schnieders (Biochemistry)

Advanced Simulations for Computational Protein Design

Computational protein modeling has become an accepted tool in protein design efforts, with applications in designing new biologics (antibody drugs), biosynthesis, and pure research. Simulations of proteins at an atomic level require a model of physical atom-atom interactions. Most prior simulations have used a “fixed-
charge” model, which while efficient, can be too severe of an approximation, leading to inaccurate results. Simulations using more sophisticated polarizable models such as AMOEBA can provide more accurate results, but require more compute time due to the complexity of polarizable models. This is an ongoing challenge, as even fixed-charge simulations require enormous computational resources. Indirect methods have been shown to recoup polarizable-quality results by simulating mostly under a fixed-charge model with a few evaluations under a polarizable model, but have not yet been applied to large systems. Our “dual environment switching” approach is shown to function on a 648-atom system, 15 times larger than anything that has been previously studied with an indirect method, and may be able to scale to protein-scale simulations. This approach can provide polarizable-quality simulation results at fixed-charge speeds, improving a common tool in protein design.

**73 - Alexandra Pagano**  
Major: Marketing  
Mentor: Mark Winkler (Marketing)  
*Recruiting Targets for Air Force Cadets*

This research was designed to survey and study the types of people that join Air Force ROTC and their motivations for joining. By studying the demographic make up of current cadets, we can see similarities and point our recruiting effort towards these types of people. Next, we also look at Big Ten units similar to Iowa to get a larger scope on what type of cadets we should be recruiting. We also ask some questions to determine the reason people joined and how the found out about the program, so that the Air Force ROTC can learn how to recruit in the future and what works best. Lastly, when speaking with current cadets, we can determine what to say in order to further draw them in to the program and keep them there.
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.

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)

Beyond Breadth: Diving into Depth of Vocabulary Knowledge in Children who are Hard of Hearing

Children with hearing loss typically have smaller vocabularies than normal hearing children, which can make it harder to understand speech, especially in noisy environments. A small vocabulary can also make learning to read and other academic tasks more difficult. While past research has shown that vocabulary size, or breadth, is important, new research suggests that the quality of understanding of words, or vocabulary depth, may be equally important for reading and academic success. The current 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 hypotheses were that children with hearing loss would have persistent delays in depth of knowledge and that factors affecting their experience with sound, such as age of receiving their first hearing aid and quality of fit of the hearing aid, would predict the size of those
delays. The results agreed with our hypotheses. Children with hearing loss showed significant delays in vocabulary depth that appeared to last longer than delays in vocabulary breadth, and better sound experience helped decrease those delays.

81 - Jade Rivera  
Major: Human Physiology  
Mentor: Mahmoud Abou Alaiwa (Internal Medicine)  

Effect of pH on mucus behavior

Foreign particles enter through our airways with each breath we take. Sticky mucus traps the particles and cells that line our respiratory tract propel the mucus towards our mouth in order to eliminate the potentially harmful particles. This is an important mechanism the body utilizes to protect itself from infection causing bacteria. In patients with Cystic Fibrosis (CF), mucus builds up in the airways and leads to complications such as infections and troubled breathing. Two properties of the mucus, viscosity and elasticity, affect its behavior and transport. Viscosity is the resistance to flow, whereas elasticity measures the ability to return to the original shape after deformation. A better understanding of how these properties affect mucus behavior and how they can be altered in people with CF can lead to a better understanding of the disease mechanism and help in developing better 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-territorialized” 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," allowing 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 looks at the errors made by an 8 year old child with a history of right hemisphere brain tumor and surgery when he was asked to say the names of pictures of common items. Language is known to be located in the left half, or hemisphere, of the brain in most people. A small percentage of people have language located in the right hemisphere of their brain, so this case is atypical. For this child, language was thought to be located in
his right hemisphere, or to be located in both. A period of intensive language therapy was completed. The child showed progress on his goals, but did not show progress on tests that required him to name pictured objects. Further analysis of the kinds of test errors he made was completed, showing a continued high percentage of visually related errors, which would be expected with right brain damage. Conclusions about assessing and treating naming deficits in cases where language is located in the right hemisphere of the brain are discussed. The authors also discuss how visual processing in the right brain hemisphere might influence the ability to think of the correct name for an object.

