The 11th Annual Spring Undergraduate Research Festival

Wednesday, April 8, 2015
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), which promotes undergraduate involvement in research and creative projects at the University of Iowa, serving students, staff, and faculty.

The Spring Undergraduate Research Festival is proud to showcase poster presentations given by the University of Iowa’s student researchers. These students work in over 30 different departments and represent each of the freshman, sophomore, junior, and senior classes.

Students will stand by their posters for either the first or second hour and are free to visit fellow presenters’ posters during the other hour.

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 December 2016 for the Fall Undergraduate Research Festival!

Many thanks to the over 100 graduate and professional students for volunteered their time to serve as poster judges for this event. Their commitment to the undergraduate research community at the University of Iowa is largely what makes these festivals so successful.

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ICRU Assistant Director
Lindsay Marshall
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First Hour Presenters
4:30-5:30PM
(odd numbers only)

1. Preston Anderson

Major(s) - Biochemistry & Human Physiology
Mentor(s) - John Engelhardt (Anatomy and Cell Biology)

Lef1 Over-expression Increases Tracheal Gland Density and Serous Cell Abundance in Mice.

- Airway submucosal glands (SMGs) produce mucous and serous fluids that aid in airway clearance and innate immunity. SMGs also harbor epithelial stem/progenitor cells that regenerate the airway epithelium following injury. During glandular development, the proliferation and differentiation of primordial gland stem cells (PGSC) is driven by canonical Wnt/beta-catenin signaling and lymphoid enhancer-binding factor (Lef1). Knowing that Lef1 is required for normal development of tracheal SMGs and that the Lef1 transcription factor is critical for the proliferation of PGSC, we sought to test the following hypotheses: Conditional over-expression of Lef1 in the airway will increase glandular abundance and mass in the trachea of mice. Using a conditionally activated ROSA-flx-stop-flx-Lef1 transgene and Lef-1 promoter driven CRE driver, we found that Lef-1 overexpression increases the abundance of submucosal glands in the trachea of mice. This study improves our understanding of factors that control primordial gland stem cell proliferation and differentiation, which are relevant to hypersecretory lung diseases such as cystic fibrosis, chronic bronchitis, and asthma in which SMG mass increases.

3. Michael Anderson

Major(s) - Chemical Engineering
Mentor(s) - Julie Jessop (Chemical & Biochemical Engineering)

Let there be MORE light: Intramolecular vs. intermolecular photosensitization of onium salt photoinitiators with coumarin

- A photo-initiated polymerization reaction is one that utilizes a light-absorbing molecule which breaks apart to form a higher energy cation or radical. This higher energy molecule, called a photoinitiator (PI), can then initiate the formation of polymers through a chain reaction. The amount of conversion these PIs cause depends on a number of factors, one factor is the amount of light energy absorbed by the molecule from the light source. A commonly used PI, PC-2506, absorbs light, but not efficiently over the full range of UV light. Coumarin is a molecule called a photosensitizer that can be mixed with PC-2506 to extend the wavelengths of light used to start the polymerization. Also, recently-designed PIs incorporate coumarin on the PI molecule as a functional group allowing them to absorb light over a wider range of wavelengths. In this research, we focused on comparing the effectiveness of these new PIs and the Coumarin/PC-
2506 system with the original PC-2506 PI. The systems were compared using UV-vis absorption spectroscopy, and by comparing the capacity of each PI system to convert monomer to polymer. This conversion was measured using Raman spectroscopy which detected the formation of bonds in the polymer product.

5. Lok-hang Au
Hau-Yih Chang

Major(s) – Mathematics
Major(s) – Mathematics
Mentor(s) - N/A

Death rate varies with medical expenditure

- I am interested in analyzing data regarding human health in any form. So I thought the charges of health services providers would be a great criteria regarding whether people go to the doctors when they are not feeling well or not. Then I found the data set regarding the amount of money different patients paid in different health services providers in different part of the States. In this project, I will evaluate in detail whether the charges would affect people in the case that they are less likely to go to the doctor when feeling sick because of the high costs and thus, caused death. I already had a large data set containing the average amount of patient spent, the next I need to do will be finding out the average number of death in different states of the states so that I can compare to see if the two sets of data are correlated or not.

7. Rebecca Barrett

Major(s) - Biomedical Engineering
Mentor(s) - Ibrahim Ozbolat (Mechanical Engineering)

3D-Bioprinting of Artificial Blood Vessels for Tissue Engineering

- One of the main obstacles in organ fabrication is being able to create an efficient nutrient and waste exchange system that can supply adequate nutrients to interior and exterior tissue. Alginate has been the material of choice for such a profusion system, because Alginate is not toxic to cells, and is relatively cheap and plentiful. The cells on the outside have access to the nutrient rich media that keeps them alive, while the cells on the inside die. As a result only very small thickness structures have been printed. To help improve the cell viability, the survival rate of cells, of printed structures we are developing artificial blood vessels, or vasculatures, using a hydrogel called alginate. / / The goal of the experimental project is to create alginate vasculatures with properties that more closely biomimick those of natural human blood vessels by reinforcing them with collagen and elastin nanofibers. We will study the mechanical properties of these hybrid vasculatures, as well as short and long term cell viability. The project will be considered as successful if the hybrid vasculatures have increased cell viability, or properties closer to human blood vessels, than the unhybridized alginate vasculatures. /
Skeletal Muscle- Remodeling to Grow

- Blood is important! It should come as no surprise to us that the body tries to maintain blood perfusion to all organs. However, patients with Peripheral Artery Disease (PAD) can experience trouble walking due to low perfusion to leg muscles, which get weaker and atrophy. In this study, we used a mouse model of PAD where one leg becomes ischemic; blood flow is kept normal in the contralateral leg as a control. Our goal was to understand events that may contribute to the initial muscle atrophy and then to re-growth as blood flow is slowly re-established in the weeks after surgery. We wanted to see the remodeling process, focusing on autophagy. In short, autophagy is the demolition crew of a cell. This crew removes proteins and organelles that do not work or are not needed to save energy and keep cells clean and efficient. We found that autophagy levels in leg muscles were unchanged at 1 and 3 hours after blood flow stopped. However, the process became more active 1 week after surgery, when blood flow had recovered to ~60% of the contralateral leg. These preliminary findings suggest that autophagy may play an important role in muscle re-growth after ischemia.
PTEN Redundancy in Cancer: Overexpressing PTEN Homologs as a strategy to normalize Cancer cells.

- The PTEN (Phosphatase and Tensin Homolog) gene is commonly mutated in human cancer cells. PTEN is a protein that controls the level of specific lipids within a given cell. When PTEN becomes mutated, the cell is no longer able to maintain the lipid balance, which affects proper cell growth, since tumors possess a disturbed growth control. We expect to see deficiencies in cell motility and chemotaxis as well, since we have shown this in a model system, the amoeba Dictyostelium discoideum, which have similar behavior as human cells. There are several proteins that are closely related to PTEN. We hypothesized that these proteins may restore normal function to the mutated cell. We tested this hypothesis in the model system and found it to be true. Now, we are testing this hypothesis in human breast cancer cells possessing a mutated PTEN gene. Our approach is to test whether genetically engineered high levels of proteins with predicted similar function to PTEN (TPTE) can restore normal function in the mutant in humans. We hope to find that by the application of this approach we will be able to normalize the effects of PTEN with regards to cell motility, wound healing, and pseudopod behavior. Then, we can begin to test drugs that may induce the expression of one of these TPTE homologs and rescue the effects of PTEN in cancer cells.

15. Jacob Byers

Major(s) - Chemistry  
Mentor(s) - Renee Cole (Chemistry)

Documenting Collective Activity in a Large Scale Introductory Chemistry Class

- An introductory level chemistry class using Process Oriented Guided Inquiry Learning (POGIL) teaching method was videotaped and transcribed verbatim. Then it was analyzed to look at the levels of representation (sub-microscopic, macroscopic, and symbolic) used in discussion, how and by who the discussions are formed, and what the professor does to facilitate discussion. Analysis of the instructor's pedagogy, student interactions, and the POGIL materials showed the dynamics of small group and whole class discussions, the quality of arguments developed by the students, what the instructor can do to improve student interactions, and the students' conceptual understanding of freshman-level chemistry.

17. Joelle Christy

Major(s) - Speech and Hearing Science  
Mentor(s) - Carolyn Brown (Communication Sciences and Disorders)

The Effect of Intracochlear Electrode Design on Neural Response Telemetry Measures Recorded from Cochlear Implant Users

- A cochlear implant (CI) is a surgically implanted, electronic device that is used by individuals with too much hearing loss to benefit from hearing aids. Since CIs were first introduced in the late
1980’s, there have been several improvements and design changes to the implanted electronic components. For example, neural response telemetry (NRT) was introduced in 1995, allowing us to stimulate a single intracochlear electrode and record the neural response from the auditory nerve using another electrode inside the cochlea. Those responses are called electrically evoked compound action potentials (ECAP). ECAPs are measures of the synchronous response of a large group of auditory nerve fibers. The goal of this study was to determine how changes in the implanted electronic components over the past few decades have affected these ECAP recordings. We found that individuals who use the older cochlear implant systems have higher ECAP thresholds and steeper growth functions than individuals who use the newer devices. These differences are likely the result of differences in the design of the intracochlear electrode array and a lower noise floor on the NRT of the newer systems. Results of this study provide important normative data for audiologists who work with this population.

19. Samantha Crooks

**Major(s)** - Speech and Hearing Science  
**Mentor(s)** - Melissa Duff (Communication Sciences and Disorders)

**Procedural Memory in Traumatic Brain injury**

- Traumatic Brain Injury (TBI) affects 2.5 million Americans and leads to $76.5 billion dollars in medical costs and loss of productivity annually. TBI is a variable injury that affects a variety of people, from toddlers and elderly adults falling and hitting their heads, to people suffering from injuries related to sports or car accidents. One of the most common and incapacitating conditions following a TBI is memory impairment. Patients with impairments in declarative memory forget appointments or have trouble remembering new people they meet. This type of memory for facts and events has been the principal focus of previous research. Past research, for the most part, neglects procedural memory, which is memory for skills, habits, rules, and sequences. This project investigated procedural memory in TBI patients through testing a large population on a battery of procedural memory tasks. 17 of 18 patients showed impairment on at least one of these tasks. Our initial findings contradict the commonly held belief that TBI spares the procedural memory system and provide evidence that the procedural memory system in TBI patients is not uniformly intact. This supports the need for individualized clinical treatments approaches that account for the variable nature of traumatic brain injury.