87 - Cole Toovey
Major: Psychology
Mentor: Jason Radley (Psychological and Brain Sciences)

Effects of Chronic Stress on Neurons Activated by Stress
Stress has been implicated in the onset or exacerbation of a variety of psychiatric, immunologic and cardiovascular disorders. Additionally, high levels of a stress related hormone have been documented in major depressive illness, anorexia, Alzheimer’s, and some cancers. This study is an attempt to better understand the fundamental structural changes that take place in the brain as a result of prolonged periods of stress. In this study the focus is geared in large part towards stress that mimics the stress of daily life, rather than the severe stress that develops into post-traumatic stress disorder from experiencing life threatening situations. In this study, female rats were used as an animal model for determining the effects prolonged stress has on individual neurons. Determining how neurons in specific stress activated pathways of the brain are effected by prolonged stress and how those effects might be different as a result of female versus male hormones may help to shed light on how to resolve portions of the detriment related to chronic stress.
89 - Akshaya Warrier  
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 expressed in the placenta and a variety of human cancers. In both the placenta and in cancers, PLAC1 expression enhances growth and invasiveness of the tissue. PLAC1 has two promotors that produce messages. One of these, P2, regulates PLAC1 in the placenta, whereas P1, regulates PLAC1 in tumors. Recently, a study using cancer cells showed that the tumor suppressor p53 inhibits PLAC1 by blocking the P1 promotor. We have shown in human ovarian cancer patients that mutations in p53 block the ability of the protein to bind to the P1 promotor, resulting in higher levels of PLAC1. Further, we determined that this phenomenon has a clinical relevance as higher PLAC1 expression levels negatively influences patient survival.

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 influenced 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 ath-
letes 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)

Up-Regulation of a Target Receptor in Skin Cancer Cells
Human metastatic melanoma, the most lethal type of skin cancer, is the fastest growing cancer in US. The cell receptor of interest, MC1R, is responsible for controlling skin cell, or melanocyte production. This receptor is found in increased levels within metastatic melanoma cells compared with normal cells. The increased levels of MC1R provide an opportunity for specific delivery of anti-cancer reagents to melanoma cells using vectors that specifically bind with this receptor. Despite several numerous studies in the past decade, no study has been done to show efficacy of MC1R-targeted therapy in human melanoma. This is because this receptor has varied level from patient to patient. Therefore, our goal is to safely up regulate the MC1R, specifically in human melanoma tumors. By upregulating MC1R, the goal is to effectively enhance the delivery of MC1R-targeted anti-cancer treatments to metastatic melanoma cells.

97 - Tsun Ming Yuen
Major: Chemical Engineering
Mentor: Nobutoshi (Charles) Harata (Molecular Physiology)

Brain cells uptake foreign materials: where do those materials go within the cells?

There are several ways for living cells to interact with the surrounding environment. One way is to change the shape of the cell membrane to uptake nearby molecules. This process is essential for cells to absorb important materials to live. Malfunction of this process can cause abnormal blood fat level and Alzheimer’s disease. Uptaken molecules are transported into different types of capsules within the cell, but the identities of capsules and efficiency of targeting (molecules appearing in different capsules) are not clearly known. We focused on brain cells (nerve cells and neighboring supporting cells) to address three related questions: Q1)
What is the targeting efficiency of different capsules? Q2) Do different parts of nerve cells (the process that receives signal, the nerve cell body, the process that sends signal) have different targeting efficiency? Q3) Do nerve cells and neighboring supporting cells have different targeting efficiency? We studied this uptake process by using a single type of molecule in rat brain cells, and found significant differences between different capsules (Q1), different parts of nerve cells (Q2) and different types of brain cells (Q3). We believe that our result is essential to better understand the differences of other cells uptaking different molecules.

Second Hour Presenters
5:30-6:30PM
(even numbers only—boards will be turned around)

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 a condition that results in poor fetal growth during pregnancy and affects 3-7% of the population. It can lead to long-term pulmonary, cardiovascular and neurological complications and delayed psychomotor development for the baby. IUGR may result from poor placental development and Arginine Vasopressin is a stress hormone that has been shown to be predictive of other maternal diseases with poor placentation. Copeptin serves as a stable surrogate marker for Arginine Vasopressin. The objective of the current study is to determine whether copeptin is significantly associated with IUGR. 21
participants diagnosed with IUGR were identified in the Maternal Fetal Tissue Bank and 21 controls for the IUGR cases were age-matched to study participants by maternal and gestational age of maternal blood sample. Maternal blood plasma copeptin concentrations during each trimester were measured using a commercial enzyme-linked immunosorbent assay (ELISA) specific for human copeptin. Additionally, samples were analyzed in duplicate for creatinine and total protein to measure maternal kidney function. The results indicated no significant differences in copeptin and creatinine concentrations between IUGR and control pregnancies. In this preliminary study, we 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 maps (DEMs) help in a high range of important roles in studying active faults and Quaternary Faults (i.e. present day to 2.6 ma). These topographic models provide core input of mapping active geologic structures and quantifying co-seismic displacements. Normally, local and regional DEMs are created 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 LiDARproject). Previous topographic maps created from these sources suffer from several short comings, most of the short coming are to do with the spatial resolution (~30 m ground resolution for radar-derived DEMs per pixel).

6 - Christina Blomquist
Major: Speech and Hearing Science, Psychology
As we listen to a word, we are anticipating what the word may be before we even hear the end of the word. This anticipatory strategy is what allows us to understand speech quickly and efficiently. During perception of spoken words, similar-sounding words in our mental lexicon are activated. Once a target word (e.g., cap) is identified, this increasingly activated word suppresses the activation of competing words (e.g., cat). This process is referred to as lexical competition. Eye-tracking research has shown that this lexical competition occurs in the lexicon of adults during spoken word recognition. The present study utilized an eye-tracking paradigm to investigate lexical competition in children of two age groups: 7- to 8-year-olds and 12- to 13-year olds. We observed that children looked less at the picture of a target word when the onset of the target word (e.g., cap) came from a competing word (e.g., ca(t)p) than from a nonword (e.g., ca(ck)t). These results suggest that lexical competition occurs during spoken word recognition by children, and differences in performance across age groups suggest this process may change with development in later 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 PedsQL Cancer 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)

*Research on how to modify the size and uniformity of nanoparticles*

In medicine the use of many drugs can be limited due to potential off target effects. The use of nanoparticle systems for drug delivery is a growing field that has much potential to change the way we deliver drugs, both making it safer and more effective. This is achieved using targeted nanoparticle drug delivery to different tissues. Unfortunately, creation of such small particle/drug com-
plexes poses many issues when trying to achieve a desired size, uniformity and drug loading to each particle to ensure even and sustained drug delivery. The focus of my research has been working to identify the variables that change both the size and the uniformity of the particles made in our lab. I investigated the changes how ratios to the solvent/solute, suspension formulation, stir speeds, temperature, time of sonication/homogenization, and a combination of these factors in parallel can lead to the creation of particles with high uniformity and a range of sizes ranging from 100nm-5¼m in diameter. This provides a solid foundation for our labs use of nanoparticles as a system for drug delivery to tissues and cells.

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*

Stuttering is described as an abnormally high frequency of stoppages in speech that usually take the form of repetitions of sounds or syllables, prolongation of sounds, or “blocks” of airflow or voicing in speech. These disruptions have been shown to have negative behavioral and social outcomes in children who stutter, such as increased anxiety, worry, and perfectionist tendencies. Therefore, it is important that a speech-language pathologist can work on a patient’s fluency as well as their social and behavioral competencies; a fact widely agreed upon and commonly implemented in therapy. However, researchers have yet to consider the characteristics of a therapist that a child views as effective. In other words, are some speech-language pathologists displaying characteristics that are more suitable for producing positive change in
a child’s fluency and social/behavioral competencies, and what are these characteristics? This study aims to determine what a child who stutters (CWS) and the parent of a CWS views as effective therapy, and to determine if their views are aligned. This can be looked at by conducting interviews with the CWS and their parents to understand what characteristics are meaningful to them.