21. Christina Crowley

**Major(s)** - English  
**Mentor(s)** - Blaine Greteman (English)

**“Grapple Them to Thy Soul”: The Women’s Shakespeare Club of Marion, Iowa**

- On October 25, 1909, a group of women in the small town of Marion decided to form a club on the premises of intellectual growth and appreciation of Shakespeare. They kept records of their weekly meetings from this day until 1955, charting their activities, their readings, and their thoughts on each play they read. Though it would be easy to see them merely as a social club,
these women were determined to keep Shakespeare at the center of their meetings. They read the Bard through two World Wars, using his texts as alternately a distraction and a means to understand human nature when it was at its darkest. From early in their records, one can see their fascination with Shakespeare’s women, and their writings often draw parallels from these ladies to their own lives. These women became a part of a larger organization of clubs in their own town and across the country. Their records allow us a view into a changing country, a tight-knit group of friends, and the importance of Shakespeare to those at all stages of life.

23. Ryan Davisson
Chance Lacina

Major(s) - Psychology
Mentor(s) - Eliot Hazeltine (Psychology)

How do feedback and training schedule interact during motor-skill learning?

- Have you ever wondered how to maximize your ability to learn a motor skill like sinking free throws or putting? Research shows that rewarding feedback and variable training schedule each independently improve the retention these kinds of skills. The present experiment examined what happens when rewarding feedback and a variable training schedule are combined. Participants performed a “path-tracing” task in which they maximized the amount of time they remain on the path. Participants were divided into four groups and completed the path-tracing mazes in either blocked (practicing each maze one at a time) or variable (practicing all mazes in a mixed fashion) order, while being either rewarded or punished for their performance. On a second day, participants returned to the lab and we measured how much these four groups retained the new skill. We found that when rewarding feedback was combined with a variable training schedule motor skill retention suffered. These results provide support for the idea that feedback and training schedule may interfere with each other during skill learning. The results have implications for motor learning and rehabilitation programs for clinical populations that suffer from motor deficits, such as stroke survivors.

25. Jenna DeCata

Major(s) - Biology: Genetics and Biotechnology
Mentor(s) - Anna Malkova (Biology)

Determining mechanistic features of an important DNA repair pathway

- DNA undergoes constant damage that can be repaired by various pathways depending on the damage. A double stranded break (DSB) is one of the most detrimental types of damage to DNA. Luckily, Break-induced Replication (BIR) can repair DSBs, but it is also known to be highly mutagenic and to cause chromosomal rearrangements, similar to what is observed in cancer and other human diseases. Moreover, many of the proteins involved in the BIR pathway have not been identified. For example, it is unknown which helicases are involved in opening the DNA during BIR. Therefore, I will test the function of the helicase Srs2 to determine its role during BIR. Specifically, I will use srs2 mutants in yeast to examine the ability of cells to repair DNA and
survive after an induced DSB. By evaluating the role of Srs2 in BIR, we will have further insight into how this pathway functions, which in the future could have important implications for understanding the underlying mechanisms of cancer.

27. Michael Dolan

**Major(s)** - Chemistry
**Mentor(s)** - Betsy Stone (Chemistry)

**Biomass Burning Emissions**

- Biomass is biological material derived from any living organisms, which are mainly composed of carbon molecules. The burning of biomass therefore releases carbon dioxide into the atmosphere along with other particulate matter. The portion of organic carbon that is soluble in water is called water-soluble organic carbon (WSOC), which is an atmospheric aerosol that has the ability to scatter and absorb sunlight. The variation of water soluble organic carbon was measured from globally important biomass samples using a total organic carbon analyzer. Nitro-aromatic and polycyclic aromatic hydrocarbon sampling was done as well. Our research suggests that there is variation among the burning different biomasses. Ponderosa pine, black spruce, agricultural residues, and peat were the biomass types sampled from all across the globe and their average WSOC compositions were 43.2%, 51.1%, 49.7% and 26.1% respectively. Relationships such as the modified combustion efficiency and water soluble organic carbon emission factors were determined such that as modified combustion efficiency increased, organic carbon and water soluble organic carbon emission factors decreased. There is variation of water soluble organic carbon emissions among the burning of different biomasses and emissions were clearly impacted by the burning conditions.

29. Nicholas Dunne

**Major(s)** - Biomedical Engineering
**Mentor(s)** - Trevor Fidler (Internal Medicine)

**Platelet expression of glucose transporter 1 plays an important role in male mouse survival**

- Patients with diabetes experience increased blood glucose concentrations as well as increased platelet activation, which leads to increased clot formation. Clotting is essential to prevent excessive blood loss, but in excess can lead to heart attack and stroke. Because diabetics are known to have increased circulating glucose and increased platelet activation, we wanted to study the contribution of glucose metabolism to platelet function. In this study we discovered the effect of glucose metabolism on platelet activation and clotting by deleting a specific glucose transport protein, glucose transporter 1 (GLUT1), from the platelets of mice. We found that the deletion of GLUT1 caused a 50% mortality rate in males, from one week post birth until at least five weeks of age. Females experienced no effect on survival. The surviving males with the GLUT1 deletion showed an increase in platelet activity and increased clotting. This did not occur in females. Together these data suggests that GLUT1 has a gender specific role in platelet
function and overall survival rate. Future studies will determine what causes the increased mortality rate of the male mice with deletion of GLUT1.

31. Jacqueline Dunning

Major(s) - Neurobiology
Mentor(s) - Michael Dailey (Biology)

The Aftermath of Alcohol Exposure in the Brain: Astrocyte and Polydendrocyte Responses in a Mouse Model of Fetal Alcohol Syndrome

- Fetal alcohol spectrum disorders (FASD) are the most preventable cause of mental retardation. Children with FASD show both neurological and physical abnormalities which largely result from the deleterious effects of alcohol toxicity on the developing brain. Alcohol induces death in neurons; however, less is understood about glial cells’ vulnerability to alcohol. Glia cells are currently defined as support cells for neurons. However, research, like ours, is working to expand the definition to encompass the diversity and importance of these cells. I focus on the structure and function of two of the four types of brain glial cells: astrocytes and polydendrocytes. By comparing healthy developing brains to brains exposed to alcohol, we can assess the normal function of these glial cells as well as the responses of these cells to neural injury. Because seven-day-old mice are equivalent to third trimester human fetuses, we are able to use a model that mimics the effects if a human mother went binge drinking for one night in her third trimester. This model allows us to detail the reactions and interactions of cells to acute alcohol exposure. Our research is an essential step in understanding both the vulnerabilities and strengths of the developing brain.

33. Jena Edwards

Major(s) - Biomedical Engineering
Mentor(s) - Al Klingelhutz (Microbiology)

Genetic manipulation of cells to understand the role of environmental pollutants in human disease

- The Aryl Hydrocarbon Receptor (AhR) regulates the responses of cells to certain persistent organic pollutants. Polychlorinated biphenyls (PCBs) were used widely in industrial applications and have been linked to cancer and diabetes. Dioxin-like PCBs activate AhR. Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR)/Cas9 is a method to knock out genes. Gene knock out is something that makes the gene nonfunctional, which allows experiments to be done to learn more about how the gene is involved in cell function. Our goal was to knock out AhR in cells using CRISPR/Cas9 technology. CRISPR/Cas9 and AhR-specific genetic material were introduced into human cells. Genomic DNA from the cells was assessed for changes in AhR using Polymerase Chain Reaction (PCR). PCR is a technique that amplifies a specific region of DNA. Partial knockout was observed. Further studies will address methods to achieve complete knockout. AhR knockout cells will be used in future applications to study the role of AhR in
response to PCBs, particularly in how AhR activation is involved in changes in cell metabolism and carcinogenesis.

35. Emily Eilers

Major(s) - Communication Sciences and Disorders  
Mentor(s) - Ruth Bentler (Communication Sciences and Disorders)

Measuring Listening Effort

- As one sits in a crowded restaurant, the chatter of customers and clashing dishes makes it difficult to hear what is being spoken from across the table. In order to understand the message being conveyed to him, one must compensate in this competing noise, leaning forward towards the speaker or watching their lips as they speak. In these situations, it is evident that background noise can affect one's ability to listen to and understand speech, and that in order to do so, a certain amount of effort must be put forward. This effort – defined as listening effort – is important to understand as it can lead to fatigue and frustration, and can negatively affect the lives of people who struggle to hear in the presence of background noise. The current study aims to find an objective measure of listening effort. Listening effort was measured using a dual-task paradigm. The primary task consisted of speech recognition in the presence of varying SNRs; the secondary tasks consisted of reaction-time tasks presented in two conditions – a simple task, requiring participants to respond to the stimuli with a simple press of a button, and a hard task, requiring the participant to use deeper semantic processing in order to press a button that corresponds the stimuli to its associated color. Listening effort was thus measured as a function of the change in reaction times of the simple or hard tasks. Results indicated that listening effort did not increase monotonically as SNR decreased.

37. Yuan Fang

Major(s) - Business Analytics and Information Systems, Finance  
Mentor(s) - John Solow (Economics)

Financial Impact of Airplane Crashes on Airlines

- Airplane crashes may bring airline companies enormous social costs as well as financial costs. Public perception about the safety of airlines may be affected by airplane crashes thus further influencing the stock market. To see how people react to airline accidents in the stock market, I chose a sample of 29 airplane crashes from nine publicly traded airline companies in the United States since 1988. I gathered daily change in stock prices of those airline companies as well as the market (S&P 500). I am about to create a model to see whether there is abnormal falling of airlines stock prices after crash dates.

39. Mary Feng
Topological Data Analysis of General Social Survey

- Topological data analysis can be used to describe the shape of data. Topology allows for various deformations of objects, including stretching and twisting; however, gluing or tearing are not allowed. This project seeks to apply topological data analysis to sociology data provided from the General Social Survey, which collects demographic information of U.S. residents. Due to the high quantity of data, we will analyze a subset of data related to arrest and factors which may be correlated with arrests. A point of interest will be to see if trends found in the data match accepted sociological theories. Software used will include R (statistical software) and PEGASUS (topological data analysis).

41. Timothy Fuqua

Major(s) - Biology
Mentor(s) - Albert Erives and Elizabeth Stroebele (Biology)

Enhancers: cracking the genetic password

- Organisms grow and develop by turning their genes on and off - a process completed using DNA sequences in regions called enhancers. Enhancers are like your smartphone’s password to lock or unlock the device. Just as passwords need the right set of characters in a specific order to work, enhancers do too. The characters for an enhancer are proteins that bind to the DNA. The order of the proteins is determined by special DNA sequences that each protein likes to bind to. We want to be able to read passwords to see how they truly work, so we ran an experiment using fruit flies. We wanted to understand passwords that use the protein character Su(H), which is used in a developmental cascade in flies, humans, and other animals. We did a computer search for the sequence that Su(H) likes to bind to, as well as other protein characters to identify a set of potential password enhancers in the fly’s wing. We found a variety of enhancers using the Su(H) and other characters - most in the wing - but one in the guts of the larvae. Cracking enhancer codes would allow scientists to make better medicine and understand many diseases.