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 personalities 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 portrait 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 Con-
trol) 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 looked at how the usual diets of six participants with
Relapsing Remitting Multiple Sclerosis (an autoimmune disease)
compare to dietary guidelines and average Healthy Eating Index
(HEI) scores of America. Participants selected were currently en-
rolled in a study comparing the Swank and Wahls Diets. After
training, participants completed a seven day food record detailing
their entire usual day’s food and drink intake. Records were en-
tered into a nutrient database. Nutrient intake and food group
servings were calculated for each. HEI scores for the six partici-
pants’ 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 partici-
pants had percent recommended daily values above 92%, the
other averaging 77%. The fat, carbohydrates, and protein were
within recommendations 50% of the time. In total, the MS partici-
pants averaged a moderately fit diet when compared to the aver-
age American diet and US dietary guidelines, but did show sub-
stantial room for improvement. These baseline nutritional values
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 strategy is aimed at supporting creative activities that connect preschool age children with their social and physical environment while emphasizing communication. The poster will explore our choice of design and research activities, our preliminary findings, and the future of our project.

22 - Callie Ginapp
Major: Neurobiology
Mentor: Gordon Buchanan (Neurology)

*Midbrain* serotonin receptors in CO2-induced arousal from sleep
Obstructive sleep apnea affects up to 14% of American adults and is associated with increased risk for cardiovascular disease, diabetes, and stroke, increased daytime sleepiness, and reduced fine motor and cognitive function. Currently there is no cure and limited treatment options. This project aimed to understand the biological processes leading to arousal in sleep apnea in order to lead to better treatments and diagnoses. Sleep apnea is caused by airway relaxation during sleep which blocks airflow and leads to CO2 buildup in the bloodstream. This increase of CO2 is detected by nerve cells in the midbrain which then release the chemical messenger serotonin. Serotonin affects other cells by binding to their receptors, leading to arousal. The purpose of this study was to begin to understand where in the brain serotonin might act. Directly activating serotonin receptors in the midbrain of mice did not cause arousal, whereas blocking these receptors did not inhibit arousal in response to elevated CO2 within the midbrain. These data suggest serotonin neurons in the midbrain must activate receptors in a different region of the brain, potentially the lateral hypothalamus, to cause arousal to increased CO2.

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. Interviews were recorded and tran-
scribed. Two independent readers then coded the transcripts. The interviews were analyzed 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 recorded. 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 the most effective 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)

Neurofeedback Training of Auditory Selective Attention

To communicate effectively in noise and reverberation, listeners must selectively attend to a target voice and ignore other sounds. Hearing-impaired listeners often have difficulty in such settings, but even listeners with normal-hearing thresholds differ widely in how well they can understand speech when there are competing sounds. Understanding these individual differences, and the mechanisms underlying them, is critical for developing new devices that could aid hearing-impaired listeners. Using electroencephalography (EEG) we will test normal hearing subjects to examine cortical activity during selective attention. This will enable us to estimate when activity occurs with great precision, and what brain regions are involved with some specificity. Based on previously
published results, we expect EEG measures to reveal large inter-subject differences in brain activity that correlate with differences in behavioral ability. We believe that insight into the interplay between subcortical and cortical encoding of sound will be an important step towards being able to diagnose specific hearing deficits that currently fall under the broad, non-specific category of auditory processing disorders, and might someday be beneficial in training hearing-impaired listeners to improve their selective attention abilities.

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 order to cure and harden 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 energy provided to the restoration during curing. In this study, two-dimensional spatial mapping was performed on the irradiance and wavelength emitted by a given 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 optogenetics decreases cocaine seeking*
A central issue in cocaine addiction is that addicts are vulnerable to relapse despite extended periods of drug abstinence, inspiring researchers to investigate the neural circuitry underlying the inhibition of drug seeking. Previous research has revealed the infralimbic cortex (IL), a sub region of the prefrontal cortex, as an important node in mediating extinction learning and the suppression of cocaine seeking. Thus, our experiment focused on stimulating the IL to increase activity in this brain region during relapse, or reinstatement. Rats received surgical implantation of jugular catheters and IL-aimed fiber optics and then underwent cocaine self-administration training where lever presses resulted in a cocaine infusion as well as a light and tone cue. Following withdrawal, rats underwent two distinct reinstatement tests during which the IL was optogenetically stimulated with no behavioral effect. Next, rats underwent extinction training during which lever pressing no longer delivered cocaine infusions followed by another round of reinstatement tests. IL activation reduced cocaine seeking during both tests. These results 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 rats 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 un-
likely 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, preformed 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 distribution 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
Hong Kong was an orphan, handed away by China, on lease to Britain for 99 years; and now returned to her motherland, but is rootless and anchorless. Hong Kong is a city of mixed identities, still hovering in the post-colonial space trying to find her place of landing. I wish to examine the idea of “rootlessness” that exists within the city. I have invited 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 the city. I am interested in seeing how the perception of “roots” change through generations, hence, the writers and artists participating in the project encompasses several generations; their ages range from 21-67. I envision the final product to be an anthology of writing and art pieces created by the current, living and breath-
ing citizens of Hong Kong, an ode to the organ that anchors its body firmly to soil, the origin of the city’s being.

38 - Emma Husar
Major: English, Creative Writing
Mentor: Barbara Eckstein (English)

Iowa's Severe Weather Stories Online: The Peoples' Weather Map

The Peoples’ Weather Map is an interactive, digital map of Iowa initiated by Prof. Barbara Eckstein in the English Department. The project connects Iowans’ severe weather stories to scientific research on climate change. We invite the user to explore 99 counties of severe weather stories, and to share their own. This is an interdisciplinary project for which I am a writer and researcher. I write and research severe weather events in select Iowa counties, historical and contemporary. Other team members work with geography, environmental science and computer science. We have come together to build a website that, as its own medium, determines the way in which I write the stories. This semester, I’ve researched weather events concerning the Meskwaki people in Tama County. Their settlement in mid 19th century has had prominent environmental and political impacts that I attempt to present on the website in a way effectively connected to climate change data and hazard data that other team members compile, while also keeping their story alive. For the web medium, the visual representation of stories is fully part of the story, but we are also seeking to encompass an Iowa history beyond the white settler narratives most readily available.

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)

University of Iowa Library’s Role in National History Day

National History Day is an event for middle school aged students across the country to compete against each other for awards and scholarships by presenting a part of history through different presentation types including performances, exhibits, documentaries, papers, and more. The University’s role in this procedure is preparing local competitors by helping them find relevant resources to use in their project as well as how to look for these resources. My position with the library allows me to aid in the Library’s role as well as create banks for students to look for topic ideas, guidelines for what winning performances offer, and judging at the regional competition. With my work in the program my research provides a look into how the Library’s role in National History Day can improve and grow.

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 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. 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)

Resistance to Hormone Mediated Insulin Sensitization

In healthy individuals, when food is consumed, the hormone insulin serves as the signal for cells to take up. However, in type 2 diabetes, the fat cell’s ability to respond to insulin and take up glucose is reduced a state termed insulin resistance. While there are insulin sensitizing drugs on the market, our body contains its own version: a hormone called fibroblast growth factor 21, or FGF21 for short. FGF21 lowers plasma glucose and insulin levels thus improving insulin sensitivity. However, much like insulin resistance, during diabetes, the fat cell’s ability to respond to FGF21 is hindered as well. It has been hypothesized that the inability to re-
spond to FGF21 was due to decreased expression of its co-receptor Beta-klotho (KLB). However, we determined that activity of an enzyme within the fat cell known as DUSP6 is capable of decreasing the fat cell’s ability to utilize FGF21 during obesity. While further studies need to be conducted regarding the role of DUSP6 in regulating fat cell FGF21 sensitivity, these findings support a potential new avenue for improving FGF21 sensitivity and potentially treating obesity and type 2 diabetes.