43. Irina Gass

Major(s) - Dance
Mentor(s) - Rebekah Kowal (Dance)

Globalizing Jewish-American Dance: The “New” Israeli Identity

- My research explores the workings of contemporary Israeli dance with respect to religious and political intent, by taking a close look at Ohad Naharin’s Batsheva Dance Company and its history. Naharin’s work is intriguing because it is perceived as containing controversial religious material. Interestingly, Naharin claims to have no such intent. This is possible by the theory of
phenomenology, which states that the body reacts to its environment instantly without any filter from the mind. The environment that Naharin interacts with is one saturated with unstable, but strong, influences, and they permeate through his work. Since Israel became a state, Zionism has heavily shaped Israeli culture. Because the politics of creating a state trumped the original religious agenda for Israel, an American structure dominated Israeli culture. The U.S. sent over American choreographers to Israeli companies, such as Batsheva, to build a cultural foundation, leaving little room for artistic license and independence. However, the strong religious movement still lingered. A state designed for a religious purpose now had a purely political aim, and this mix of intentions generated ambiguous content in the arts. I aim to navigate this instability of Zionism and how it has affected Israeli dance today.

45. Alejandra Gonzalez

Major(s) - Nursing and Psychology
Mentor(s) - Melissa Lehan Mackin (College of Nursing)

Early Development of Sexual Education App for Teens with ASD

- Autism Spectrum Disorder (ASD) affects teens and there is a lack of sexual education resources. There is a larger research project that aims to create a mobile app focused on sexual education for teens with ASD. This study is the first step in creating the mobile app. The purpose is to explore already developed apps and evaluate them based on certain criteria. After researching, a total of 158 apps were identified. Most were available for Mac software (72%) and majority were targeted towards children 0-12 years (65.8%) compared to only four (2.5%) for adolescents. The apps that were free of charge to download were further evaluated. It was found that most used animation (72.4%) instead of realistic human characters to communicate information. Storytelling (27.6%), gameplay (58.6%), and realistic video (14.0%) provided context in which information was presented. Although apps for older children tended to use human characters, the preferred character interface will need to be determined especially in context of presenting sexual information. The evaluation of apps were limited by the cost of the apps so those that require purchasing should be evaluated in detail on a future research project.

47. Tess Haverkamp

Major(s) - Communication Sciences and Disorders
Mentor(s) - Yu-Hsiang Wu (Communication Sciences and Disorders)

List Equivalency in the Measurement of Listening Effort

- The ease of everyday listening is often taken for granted. But, for those with hearing loss, listening becomes very effortful. For such individuals, listening effort is an important measure that can help determine appropriate interventions and inform future outcomes. The purpose of this study was to investigate the equivalency of the Speech Perception in Noise (SPIN) lists when used as a measure of listening effort. The SPIN lists consist of sentence-final target words placed in both high and low context sentences. High context sentences contain information that help the listener predict the target words, while low context sentences lack this supporting
information. Twenty-five young adults with normal hearing were recruited as subjects. Measurements were taken using a dual-task paradigm in which participants were asked to perform two separate tasks, a word identification task and a recall task, in response to the SPIN stimuli. According to the dual-task paradigm model, the amount of listening effort required for a particular sentence can be quantified by the subject’s recall ability for that sentence. Initial results show no significant differences in recall ability between the high and low context sentences, indicating that the SPIN lists are equivalent when used as a listening effort measure.

49. Lance Heady

Major(s) - Biochemistry and Biology
Mentor(s) - Andrew Pieper (Psychiatry, Neurology, and Veterans Affairs)

Visualization of neuronal response to treatment with a neuroprotective molecule.

- Parkinson’s disease causes dopamine-producing neurons in the brain to die, which leads to related motor symptoms. The new P7C3 class of neuroprotective molecules has recently been shown to protect against these symptoms in multiple preclinical models of Parkinson’s disease. Here, we examined differences in growth and maturation of cultured neurons as a function of exposure to this class of neuroprotective agents. We achieved this by carefully photographing the same cells on a daily basis in order to produce time-lapse imaging of neuronal maturation. The overall goal is to facilitate investigation of the underlying mechanism of action of the P7C3 neuroprotective molecules, in hopes of fostering development of new treatment strategies for patients suffering from Parkinson’s disease.

51. Nicholas Herkert

Major(s) - Civil & Environmental Engineering
Mentor(s) - Keri Hornbuckle and Andres Martinez (Civil & Environmental Engineering)

Measuring the spatial and temporal variability of Polychlorinated Biphenyls (PCBs) in the Metropolitan Chicago area.

- Polychlorinated Biphenyls (PCBs) are anthropogenic persistent organic pollutants that are present in the environment, especially in air. Many studies have measured the presence of airborne PCBs in metropolitan areas. Unfortunately, the sources of these airborne PCB concentrations are largely unknown. The present study seeks to further understand the possible sources of PCBs in densely populated metropolitan areas. This study will utilize a passive air sampling network to measure PCB concentrations in over 230 samples from 21 different sampling locations in the Metropolitan Chicago area. Each sample was deployed for an average of 45 days over a two year period from January 2012 to January 2014. Based on the 86 samples already analyzed for PCBs, we have found an average ∑PCB concentration of 537 ± 896 pg m⁻³. Airborne PCB concentrations at some sites appear to have a slight correlation to season and temperature, while others do not. Some sites have displayed a unique signature suggesting local sources may play a large role in PCB air emissions. Further sample processing is needed to explore these trends.
53. Jonah Heskje

Major(s) - Biology  
Mentor(s) - Daniel Tranel (Neuroscience)

Hearing music without feeling music

- Listening to and appreciating music is one of the most widely shared human experiences. Indeed, music is almost synonymous with enjoyment. However, this isn’t always the case. It has been demonstrated that at least some individuals are incapable of deriving pleasure from music. To better understand why this is so, the present study investigates the brain regions implicated in this specific loss of musical emotion. By examining images of damaged brains from patients unable to experience musical pleasure, we hope to determine which regions of the brain enable us to enjoy music.

55. Hannah Hinkel

Major(s) - Psychology  
Mentor(s) - Teresa Treat (Psychology)

Contextual Influences on Men’s Perceptions of Women’s Sexual Interest

- The current study evaluates whether the sexual relevance of the social environment potentiates men’s judgments of women’s sexual interest, particularly among men who endorse more rape-supportive attitudes. 217 undergraduate men viewed 173 scenes that were either lower (n=87) or higher (n=86) in sexual relevance (e.g. office vs. bar). A full-body photograph of a college-aged woman who varied in affect (rejecting to sexually interested), clothing style (modest to sexually provocative) and normative attractiveness was inserted into each scene. The men completed the sexual interest judgment task where they viewed each scene for 2s a piece and judged how sexually each woman felt “right now.” Surprisingly, the sexual relevance of the social environment did not potentiate men’s judgments of women’s sexual interest, although future research might profitably benefit from task changes. Overall, the results reveal strong replication of past work documenting men’s reliance on affect, clothing style, and attractiveness when judging sexual interest.

57. Alexander Hjelmaas

Major(s) - Biochemistry  
Mentor(s) - Brandon Davies (Biochemistry)

Investigating the Role of ANGPTL3 in Fat Metabolism

- Fats from our diet are initially broken down by various lipases in the intestines. The resulting fatty acids enter cells of the intestine, where they are packaged into fat-rich chylomicrons and
delivered to various tissues via the bloodstream. Upon reaching the target tissue capillary, a protein called lipoprotein lipase (LPL) must break down the fats into fatty acids, which are then able to cross the capillary and enter fat and muscle cells to be stored or used for energy. LPL is bound to the capillary wall by a protein called GPIHBP1 and it is in this context that LPL processes circulating fat. ANGPTL3 is an additional protein that helps to regulate this process by inactivating LPL bound to the capillary. Inactivating LPL leads to higher fat levels in the bloodstream, a risk factor for various cardiac diseases. This study investigates the interaction between ANGPTL3 and LPL and the interaction between ANGPTL3 and GPIHBP1/LPL complexes. ANGPTL3 has been proposed as a target for treating a wide range of obesity-related disease. Understanding its interactions with LPL will be crucial for maximizing ANGPTL3’s therapeutic potential.

59. Brianna Hoffmann

Major(s) - Anthropology (B.S.)
Mentor(s) - Robert Franciscus (Anthropology)

Skeletal 2nd/4th digit ratios of the hand are associated with wider faces in adult males

- Studies have shown that levels of testosterone in the prenatal environment affects the growth of the fingers and the face. These studies have demonstrated that higher levels of prenatal testosterone result in a shorter second finger relative to the fourth (a lower ratio), while lower levels result in a longer second finger relative to the fourth (a higher ratio). Other research has shown that individuals with a lower digit ratio, indicative of high prenatal testosterone levels, also have wider, shorter faces. The data in these studies were obtained using digital scans of the hand and photographs of the face. Our research aims to demonstrate that the association between a lower ratio and a wider face is maintained when using skeletal elements as opposed to soft tissue structures. This is important when examining fossil hominins, as soft tissue is not preserved in the fossil record. Our results can serve as a baseline for future research investigating prenatal testosterone, digit ratios, and facial development in fossil hominins.

61. Colton Jensen

Major(s) - Chemistry
Mentor(s) - Lou Messerle (Chemistry)

Synthesis of Novel Dimolybdenum Complexes

- Reported dimolybdenum (Mo2) complexes, stabilized by chemical bonding to another molecule called a ligand, in mid- and low oxidation states are rare and difficult, time consuming, and expensive to synthesize. A new synthetic sequence for dimolybdenum compounds would allow for further exploration of their reactivity and utility. The paddlewheel compound Mo2(hpp)4 (hpp is a bridging ligand) has a unique, symmetrical structure with a Mo-Mo quadruple bond and potential ability to function as a reducing agent in organic reactions. We have developed a new synthesis that reduces high oxidation state mono-molybdenum complexes to a novel,
probable dimolybdenum precursor, which we are attempting to convert to Mo2(hpp)4. An easier synthesis will allow further study of Mo2(hpp)4.

63. Blake Johnson

**Major(s)** - Human Physiology  
**Mentor(s)** - Janice Staber (Pediatrics)

**Gene Therapy Correction of von Willebrand Disease**

- von Willebrand Disease (vWD) is the most common genetic bleeding disorder in the United States. vWD results in increased bleeding time due to a deficiency von Willebrand factor (vWF), a protein necessary for normal blood clotting. We are attempting to correct von Willebrand Disease by inserting a functional vWF cDNA into the host’s DNA. Thus far, animals receiving PB containing vWF cDNA are being followed for evidence of vWF production. Further testing is needed to see if these animals can produce vWF using this gene transfer strategy. Analysis of a hepatocyte cell line given the vWF gene has shown production of von Willebrand factor. We conclude that the PB transposon has the potential for therapeutic utility in von Willebrand disease.