48 - Michael Klemme  
Major: Biology  
Mentor: Daniel Lusche (Biology)

Identification of Antibodies that Inhibit Tumor Formation

Previously, we developed a method for recapitulating tumor formation outside the body and reconstructing it in 4D using computer systems. This approach led to our discovery of coalescence, a phenomenon that has never been described and one that may contribute to tumor formation in cancer patients [1, 2]. During coalescence, cells form aggregates which are brought together by bridges and cables between them that then contract, pulling the aggregates together. Therefore, the tumor grows through the process of coalescence. We developed a method to record coalescence under conditions that simulated internal body environments and used this assay to test antibodies, proteins that bind specific targets on cells, 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 4400 antibodies that we are currently testing in our assay. These experiments allow us to identify antibodies that stop coalescence during breast and melanoma tumor formation. We discovered antibodies that inhibit breast cancer and melanoma cells from coalescing in 3-Dimensional models [1-5]. Here we de-
scribe 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*

Epilepsy affects an estimated 3 million Americans and around 1/3 of these cases will not respond to treatment. A chemical messenger in the brain called serotonin is thought to prevent death through the recovery of breathing after the seizure by preventing seizure-induced respiratory arrest (S-IRA). Our study focused on norepinephrine, another chemical messenger, and the role it plays in prevention of S-IRA. We used pharmacological agents to manipulate the levels of both serotonin and norepinephrine in wild-type and genetically altered mice without serotonin. We also developed and utilized a model for depleting norepinephrine-producing neurons within a specific brain region. Within these conditions, mice underwent an artificially created seizure while breathing, heart rate, and brain activity were recorded. We found that an increase in norepinephrine reduced S-IRA and death while pretreatment with a norepinephrine blocker extinguished this effect. An increase in serotonin was not sufficient to prevent S-IRA and death in mice with depleted noradrenergic systems. These results support the importance of norepinephrine in recovery of post-seizure breathing and may be a basis for further studies involving norepinephrine in seizure.

52 - Olivia Lewis
Major: Human Physiology
Effect of prenatal stress on in utero mouse brain and placental cellular function

Prenatal stress (PS), a risk factor for neuropsychiatric disorders, may influence cellular function in utero through oxidative stress, an imbalance of reactive molecules. In this study, we are interested to see how changes in cellular function after one day of PS may arise initially. We examined brain and placenta gene expression of four important antioxidant enzymes in mice. All effects of PS pass from mother to offspring through the placenta. One antioxidant gene increased in male and female brain and placenta, suggesting that PS may have increased the antioxidant activity. Sex affected the stress response in the other genes. Overall, we found that prenatal stress may cause several changes in antioxidant pathways, sometimes sex-specifically. The changed response to PS in antioxidant genes may depend on location in the stress response pathway - the earlier a gene plays a role, the more PS affects the gene. PS caused sex-dependent changes in several important antioxidant genes, which may explain increased 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 Modulation of Seizure-like Behavior of a Drosophila Model of Epilepsy by Genetic Manipulation of the Nrf2 Signaling Pathway

Epilepsy is a neurological disorder characterized by an abnormal pattern of neuronal activity which manifests itself as seizures. Our lab wants to understand how the severity of seizures can be modified by genetic factors. To accomplish this we use the fruit fly Drosophila melanogaster and study genes that significantly modify seizure-like phenotypes in a fly epilepsy model. Drosophila has been extensively used as a versatile genetic model to investigate a variety of important biological processes. Since the basic mechanisms controlling brain activity are evolutionarily well conserved between flies and humans, our findings about seizure modifiers in Drosophila are expected to shed light on genetic factors affecting the severity of epilepsy in human patients. So far we found that seizures in Drosophila can be greatly suppressed when we reduce the activity of a gene that is involved in "oxidative stress" a kind of stress caused by toxic chemicals called reactive oxygen species or ROS. To better understand the role of oxidative stress in seizure severity, we are manipulating signaling pathways responsible for oxidative stress response and examining its effect on fly seizures by taking advantage of Drosophila genetics.
Investigating the roles of Tfap2 and Kctd15a in melanocyte differentiation

Incidence of melanoma, the cancer of melanocytes, is rising in the US. Melanoma arises when proteins that regulate the maturation of melanocytes become mutated. Understanding the roles of each protein involved in melanocyte development is important to determine causes of melanoma. Two proteins, Tfap2 and its inhibitor Kctd15a, are known to play roles in regulating melanocyte development. We are continuing to understand these two proteins through several experiments. First, we overexpressed Kctd15a in zebrafish melanocytes, therefore preventing normal activity of Tfap2, and we found it severely worsened melanocyte quality. We validated our results using fluorescent tags that showed Kctd15a was present in these melanocytes. This suggests loss of Tfap2 disrupts normal melanocyte development. Second, we deleted both Tfap2 (version b), and Kctd15a in zebrafish to characterize the biological roles of these genes. Finally, we are investigating the role Tfap2 plays in driving expression of Kctd15a. We identified a potential Tfap2-dependent enhancer of Kcdt15a and linked it to a fluorescent protein. Expression of this construct in zebrafish allows fluorescent labeling of cells in which the construct has been activated, and we observed labeling in various cell types, including melanocytes. These results suggest Tfap2 and Kctd15a regulate each other during melanocyte differentiation.
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)

Relapse - The Role of Dopamine Receptors and the Dorsal Agranular Insular Cortex

Research has been perplexed by the neurobiology underlying relapse to develop more successful treatment for addicts. Inactivating the dorsal agranular cortex (AId), located in the lateral prefrontal cortex, reduces cued relapse, but not cocaine-primed relapse. The mechanisms mediating this influence are unclear, but previous research suggests a role for D1 and D2 receptors. These receptors receive surges of dopamine from the ventral tegmental area. Blocking dopamine D1 receptors in the AId reduce cocaine self-administration, an effect that has not been examined during cocaine-seeking reinstatement (relapse). Using rats, we investigated dopamine's influence on cocaine-seeking in the AId by blocking D1 and D2 receptors during reinstatement tests. Rats received jugular catheters and cannulae implants into the AId. After 12 days of 2-hour self-administration, rats underwent extinction (withdrawal), 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
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 re-
paired, 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 glauco-
ma?*

Glaucoma is a leading cause of irreversible blindness. It is caused
by the death of retinal ganglion cells within the eye, which nor-
mally communicate visual information to the brain through the
optic nerve. We use multiple strains of mice with genetic muta-
tions to learn about glaucoma and retinal ganglion cells. Similar to
what is observed in humans with healthy eyes, we found a wide
range in the number of retinal ganglion cells and retinal area
among mice with healthy eyes. In contrast to this, a strain of mice
called nee develops glaucoma and we found a decrease in retinal
ganglion cell number by 8 weeks old. We wanted to test the hy-
pothesis that increased cellular energy production can protect ret-
inal ganglion cells from death in nee mice. We used a second
strain of mice with a mutation in a gene called Ppp2r2b that in-
creases the efficiency of energy production in a cell and mated it
with nee mice. Baseline study of Ppp2r2b-mutant mice showed a
trend toward an increase in the number of retinal ganglion cells at
6 weeks old. Studies of the ability of increased energy production
to protect retinal ganglion cells from death in glaucoma are ongo-
ing.
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.
HIV/AIDS is a disease that presents itself as both a health and social issue requiring the collective efforts of several disciplines to tackle the issue, be it through treatment, diagnosis, prevention, awareness, or education. Our research team specifically uses outreach, narrative, and digital art to tell the stories of those affected by HIV/AIDS and increase awareness of the disease in the surrounding community. In the fall, we focused on activism through a weeklong series of events at the beginning of December called IC Red Week. The main event of the week occurred on World AIDS Day, December 1st, The Reading of Names. From dawn until dusk, we had readers read the names of individuals who have passed from AIDS in front of the Old Capitol Museum continuously throughout the day accompanied by a display of a panel from the AIDS Memorial Quilt. In the spring, we focused on the development of AIDS Quilt Touch, a mobile web app developed for the AIDS Memorial Quilt that provides access to an archive of the 48,000 panels that make the Quilt. Our team is currently in the process of interviewing individuals with some connection to HIV/AIDS and/or the AIDS Memorial Quilt.