65. Michelle Johnson

**Major(s)** - Speech and Hearing Sciences  
**Mentor(s)** - Karla McGregor (Communication Sciences and Disorders)

**College Students Do Not Get Enough Sleep and those with Learning Impairments Are at Risk for Sleep Disorders**

- Receiving sufficient uninterrupted sleep every night enhances daily performance on motor and cognitive tasks. College students are notoriously bad sleepers. In this study, we analyzed amount and quality of sleep and daytime sleepiness in 298 undergraduates. Motivated by a link between sleep and learning, we also examined differences among college students with learning impairments (LI) and those with typical development (TD). Overall, 47% of students reported less than the recommended 7 hours of sleep on a typical night. There was a marginal difference between the sleep quality scores of students in LI and TD groups such that students with LI reported poorer, more disrupted sleep. From the sleep diary we analyzed medication, caffeine, and alcohol intake to determine whether these might account for poorer sleep in the LI group. Compared to students without LI, a larger percentage of students with LI took medications (many to control attention deficit) known to affect sleep and students who took these medications were more likely to score in the range of clinical concern on the sleep quality measure. It is necessary to increase awareness of the effects of sleep problems in college students. Students on stimulant medications should be especially diligent about sleep hygiene.

67. Hyejung Kim
Dispersion between Similar Companies of South Korea and US through Valuing Firms Using Free Cash Flow Method

- Ever since the stock market crash of 1929, Discounting Cash Flow (DCF) has become one of the prevalent models valuing firms that has employed by many US institutional investors including Warren Buffett, a prominent investor and philanthropist. The method, however, shows its limitations in forecasting the intrinsic value of companies in South Korea and their intrinsic value of a stock price. Using the same figures of US firms simply does not apply to Korean firms. Through researching and running multiple times of a designed Free Cash Flow (FCF) model by Tong Yao, Associate Professor of Finance at the Tippie College of Business, there seem to be reasonable inputs that could reduce the dispersion between the market value of firms and the intrinsic value of firms. These variables are Beta, Risk Premium rate, Risk Free rate, Cost of Debt, Tax Rate, and Debt to Value of Operations. Each company is exposed to different risk levels, thereby, estimating and adjusting the variables based on what kinds of industry are crucial to lessen the dispersion and forecast the fundamental value of firms.

69. Marcy Kreda

Major(s) - Marketing
Mentor(s) - William Hedgcock (Marketing)

Predicting Decisions: Similarities between Simple Decision Making Habits and Complex Financial Decision Making Habits

- The purpose of our study is to determine whether decision making in a simple decision task can predict performance in a complex financial decision making task. During the simple task, we measure participants’ preferences to gamble (or not gamble) on the outcome of a coin flip while we measure their physiological responses such as arousal. These decisions and physiological reactions will then be compared to decision making during complex financial decision making in the Iowa Electronic Market (IEM), a market that allows us to study individual level trading behavior and outcomes. We predict decision making and physiological reactions during the coin flip study will better predict decision making in the IEM than questionnaires that are typically used to determine risk and stock preferences.

71. Haley Kreiter

Major(s) - Speech and Hearing Science
Mentor(s) - Elizabeth Walker (Communication Sciences and Disorders)

Predictors of Special Education Services in Children Who are Hard of Hearing
Little research has been devoted to describing the educational support services for children who are hard-of-hearing (HH). The primary objective of this thesis was to quantify the percentage of 6 year olds who are HH receiving special education services. The secondary objective was to examine what factors predict whether or not 6 year olds who are HH receive special education services. Our participants included 132 children who are HH. Information for all of the participants was obtained via the Outcomes of Children with Mild to Severe Hearing Loss (OCHL) database. Measures included demographic, audiometric, and speech/language information. Our results showed that 76% percent of the participants had an IEP, 21% received no special education services, and 3% had a 504. Children with IEPs had significantly poorer production and comprehension of grammar, speech intelligibility, and pragmatics skills compared to children who did not receive special education services. Participants who were 90% intelligible or less during conversation with an adult were 5.9 times more likely to have an IEP. In summary, many 6 year olds who are HH receive special education services, and poorer speech intelligibility predicts the likelihood of having an IEP.

73. Kelsey Kruse

Major(s) - Speech and Hearing Science
Mentor(s) - Tricia Zebrowski (Communication Sciences and Disorders)

Patterns of development in children who stutter

- The purpose of this study was to examine patterns of development in children who stutter over the course of 1 year. Development patterns may provide insight into whether or not the child continues to stutter. Measures included severity of the stutter, a vocabulary test, a test of language development, and a questionnaire filled out by the parents about the child’s behavior. The subjects were 25 children who stutter (9 females and 16 males) ages 31 to 70 months. The children were split into two groups: those who continued to stutter after 1 year, and those you stopped stuttering after 1 year. The two groups were then compared using statistical analysis to identify similarities and differences between the groups. The only significant difference found were the severity levels of stuttering at the third visit. There will be more analyses to come.

75. Carrie Lapsey

Major(s) - Psychology
Mentor(s) - Grazyna Kochanska (Psychology)

Parent-Child Shared Positive Affect in Toddlerhood Predicts Children’s Internalization of Rules at Preschool Age

- Children’s effective internalization of rules and standards of behavior is key for their successful functioning in the family and society, and a core aspect of early moral development. The present study examines a mutually positive parent-child early relationship, reflected in shared positive affect in the parent-child dyad at toddler age, as a predictor of children’s future internalization of rules in a longitudinal study of 102 two-parent community families and their typically developing children. Shared positive affect was observed in mother-child and father-child dyads...
in a variety of naturalistic contexts in lengthy laboratory sessions at 25 and 38 months. Children’s internalization of rules was assessed at 52 and 67 months when children were observed alone with attractive toys that had been designated as off limits by the parent. The findings were robust, consistent with expectations, and parallel for mother-child and father-child relationships. Children’s shared positive affect with the parent, across the toddler age, significantly predicted children’s internalized behavior consistent with parental prohibition across preschool-early kindergarten period. This research provides further evidence for the view that positive, warm, reciprocal early parent-child relationships promote future moral development and internalization of rules.

77. Cara Larson

Major(s) - B.A. Biochemistry
Mentor(s) - Lori Wallrath (Biochemistry)

Finding a candidate disease gene for an infant death syndrome

- My research project is focused on the identification of a disease-causing gene in a family who has lost four children to Pena-Shokeir syndrome. Pena-Shokeir syndrome is a recessive lethal disorder that causes fetal death due to lack of mobility during growth in utero. Genomic sequence analyses from an affected child and both parents identified a change in the DNA sequence of the Nucleoporin 88 gene. The Nucleoporin 88 gene codes for a nuclear pore protein. Nuclear pores regulate the flow of molecules in and out of the nucleus of a cell. We hypothesized that this DNA change causes loss of muscle function. To test this hypothesis, I made the analogous change in the fruit fly Nucleoporin 88 gene. The resulting flies had a leg defect consistent with a loss of muscle function. These results support the Nucleoporin 88 gene as a Pena-Shokeir candidate disease gene.

79. Mackenzie Leonard
Jissele Verdinez

Major(s) - International Studies, Political Science
Major(s) – Human Physiology
Mentor(s) - Jon Winet (The Digital Studio for Public Arts & Humanities)

IC Red Week: Past, Present and Future

- IC Red Week 2014 was the week-long HIV/AIDS awareness and education initiatives at the University of Iowa that occurred during the first week of December. The series of events started on World AIDS Day, Monday, December 1st, and ended on Saturday, December 6th. The purpose of this research is to assess the extent to which the HIV/AIDS initiatives of IC Red Week increased awareness and education among the participating audience and to provide a foundation for the continuation of IC Red Week efforts in the future. Moving forward, our objectives are to foster dialogue about public health, HIV education and prevention mechanisms, and community-led memorialization efforts related to the AIDS Memorial Quilts. / The poster created in collaboration with Digital Studio ICRU fellow, Ari Craven, is intended to
act as a springboard for engaged conversation on IC Red Week and broader public humanities projects in community. [link to online version of poster on Facebook: https://www.facebook.com/ICRedWeek/photos/a.372958999459643.92103.372882896133920/81877574877781/?type=1&theater]

81. Jared Liebergen

Major(s) - Philosophy
Mentor(s) - Gregory Landini (Philosophy)

What is Logic? – Developments of Logic in the early 1900s

- We often hear statements like, “It's only logical”, or “Logic dictates”, but what do we mean by the use of the phrase “logic”? When we take introductory courses in logic we spend an enormous amount of time navigating complex symbols and trying to prove conclusions from premises. So it seems that we could say that logic is all about correct reasoning and valid argumentation. This is however, only partially correct—one of the major developments in modern logic was the formation of a deductive system (or “calculus”) in accordance with inference rules. But there are further questions that can be asked about logic that could shed some light on the subject. For example, what is the relationship between logic and mathematics? What is a number? Can we prove that 2+2=4? These sorts of questions can be answered by looking at the history of modern logic and mathematics. Through the revolutionary works of Georg Cantor and Gottlob Frege, and further works by Bertrand Russell, logic has been argued to be the abstract science of structures and relations.

83. Alicia Means

Major(s) - Psychology
Mentor(s) - Susan Lutgendorf (Psychology)

Personal growth after cancer: Does it predict adjustment one year later?

- Cancer can affect many aspects of a patient’s life in negative ways, but positive changes after cancer, or posttraumatic growth (PTG) have also been reported. This change may affect several aspects of an individual’s life, such as their relationships, spirituality, or outlook on life. Studies about how PTG affects psychological outcomes, such as quality of life and depression, have mixed results. Many also ask participants to recall information about positive changes, measuring perceived but not actual growth. This study examines whether PTG in 180 women with ovarian cancer can predict psychological outcomes in the year after diagnostic surgery. In this study, PTG was measured as changes over time in the domains of purpose in life and three aspects of spirituality - faith, meaning, and peace. This study found that faith and peace significantly changed over time. Furthermore, only positive change in peace was related to better QOL, higher positive affect, and lower depression at 1-year, even when controlling for several variables. Positive change in faith was not related to QOL, positive affect, or depression at 1-year. These results expand our knowledge of how PTG affects psychological outcomes, as well as the relative importance of peace as an indicator of growth.
85. Jason Mixdorf

Major(s) - Chemistry
Mentor(s) - Hien Nguyen (Chemistry)

Rhodium-Catalyzed Fluorination

- Organic compounds containing fluorine atoms are common motifs found in many pharmaceutical drug candidates. This is due to the various properties that are affected by the addition of fluorine such as increasing the lipophilicity of the molecule or increasing the binding affinity to enzymes in vivo. Radioactive fluorine, 18F, is a commonly used isotope incorporated in many radiotracers in Positron Emission Tomography (PET) imaging due to its short half-life and non-toxic byproduct. PET imaging is often used when analyzing various organs and tissue in the body. In our lab, we are exploring the concept of using metal catalysts to place fluorine atoms on specific positions of various compounds. Initially, we screened many different types of rhodium and iridium catalysts. This screening led us to find optimal conditions using cationic rhodium and a nucleophilic fluorine source to fluorinate our molecules. We initially tested our methodology on various naphthyl substrates. Encouraged by these results we then expanded our substrate scope to compounds containing phenyl and/or heterocyclic rings.

87. Christina Moscatel

Major(s) - Anthropology
Mentor(s) - Andrew Kitchen (Anthropology)

The study of Ebola and Marburg through Computer Analysis

- The viral family Filoviridae contains several lineages of viruses that cause hemorrhagic fever in mammalian hosts, such as the Ebola viruses (EBOV) and the Marburg viruses (MARV). Though these viruses circulate continuously in their reservoir hosts (most likely bats), periodic spill-overs into alternative hosts, such as human and non-human primates, result in local epidemics. Importantly, whilst mortality in these epidemics is often quite high (> 50% is not unusual), these epidemics are typically limited to relatively small locales or populations. The ongoing EBOV epidemic is extraordinary in its extent, being both larger and longer than all previous human outbreaks. The prolonged duration of this epidemic, sustained by human-to-human transmission, has challenged epidemic EBOV with a novel, human environment through multiple transmission cycles. It is unclear how sustained transmission in a non-reservoir host has altered the selective landscape and affected the evolution of EBOV in humans. Here, we estimate the evolutionary rates of EBOV and MARV in order to determine whether transmission in humans has altered the evolutionary rate of EBOV. We found that MARV and EBOV are evolving in a similar manner, suggesting that the epidemic in West Africa has not resulted in the adaptation of EBOV to humans.

89. Miranda Neff
Major(s) - Chemistry  
Mentor(s) - Betsy Stone (Chemistry)

Observing Iowa's Climate: What's happening to our farms, weather, and health?

- Atmospheric aerosols are substances in the air that have climate changing properties. The Southern Oxidant and Aerosol Study (SOAS) that took place in 2013 has an overall goal of determining the effects of climate change from humans and from natural biological sources. A part of determining these effects includes the determination of how much of the carbon in the atmosphere is able to be dissolved in water, or “water soluble”. It has been determined that around 60-70% of carbon in the atmosphere is water soluble, indicating an effect on climate change. There is a climate science exhibit that is being put on through the Museum of Natural History that educates audiences on how climate science is affecting Iowan’s farms, weather, and health. Human and biological actions are changing the climate in the Midwest, and are showing trends of changing future climate trends.

91. Nathaniel Otjen

Major(s) - English and Anthropology  
Mentor(s) - Barbara Eckstein (English)

The Peoples’ Weather Map

- The Peoples’ Weather Map is a county-searchable, digital map of Iowa displaying both past and recent severe weather events that have occurred in all 99 counties across the state. The goal of the project is to display stories that have affected Iowans in order to encourage conversations about ways to live together in these changing times while also inviting curiosity about the ways local weather fits into larger climate patterns and other peoples’ stories about severe weather elsewhere in the world. Under the guidance of Professor Barbara Eckstein, much of my research has involved identifying and reaching out to people across Iowa to partner with the Peoples’ Weather Map. I identified over 220 museums across that state might be able to help with the project and mailed each of them individually. From this mailing, a number of people contacted us to help. We have met with partners from across the state with interests ranging from meteorology to storm chasing. Most recently, I completed three stories about tornadoes for the Harrison County map and I have begun constructing stories for the Ida County map. This has involved research at the State Historical Society and reaching out to local groups/individuals for assistance.

93. Brian Paul

Major(s) - Human Physiology  
Mentor(s) - Martine Dunnwald (UIHC Pediatrics)

Mutations in ARHGAP29 and MAFB lead to craniofacial defects in mice
Cleft lip and/or palate (CL/P) is among the most common birth defects, affecting 1 in 700 births in the United States. CL/P can be attributed both to genetic and environmental factors and can cause many serious issues including difficulty eating and speaking as well as psychological and social problems. This study involves analyzing two genes associated with CL/P and the effects of specific mutations on palate formation in mice. A previous genome wide association study conducted majorly at the University of Iowa associated various genes with CL/P. We determined from this study two genes to investigate: MAFB and ARHGAP29. Other sequencing studies found mutations in MAFB and ARHGAP29 that are significant in the human population with CL/P. These genes with the mutations were incorporated into the genome of separate populations of mice. The murine embryos were analyzed by serial sectioning at different time points. Preliminary data show that Arhgap29K326X/+ mice have oral adhesions, a finding previously described with a gene that causes Van der Woude syndrome, a syndrome that includes CL/P. Findings with Mafb have been complicated by wild type variability, but trend toward a delay in palate formation. Further investigation is ongoing to fully determine the effects of these two mutations on craniofacial development.

95. Therese Pechacek

Major(s) - Cinematic Arts and Theatre Arts
Mentor(s) - Paula Amad (Cinematic Arts)

Representing the Unknown: Charlie Chaplin’s The Great Dictator and the Holocaust

- Charlie Chaplin’s The Great Dictator won acclaim both when it premiered in 1940 and today for his satirical parody of Adolf Hitler. However, for modern day viewers who know the end results of the Holocaust, some scenes that depict abuses towards the Jewish characters in the film become uncomfortable to watch. In my project, I examine Chaplin’s relationship to the Holocaust using these scenes from The Great Dictator, Chaplin’s autobiography, other early American anti-Nazi films, and anti-Chaplin Nazi propaganda. I argue that although Chaplin maintains his signature style of humor throughout the film, The Great Dictator presents this humor through a more serious tone than his earlier work. To a modern-day viewer, this mix of comedy and solemnity creates a crisis of representation. On the one hand, the viewer might laugh at a physical joke; on the other, they might realize that the scene takes place in a concentration camp, which is clearly not humorous when the viewer knows what happened there in reality. In conclusion, closely examining The Great Dictator from a present day point of view sheds new light on the neglected issue of the film’s depiction of the Holocaust when its full effects were widely unknown.

97. Jillian Peterson

Major(s) - Communication Science and Disorders
Mentor(s) - Jerald Moon (Communication Sciences and Disorders)

The effect of speaking effort on lip and air pressure in the mouth, and the difference of those pressures during electrolarynx speech and laryngeal speech
Speech production is a complex action that requires coordination of multiple anatomical structures. The lips are important articulators, or speech organs, that are involved in the production of many consonants such as /p/ and /b/. People who undergo a laryngectomy, or a surgical removal of the voice box, tend to change the way that they produce words in order to speak more clearly. In this study, the effect of increased speaking effort on bilabial (or lip) contact pressures and intraoral air pressures are investigated. Also, the difference in lip pressures during normal speech and electro-laryngeal speech, which is talking using a device that is an external mechanical voice box, was studied.

99. Daniel Plebanek

Major(s) - Psychology and Linguistics  
Mentor(s) - Larissa Samuelson (Psychology)

The Development of Flexible Thinking

- Cognitive flexibility is the ability to switch between different rules and tasks. This ability develops later in life, but is extremely important for early success in the classroom. Furthermore, it has been found that early competency with cognitive flexibility and related cognitive abilities may lead to success later in life. The present study investigates children’s cognitive flexibility in relation to children’s age and knowledge of shapes and colors. To assess this, we asked children to complete two tasks. First, children sorted cards by different rules. Then, we asked children to find cards that matched either by color or shape. As with previous results, 3 year old children were typically unable to switch sorting rules. 4 and 5 year old children demonstrate the ability to switch depending on the rule. By comparing this with the matching tasks, we are able to determine how children think about different dimension (i.e. color and shape). This in turn may relate to cognitive flexibility. Current results suggest that children are able to match shapes that they know better than new shapes. Children who were able to match new variations of shape were more likely to flexibly switch from sorting rules from color to shape. These findings suggest that the ability to make property mappings influences cognitive flexibility in the DCCS.

101. Anthony Rogers

Major(s) - Physics  
Mentor(s) - Fred Skiff (Physics and Astronomy)

A More Efficient Amplifier for Creating Plasma in the Laboratory

- A plasma is a gas which has been heated until it loses electrons and becomes ionized. Radio waves are commonly used in laboratory settings to heat Argon gas and create Argon plasma. Presented is a more efficient type of radio amplifier to help make such plasmas. This new amplifier would, ideally, allow for a broader range of both frequencies and power outputs to be used in plasma creation. Such flexibility would give the experimenter greater control over many characteristics of the plasma being created and experimented on. Preliminary tests and comparisons to older techniques are also presented.
103. Chelsea Ryan

**Major(s)** - Psychology  
**Mentor(s)** - Ryan LaLumiere (Psychology)

**Brain Regions Involved in Memory Processes**

- Brain-based disorders like post-traumatic stress disorder (PTSD) and certain phobias are important to the area of research on emotionally influenced memory consolidation. Because these processes are thought to rely on the involvement of multiple different brain regions, they require investigations into multiple points of the underlying systems. However, there is little known about what specific neural pathways are involved with various processes of memory. The present study aimed to formulate a better understanding of one pathway and its involvement in different components of a memory task (contextual fear conditioning). Investigation of these memory processes may provide a greater perspective on ways to develop treatments for various brain-based disorders as well as injuries that can affect memory.

105. Brett Schneider

**Major(s)** - Biology and Psychology  
**Mentor(s)** - Daniel Tranel and Amy Belfi (Psychology/Neuroscience)

**Brain Regions Underlying Conceptual Knowledge Retrieval**

- This experiment utilizes the lesion approach to try and correlate a specific brain region to the task of retrieving conceptual knowledge on specific entities. Participants were presented with slideshows of names of famous people, landmarks, and melodies. Participants then described in detail information that was unique to the people or landmark, and asked to sing, hum, or tap the melody just from the name. Participants rated familiarity with the item, ability to visualize the item, and asked to identify the correct item in a multiple-choice format. Upon data collection, three people were then given transcripts of the descriptions, and the recordings of the participant’s performance in the melody task, and asked to rate if they can identify each item. Data collection has just been commenced, and therefore no preliminary results have been identified. This data will then be compared to a normal comparison group. However, we hypothesize patients with lesions in the left temporal pole will have overall more identification problems in faces, landmarks, and melodies than both brain-damage and normal comparison groups. The experiment continues to help identify the neural regions associated with retrieving conceptual knowledge.

107. Jassi Singh

**Major(s)** - Health and Human Physiology  
**Mentor(s)** - Mercedes Bern-Klug (Social Work)
Can an economic theory (Prospect Theory) build our understanding of medical decision making in the nursing home setting?

- The purpose of this literature review was to understand how others have used Prospect Theory in the health setting, in particular with frail older adults, so that we can position our current findings within the context of the literature. By utilizing PubMed, using keywords (Prospect Theory, Health, Population aged 60+) and dates ranging from 1979 to 2014, I was able to identify 14 journal articles that relate to our current research project. The 14 articles can be grouped into the following categories: framing effects, reference point, and loss aversion. The literature review highlighted gaps in current knowledge and suggested further investigations. The next step in this project is to apply the results from this literature review to our study of decision making under risk in the nursing home setting, based on our data collected from family members of nursing home residents with cancer.