78 - Alexandra Redfern
Major: Speech and Hearing Sciences
Mentor: Shawn Goodman (Communication Sciences and Disorders)

Effects of Brainstem Reflexes on Basilar Membrane Vibration

Much research has been done to study the biomechanics of the ear and how it turns sound energy into neural signals, but much still not well understood, particularly in the inner ear. The basilar membrane inside the inner ear (cochlea) vibrates in response to sound. These vibrations grow nonlinearly as sound gets louder, and the location of peak vibration shifts toward the entrance of
the cochlea. Past research suggests that, despite these changes in vibration shape, the actual timing of the vibrations does not change. However, it is not known if this holds true when neural brainstem feedback pathways are activated. These pathways decrease the overall vibration of the basilar membrane to provide better listening in noisy situations, and may affect the basilar membrane biomechanics in a way that affects the timing of the vibrations. The hypothesis of this study was that intensity changes in quiet would not show changes in the timing of vibrations, but that intensity changes in noise, when the efferent pathway is activated, would cause the timing of vibration to shift earlier in time.

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. Better instruction and reading materials are necessary to facilitate reading comprehension in this population. For example, research has shown that adding pictures to reading materials helps with understanding the reading material better. This study examines whether pictures influence readers’ understanding of written material, and if so, what kind of pictures are best. Fifty adults with IDD were presented with a reading passage, comprehension questions, and one of three types of illustrations portraying the contents of the story. These included color photos, black and white line drawings, and control images consisting of random swirling patterns. The results indicated the type of picture had no effect, but that students with better
reading skills performed better on our comprehension measures. Since we originally found no difference between the three types of illustrations, we are currently making modifications to the original study to determine if specific changes influence the results.

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 made by cells that prevents tumor formation. If it is mutated (altered), 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 introducing these proteins at higher levels 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 Innovator 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 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 sound structures. They were asked to identify the word for each object when given: the target form, a similar form, 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 visitors 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)

*We Didn’t Start the Fire: A Technological Approach to FCR*

Fire cracked rock is usually only weighed and counted, but rarely even looked at after an excavation is done. We looked at the chemical make-up of the rocks to help see if we could determine how many times the rock had been burned in a controlled fire, like a campfire. We collected samples from the site of Woodpecker Cave, which is the current archaeological field school of the University of Iowa, and it is also the focus of our research. We hope that researches in the future can look at fire cracked rock in a new way, and use this method to help gain an understanding of the dynamics of other archaeological sites.

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: Biomass Energy and Biochar

Researchers around the world are looking for energy alternatives that are cleaner than coal. Miscanthus, a fast-growing prairie grass, provides an opportunity to reduce coal use with little systemic changes while decreasing overall costs. I am testing Miscanthus in a gasifier. A gasifier is a large device that takes in biomass and blasts it with heat, reducing the biomass to gas and solid carbon. The hot gas is used to generate electricity, and the carbon can be mixed with dirt to improve soil quality. Specifically, I am looking into whether Miscanthus will work well in the gasifier by watching the levels of gas and carbon produced. Miscanthus burns cleaner than coal, it is more affordable, and it takes little space to grow. The possible benefits are still being explored, but the prospects of developing Miscanthus 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.