109. Sara Strandlund

**Major(s)** - Human Physiology  
**Mentor(s)** - Vitor Lira (Human Physiology)

**Upregulating a cellular quality control mechanism to deal with high sugar and fat – a dream for heart cells in obesity and diabetes**

- Diabetes and obesity have been increasing significantly in the United States and the development of new treatments to help prevent potential unwanted cardiovascular consequences of these diseases are needed. Heart failure, being one of these consequences, can result from constant exposure of the heart to high glucose and fatty acid concentrations in the blood, as seen in pre-diabetes and uncontrolled diabetes. Autophagy, a cellular mechanism that selectively degrades malfunctioning cellular components, is an essential process for quality control of proteins and organelles to ensure normal cellular function. A few naturally occurring substances, such as spermidine, can stimulate this process. Here, we tested if heart cells treated with spermidine would be more resistant to death when exposed to high glucose and fatty acids. Cells were exposed to their respective treatment for 24 hours, and then harvested for assessment of cell death and autophagy. Results suggest that spermidine does in fact work through autophagy. We are currently assessing its potential protective properties against cell death caused by metabolic stressors associated with Type 2 diabetes.

111. Asli Tahan

**Major(s)** - Psychology, BS  
**Mentor(s)** - Michelle Voss (Department of Psychology)

**Tablet-based Spatial Reconstruction Task: An Assessment Tool for the Aging Brain**

- The hippocampus is a brain region that experiences deterioration during older adulthood and is affected in memory diseases such as Alzheimer’s disease. To provide reliable methods for monitoring hippocampal function as people age, tasks that yield stable performance over
repeated testing sessions are needed. We investigated the test-retest reliability and age differences of performance on a Spatial Reconstruction Task. This task is composed of a study section in which participants memorize the spatial location of three or five objects. After a short delay, the participant repositions the objects to the original locations. The task assesses four spatial error metrics: misplacement, edge deflection, edge resizing and swaps per relation. We hypothesized that compared to younger subjects, older subjects would make more errors. Consistent with this hypothesis, it was found that older subjects performed worse on the task and had greater error rates. To evaluate test-retest reliability of the task, a subset of participants were given the task at three separate sessions. Results suggested that the Spatial Reconstruction Task has test-retest reliability and thus can be administered repeatedly over separate sessions of testing with stable performance.

113. Brittany Todd

Major(s) - Biology, Music
Mentor(s) - Alexander Bassuk and Elizabeth Newell (Pediatrics)

Interleukin-1 Inflammatory Pathway Following Traumatic Brain Injury

- Interleukin-1 Inflammatory Pathway Following Traumatic Brain Injury / Traumatic brain injury (TBI) is the leading cause of death and disability in children and young adults. Following injury, the brain has an innate inflammatory response. While this response can aid in the healing process, it can also be detrimental following a traumatic brain injury (TBI). Understanding the pathways of neuroinflammation is crucial to developing new effective treatments for this wide-reaching injury. The interleukin-1 (IL-1) family of cytokines plays a key role in signaling inflammation. We aimed to characterize the IL-1 response in an experimental mouse model of TBI. We also used mutant mice lacking the genes for different portions of the IL-1 pathway to isolate and study their effect on outcome following injury. Following TBI, we measured the amount of cytokines expressed in the brain tissue at various time points, assessed motor function, and quantified the tissue injury volume. We found that the IL-1 pathway was activated in our mouse model of TBI; there was impaired motor function and substantial loss of cortical tissue following injury. Ongoing studies will determine how the genetically modified mice respond to injury in comparison to the wild type control and if this pathway represents a potential therapeutic target.

115. Michael Turek

Major(s) - Biochemistry
Mentor(s) - David Price (Biochemistry)

Novel phosphatase activity associated with RNA Polymerase II elongation complexes

- RNA Polymerase II (Pol II) is the enzyme responsible for catalyzing the production of the messenger RNA (mRNA) that ultimately codes for proteins. Pol II's production of mRNA is termed transcription. Pol II is comprised of multiple parts, or subunits, and the large subunit of Pol II has a unique C-terminal domain (CTD). Proteins modify this CTD throughout the
transcription process and these changes then alter the regulation of transcription through recruitment of other factors to Pol II. These modifications include phosphorylation, the addition of phosphate groups by kinases, and dephosphorylation, the removal of phosphate groups by phosphatases. Here we have uncovered a novel CTD phosphatase activity associated with Pol II. By further purifying the protein responsible for this CTD dephosphorylation activity we can then identify this protein and discern its role in regulating the transcription process.

117. Johanna Uthoff

Major(s) - Biomedical Engineering  
Mentor(s) - Jessica Sieren (Departments of Radiology and Biomedical Engineering)

Survey of Semi-Automatic Segmentation Tools for Computed Tomography (CT) Lung Cancer Assessment

- Chest computed tomography (CT) scans are an important detection tool for lung cancer; however the gold standard for diagnosis involves invasive procedures. Our lab has developed a computer algorithm to predict lung cancer diagnosis from CT scans. Currently this relies on a time-intensive and user-dependent manual-segmentations, or tracings, of the nodule and surrounding lung tissue. Several semi-automatic segmentation tools (MeVisLab, FIJI-ImageJ, ITK-Snap) were investigated to reduce segmentation time and user variation. Twelve nodules (6 cancerous, 6 non-cancerous) were selected based on segmentation difficulty (6 fair, 6 challenging) and CT scan settings (4 clinical, 4 low-dose research, and 4 high-dose research scans). To determine platform stability, each case was segmented five times per tool using a standard protocol. Using the manual-segmentation as ground truth in the preliminary run, there was no statistically significant difference in nodule volume, nodule surface area, and parenchymal volume among any of the segmentation methods. All three methods outperformed (mean = 3:00 min) the estimated manual run time (mean = 28:00 min). Upon completion of the five trials, the best performing segmentation method in terms of consistent segmentations, robustness to CT scan settings, and time for segmentation will be selected for use in the existing computer algorithm.

119. Russell Valentin

Major(s) - Psychology  
Mentor(s) - Peggy Nopoulos (Psychiatry)

Examining How Prematurity Affects Infants’ Cognitive Development using the Infant Orienting With Attention (IOWA) Task

- Data from the Infant Orienting With Attention (IOWA) task was collected and analyzed. The IOWA task incorporates assessments of visual orienting speed and accuracy during various conditions. These conditions included objects that would appear on a screen, and the IOWA task depended on how well subjects could distinguish between these objects from their left and right visual fields, as well as how quickly and accurately they were able to look at the objects when they appeared. To assess the subjects’ ability to guide their attention, different spatial cues
conditions were included the IOWA task. Data from all of these conditions provide definitive information about the development of attentional abilities, planning of eye movements, as well as speed an accuracy when deciding to look at an object. In the present study, data from the IOWA task collected from 10- to 12-month old premature infants, with similar time spent developing in the womb, are presented.

121. Jia Lui

Major(s) - Accounting
Mentor(s) – Richard Mergenthaler and Ciao Wei (Accounting)

Accounting Study of Mergers and Acquisition - Do Target Firm Benefit From Being Honest

- I examine whether target firms are going to be better off if they provide honest and adequate information to the acquirer. Here I use the premium that the acquirers pay to measure the profitability of the targets. I use the financial statements of the target firm as the major research document to test. I assume that the internal control effectiveness influences the faithfulness of the financial statements of the target firm positively. The acquirer infer effective internal controls and high credibility of the targets from better financial statements. Therefore, I argue that the acquirers would like to pay more due to the reliability of the target firm, the potential value of the accounting system, and the prospective lower integration cost. I also extend my argument to the post-acquisition effect on the acquirer. Although I predict that the target companies receive higher premium by being honest, it does not necessarily mean that the acquirers have overpaid for the deal. The acquirers can benefit from the honesty of the target firms by suffering less "surprises" in the post-acquisition operations.

123. Alyssa Bovinette
Breeana Glenn

Major(s) – Journalism and Mass Communications, Violin Performance
Major(s) - Art
Mentor(s) – Trevor Harvey (Music)

Society for Ethnomusicology Podcast

- The purpose of this research is to examine how a process of rejection remains prevalent in various fields of music across cultures. Choosing one genre, musician, technique, or song over any other, be it intentional or not, qualifies as a form of rejection within the field of music. Due to the commonality of rejecting certain forms, or elements of music over others, this research works to understand how consumers of music and music professionals arrive at their decisions to do so. By speaking with various ethnomusicologists who specialize in specific areas or geographical regions of music, progress has been made in understanding why so many musicians and forms of music have been, in our research team’s terms, rejected. It is clear that rejection in music expands the variety and options in which consumers and promoters can explore music, and also has created an entirely separate branch of music within itself. The
audience continues to grow for amateur musicians, and the market as well. Specific musicians, using songs, and musical elements, have exercised their abilities to make room for nontraditional, or rejected forms of music within the realm of entertainment. This research works to illuminate the acceptance and existence of rejected music across cultures.

125. Alex Yonk

Major(s) - Psychology
Mentor(s) - Mark Blumberg (Psychology/Biology)

Sleep movements activate the newborn brain.

- From horses to humans to ferrets to rats, twitching while sleeping is evident from just a few minutes of observing the animal. Although twitches occur throughout the lifespan, they predominantly occur early in development. Because of this, twitches have been hypothesized to be a crucial feature of the development of infant mammals. To better understand how twitches contribute to development, we have compiled a preliminary pathway through the analysis of previous experiments, showing the production of a twitch in the brainstem to the sensory feedback in the brainstem and cortex. This prototype model will aid us in establishing the precise mapping between specific brain areas and various limbs.

127. Kasra Zarei

Major(s) - Biomedical Engineering
Mentor(s) - Michael Abramoff (Ophthalmology, Electrical and Computer Engineering) and Todd Scheetz (Biomedical Engineering)

Assessing Nerve Cell Death in Three Rodent Models of Glaucoma

- Glaucoma is a disease of the eye that is the second-leading cause of blindness and a major public health problem. Glaucoma is characterized by the death of nerve cells that transmit impulses between the eye and brain. The precise mechanism of nerve cell loss is not understood, which prevents interventions from being developed that can prevent eye degeneration. Since the specific disease mechanism of glaucoma is unclear, the potential and exciting avenue for glaucoma treatment is a gene therapy approach where normal genes are implanted in place of the defective genes. There are candidate mutations in glaucoma-associated genes that may lead to blindness. Animal models allow detailed studies to vet candidate mutations by assessing glaucoma development. This avenue has been further aided by a novel medical image analysis methodology, developed and extensively validated (by the presenter) in a separate study, which provides accurate measurements of nerve cells. In this study (dating back to the last 18 months), optic nerves of three glaucoma mice models and healthy controls were obtained at multiple timepoints. The computational method was applied to these three large datasets to quantify the progression of glaucoma and rank the mouse models in terms of severity of glaucoma development.
Mapping the Nuclear State of the United States Through Creative Research and Social Practice Art

- The National TLC Service is a wishful agency in the Department of the Interior and was established by fanciful legislation in 2011 in order to attend to the domestic issues of environmental justice, labor, and human rights related to U.S. military activities. Since the beginning of the atomic bomb program in the 1940s, the United States became a site of production, testing, maintenance, and disposal of nuclear weapons and their by-products. The National TLC service works to gather information on the effects of nuclear production as a means to hold the government more accountable for the consequences it has often failed to take meaningful responsibility for. Nuclear production was mobilized throughout the United States after the 1940s, turning some of the most prestigious medical schools into locations for human plutonium experiments to appliance factories becoming assembly lines for military hardware. Using creative research to compile information on specific sites production and radioactivity throughout the United States, the National TLC is assembling a map that functions as an online interactive database. This information also takes shape as gallery exhibitions; Monuments to Cold War Victory was an exhibition on display in the Fall of 2014 at the Cooper Union in New York. This exhibition was the launching of Field Reports, a new TLC service calling for public nominations of sites in the United States and its network of extra-territorial military bases.

Second Hour Presenters
5:30-6:30PM
(even numbers only – each board will be turned around)

2. Binan Al Turk

Major(s) - Speech and hearing sciences
Mentor(s) - Natalie Denburg (Department of Neurology, Carver College of Medicine)

HOW INDECISIVENESS AFFECTS DECISION-MAKING AMONG OLDER ADULTS

- Older adulthood is a time of critical and complex decision making. Unfortunately, aging is accompanied by neural and cognitive changes that could alter older adult’s abilities to make important decisions, such as complex medical and financial decisions. Recent research investigations have shown that these age-related changes decision making are further modified by personality traits. Some personality traits aid in decision-making while other traits
compromise it. In our lab, we focus on why and how decision-making abilities are altered with the normal aging process. The aim of the present study was to investigate whether the ease (decisiveness) versus the difficulty (indecisiveness) of making a decision is related to older adults’ performance on laboratory decision-making tasks. We hypothesized that decision-making performance and indecisiveness are inversely related. In other words, older adults who are more indecisive tend to perform more poorly on decision-making tasks. To test our hypothesis, we worked with twenty-seven older adults participants, and each of them completed an indecisiveness questionnaire as well as a laboratory measure of complex decision-makings. The results supported our original hypotheses. We found that indecisiveness and fear about making decisions were related to poor decision making among healthy older adults.

4. Seima Al-Momani

Major(s) - Psychology
Mentor(s) - Timothy Weng (Psychology)

Acute Effects of Moderate Intensity Aerobic Exercise on Brain Function during a Working Memory Task.

- Evidence suggests that physical activity improves working memory performance, but little is known about the mechanisms in the brain that cause this increase in performance. The purpose of this study is to examine the effects of one session of moderate intensity exercise on brain regions associated with working memory. Examining the short-term effects after one session of exercise might help us understand how repeated exercise is good for the brain and cognition. We predicted that moderate intensity exercise would increase activity in brain regions involved in working memory. The study was conducted with 20 participants who performed a working memory task while in a functional Magnetic Resonance Imaging (fMRI) scanner, an instrument that measures brain activity, before and after a 30-minute exercise session. We used two different exercise conditions counterbalanced in their order: an active moderate intensity aerobic cycling and a passive cycling controlled by the bike, each condition occurred on separate occasions. Results show greater task-related brain activity after the active exercise compared to the passive exercise. These findings suggest that one way to improve working memory is through physical activity which increases the activity in brain regions involved in working memory.

6. Maya Amjadi

Major(s) - Biology, Spanish
Mentor(s) - Bill Nauseef (Internal Medicine)

White blood cells that eat staph bacteria secrete particles involved in local inflammation during a staph infection

- Infection by staph bacteria cause symptoms such as swelling and boils and may lead to severe diseases including pneumonia. Specifically, the antibiotic-resistant strains are problematic because they infect otherwise healthy individuals. Staph infections are among the top five most
frequent hospital acquired infections; annually 500,000 individuals contract staph infections from hospitals in the United States. Neutrophils, the predominant white blood cells, ingest the staph bacteria and release particles, called ectosomes, from their surfaces. These ectosomes play a role in local inflammation during staph infections. We have found that these ectosomes instigate a pro-inflammatory signal, propagating the pro-inflammatory profile of the staph bacteria. This finding supports the hypothesis that, in this context, these ectosomes contribute to exuberant inflammation.

8. Yuanyaun Bai

Major(s) - Chemistry  
Mentor(s) - Alexei Tivanski (Chemistry)

How Atomic Force Microscopy works to analysis organic nanocrystalline materials.

- Organic nanocrystalline materials are important in medical, electronic, pharmaceutical and material science applications owing to their unique properties in nanoscale dimensions. To use them in various applications, their mechanical, electrical, magnetic and physical characterization is essential. Further this allows us to understand their structure-property relationships which is of enormous importance in device fabrication, nanomedicine and material science. However, due to size limitations traditional testing methods cannot be used in nanoscale. In this context, atomic force microscopy (AFM) based techniques are one of the foremost techniques that is widely used in the characterization of nanomaterials. The unique force and spatial resolution of AFM allows us to quantify mechanical properties such as Young’s modulus and electrical properties such as conductivity with a high precision and accuracy. Here in we have studied mechanical properties of an organic based cocystal system prepared in different synthetic methods. Our objective was to understand whether mechanical properties vary with their synthetic route. This is of tremendous importance in the context of their applications.

10. Jordan Bennett

Major(s) - Anthropology  
Mentor(s) - Tiffany Adrain and Ann Budd (Earth and Environmental Science)

Curation and research of the Frost Collection of corals from the modern-day “Coral Triangle”

- The Frost Collection was donated to the University of Iowa Paleontology Repository in 2012 by Dr. Stanley Frost, a retired Gulf Oil Company geologist. The Indonesia and Philippine corals of this collection are an important resource of information from an area of incredible biodiversity located in the area of Indonesia and the Philippines, the Coral Triangle. The Coral Triangle is an area where corals are now extremely damaged and threatened. Since there are so many different factors affecting these corals it is difficult to predict how they will react to global environmental change and what conservation methods should be put in place to protect them in the future. The fossil corals in the Frost Collection are from the Miocene period, about 20 million years ago. The collection provides clues to how corals reacted to environmental changes
over millions of years and can provide insight into how modern corals might react in the future
to similar changes. This is why museum collections are so important. They give us valuable
information about how to protect and conserve many species that are rapidly disappearing from
the planet.

12. Kenny Carlson

Major(s) - Psychology
Mentor(s) - Eliot Hazeltine (Psychology)

Reward contexts alters associative learning

- Reward has been found to improve many types of learning. Recently, Freedberg and colleagues
  (in prep) showed that reward can improve associative learning. When learning a task, one judges
  how significant the reward of a specific behavior is by comparing it to the alternative outcomes
to other similar behaviors. For example, if the outcome of two successful and similar actions is
  either given $1 or $0. The effect $1 would have on learning this action changes if the reward for
  the opposing action is $4. In our experiment, we used points as a reward and we divided
  participants into three groups that differed in terms of the outcomes they received: 1) The
  Reward group received either 1 point or 4 points, 2) The Punishment group received either 1
  point or no points, and 3) The Neutral group always received 1 point, but in green or gray font.
  Out initial results show that the context provided by the different outcomes greatly impacted
  how participants learned these associations; Participants in the Punishment group learned more
  from the greater point value than the other two groups. These results show that associative
  learning is affected by how people perceive rewards.

14. Kayla Caryl

Major(s) - Political Science - Pre-law
Mentor(s) - Donna Parsons (Music)

We Need More Banjo: The Relationship Between Bluegrass and Popular Music

- During the last decade elements of bluegrass have become more prominent in popular music.
  Bluegrass, and specifically the banjo, has often been projected as an image of Southern hillbilly
twang in shows like Hee Haw and The Beverly Hillbillies. This image has since faded. The banjo
can even be heard in rock bands like Mumford and Sons. The difference in the banjo picking
styles and intensity doesn’t change from bluegrass to popular music, but bluegrass tends to
analyze the banjo part more while it can go unnoticed among popular music critics and fans.
Collaborations between popular music and bluegrass artists have also become more apparent,
especially with the collaborative work between Robert Plant and Alison Krauss, for the critically
acclaimed album Raising Sand. Collaborations like this seem to be grounded in an interest in
the music and allow the artists to exchange musical styles and learn from one another. This also
allows for artists to step out of the constraints of their genre and experiment musically. Not
only has this allowed popular music to help bring mainstream audience attention to bluegrass,
but bluegrass has helped popular musicians produce a different soundscape and evocation of their lyrics.

16. Kathryn Classon

Major(s) - Chemical Engineering
Mentor(s) - Julie Jessop (Chemical and Biochemical Engineering)

Making Light of Shadow Cure: Using Central Composite Design to Predict Cationic Active Center Mobility

- The mobility of long-lived active centers in cationic ring-opening photopolymerization facilitates polymer formation in areas never exposed to light (shadow cure); however, current understanding of active center mobility is limited. Using a central composite design of experiments, five key experimental parameters (effective irradiance, sample depth, exposure area, and exposure time) were explored to predict movement of these active centers in a commercially available epoxide by measuring shadow cure length, polymer mass, and apparent conversion. Shadow cure length was found to be the best predictive measure, and additional experiments are underway to refine the accuracy of the model.

18. Rae Ann Corrigan

Major(s) - Biomedical Engineering
Mentor(s) - Nancy Downing (Nursing) and Michael Schnieders (Biochemistry/Biomedical Engineering)

Protein Structural Optimization of Common Cancer Genes: BRAF

- Cancer is the 4th most prevalent non-communicable disease worldwide, and rates are expected to increase as the population ages. The goal of this research is to improve structural models of proteins commonly mutated in cancer in order to develop tools for physicians, clinicians, and researchers seeking to improve cancer treatment. The 50 tested proteins were identified by the Holden Comprehensive Cancer Center (HCCC) as being commonly mutated in cancers. All proteins were optimized using a standard series of computational programs (called algorithms) developed by the Michael Schnieders lab and improved by an average of 50%, following final optimization. The protein BRAF was used as a test case for modeling of specific cancer-causing mutations and early work with treatment drug modeling. Next steps include color-coding these improved structural models to give a visual representation of which parts of a protein are typically disease-causing when mutated. This will allow physicians to determine at a glance which of a patient’s genetic mutations most likely need to be addressed during treatment.

20. Ani Danelz

Major(s) - Speech and Hearing Sciences, Psychology
Mentor(s) - Bob McMurray (Psychology)
Development of Speech Perception in Children

- In order to determine whether speech perception is still developing in children ages 7-18, we monitored eye movements as the subjects indicated which of four pictures was named by an auditory stimuli. The initial voicing segment was manipulated – either for words that rhymed, starting with /b-p/ or /sh-s/. The goal was to determine if small differences in voicing affect speech perception and how that effect changes as the child develops. Previous models of speech perception have indicated that these distinctions between /b-p/ are established after the first year of life; however, we challenge this idea in favor of smaller, gradual changes that continuously development. Initial analysis has shown statistically significant differences between children ages 7-8 and children ages 12-18.

22. Chloe Daniel

Major(s) - Anthropology, Psychology
Mentor(s) - Robert Franciscus (Anthropology)

Determining Handedness From Stone Tool Reduction

- Homo sapiens is the only primate species that displays a population level preference for right hand dominance, which has been linked with language lateralization in the brain. The ability to date the evolution of handedness in early humans may have important implications for the timing of the evolution of language. It has been argued that the hand preference of extinct humans can be determined by the debris left behind from stone tool manufacture; however, previous experimental studies have shown mixed results. We conducted an experiment using debris collected from right- and left-handed novice stone toolmakers to test whether the process of making stone tools leaves behind reliable cues for handedness. A series of measurements were taken on multiple flake attributes by an analyst who was blind to the true handedness of the stone toolmakers. Although previous experiments have reported differential flake attribute patterns for right- and left-handed stone toolmakers, we found no such pattern overall and were unable to confidently predict handedness.


Major(s) - Biomedical Engineering
Mentor(s) - Chun-Fang Wu (Biology)

Activity and rest in Drosophila: Are certain tissues required for the striking Shaker mutant caffeine response?

- Caffeine consumption has a clear effect of decreasing overall sleep in animals including humans and the fruit fly Drosophila. Fruit flies with various mutations enable genetic analysis of caffeine sensitivity. One variant with already decreased sleep levels is the null mutation of the Shaker gene which encodes the α-subunit of a potassium channel. Because the null mutation renders these channels defective, neuronal activity patterns are severely altered. The decreased
repolarization after an action potential in Shaker mutants causes hyperexcitable neurons that fire action potentials more readily and abnormally. In addition to their already reduced sleep levels, the null Shaker mutants have a somewhat exaggerated response to caffeine compared to wild type flies. However, because the Shaker channel is expressed everywhere in the body, pinpointing the responsible tissues in producing the decreased sleep phenotype and characteristic caffeine response is difficult. A convenient method of localizing the tissues causing these abnormal phenotypes is the Ring-X system in which the mutation is only expressed in certain regions of the body. By analyzing the circadian activity of these “mosaic” flies, we have determined which physical tissues must be mutated to produce characteristic phenotypes of this Shaker mutant.

26. Jessica Detrick

Major(s) - Psychology and Art  
Mentor(s) - Dave Wacker (Pediatric Psychology)

Treatment maintenance was achieved when using telehealth to treat severe problem behavior displayed by children with autism

- Behavior analytic services are often used to treat severe problem behavior (e.g., aggression, self-injurious behavior, destruction) in children with autism. The demand for these services is greater than what is available; one solution is to deliver these services via telehealth. Previous research has shown telehealth to be effective for delivering services; however, less is known about the long-term treatment effects. The current study is evaluating the use of telehealth to coach parents to implement assessment and treatment procedures to reduce their children's problem behavior. The goal of treatment was to replace the children's problem behavior with appropriate communication. Treatment maintenance was evaluated up to 6 months after. Three children with autism and their parents participated; the average reduction of problem behavior by the end of the regular telehealth visits was 99%. Problem behavior remained at zero or near zero levels during the maintenance phase of the study for all participants. Furthermore, task completion and appropriate communication increased for all participants by the end of the regular telehealth visits and remained high during the maintenance phase. Overall, the results demonstrated that long-term treatment maintenance of treatment effects were achieved when telehealth was used to deliver behavior analytic services to children with autism.

28. Benjamin Donovan

Major(s) - Physics & Astronomy  
Mentor(s) - Randall McEntaffer (Physics & Astronomy)

Development of Alignment Techniques for Off-plane X-ray Reflection Gratings

- To study highly-energetic phenomena in the Universe, astronomers use X-ray spectrometers, such as the Chandra X-ray Observatory and XMM-Newton. An X-ray spectrometer separates the X-rays emitted by these highly-energetic sources into a spectrum, similar to a rainbow after a thunderstorm. To produce the spectrum, an X-ray spectrometer uses reflection gratings, which
have a repeating pattern of grooves on their surface. When each X-ray passes over this pattern, it is reflected based on its energy, forming a spectrum of X-rays from the source. The X-ray spectra of highly-energetic astrophysical phenomena, such as black holes and exploding stars, allow astronomers to learn much about the physical processes and properties occurring at these sources. The gratings in an X-ray spectrometer must be aligned to precise tolerances, otherwise the X-ray spectrum becomes smeared and the X-ray energies overlap, reducing the quality of the data. Alignment tolerances have been calculated with computer software, so techniques to achieve these tolerances in the laboratory must be developed. We present the laboratory alignment results obtained thus far from our alignment fixtures.

30. Roxanne Dudovitz  
Shawna Dudovitz  
Major(s) - Health and Human Physiology  
Mentor(s) - Leonard MacGillivray (Chemistry)  
Distinct Hydrogen-bonding Patterns and Reactivity Observed in Co-crystals of 5-fluorouracil

- Efficacy of active pharmaceutical ingredients (APIs) is known to be influenced by formulation methods. Among the formulation strategies being studied for solid form delivery of APIs, co-crystallization has been shown a promising means of improving physicochemical properties relative to effective drug delivery. 5-fluorouracil (5-FU) has been marketed commercially as intravenous and topical formulations for the treatment of numerous forms of cancer. However, the behavior of 5-FU has been poorly studied in co-crystal systems, and currently no solid formulation of the drug is available commercially. Pure 5-FU is known to exist in two different crystalline forms, each with a unique hydrogen-bonding motif. In our studies of co-crystals involving 5-FU, we have observed two distinct patterns of hydrogen-bonding. Each of these patterns shows striking similarity to one of the motifs seen in the pure 5-FU crystals. Further investigation of these co-crystal systems showed that a conversion of the initial system’s covalent bonding occurred when the crystals were exposed to UV light. The structure of the new material was characterized and is the first known case of 5-FU participating in such a reaction.

32. Nicole Enright  
Major(s) - Biology  
Mentor(s) - Maurine Neiman (Biology)  
Genetic variation for mitochondrial function in sexual and asexual freshwater snails

- Why most organisms reproduce sexually is one of the most important unanswered questions in evolutionary biology. Potamopyrgus antipodarum, a New Zealand freshwater snail, is characterized by coexisting sexual and asexual individuals and thus provides an ideal model system with which to study sex. Here, we use P. antipodarum to test the hypothesis that sex persists at least in part because it facilitates the clearance of harmful mutations. We expect that
harmful mutations in metabolic genes, such as those encoded by the mitochondrial genome, will manifest their deficiencies to a greater extent when the organism in which they are housed experiences stress. As such, we use P. antipodarum to study differences in metabolic function across sexual and asexual lineages by measuring oxygen consumption under normal and stressed conditions.

34. Lisa Fasone

Major(s) - Human Physiology
Mentor(s) - Melissa Bates (Health and Human Physiology)

Feasibility of treating the narrowing of the branch pulmonary artery with a proposed stent method

- Branch pulmonary artery stenosis (BPAS) is the narrowing of the major blood vessel, which transports blood from the heart to the lungs. It is a common consequence of the repair of congenital heart disease in infants. A stent, or a small tube, may be placed within the branch pulmonary artery to expand the diameter and relieve the narrowing. However, this intervention is temporary, as these patients will eventually outgrow the stent. Currently, there is no evidence-based treatment recommendation for the care of the children that eventually outgrow a branch pulmonary artery stent. The purpose of our study was to investigate the feasibility of a proposed method of treatment on a pig model. The timeline of treatment in the pigs, following this proposed method, was as follows: 1) surgical creation of 4 mm left pulmonary artery stenosis at age 2-3 weeks 2) stenting of stenosis with 5-7 mm bare metal stent at age 6-7 weeks 3) expansion of stent to 12 mm at age 3 months and 4) fracturing of stent and re-stenting with expandable stent at age 4 months. We evaluated the impact of this treatment scheme on heart and pulmonary artery growth and physiology and found that stenting does not impact total heart and right ventricular growth and stenting does not promote growth of the left pulmonary artery distal to the stenosis.

36. Lindsey Floryance

Major(s) - Biochemistry
Mentor(s) - Michael Schultz (Radiation Oncology, Free Radical Radiation and Biology, Human Toxicology)

Purified Radiogallium for PET Scans Using Polyether Sulfone Filters

- One of the most common imaging technologies, Positron Emission Tomography, uses radioactive gallium-68 (68Ga). Positron Emission Tomography or PET scans are three-dimensional images produced of cancerous cells by the detection of gamma rays emitted by gallium-68 decay. Gallium-68 is used because it has a relatively short half-life of 68 minutes and decays into stable zinc-68 making it ideal for nuclear medical imaging. In order to use 68Ga, it must first be separated from its parent isotope, Germanium-68 (68Ge), using a generator and hydrochloric acid (HCl) to elude the 68Ga off of the 68Ge solid. Although this results in high purity gallium-68, over time due to the high radiation environment, germanium-68
contamination is a result. There is not complete separation of $^{68}$Ga and $^{68}$Ge, about .01% of $^{68}$Ge is found in eluded $^{68}$Ga. Post-separation techniques are needed to eliminate germanium-$^{68}$ contamination as much as possible. With widely available and commercial materials such as Polyether Sulfone filters, purification of $^{68}$Ga is inexpensive and as preliminary results indicate, is successful.

**38. Deidre Funk**

**Major(s)** - Anthropology  
**Mentor(s)** - Jim Enloe (Anthropology)

**Determining the Season of Occupation of a Prehistoric Native American Cave Site**

- Woodpecker Cave is a shallow cave located near the Coralville Reservoir which was occupied between 800-1200 years ago. During this time, Native Americans lived in farming villages and grew corn as their staple crop. If corn was their primary food, why were people living in a cave away from the farming villages? One possible explanation is that the cave was occupied during fall and winter to take food stress off the village area after the harvest. To test this hypothesis, I looked for evidence of seasonal occupation in the animal bones excavated from Woodpecker Cave. I examined the milk teeth of white-tailed deer to determine their age at death. One set of teeth came from a fawn that died at around 6 months old, another came from a deer that died at around 18 months old. As white-tailed deer are born in the spring, these deer must have died in the fall or winter. I also looked for migratory birds. I found a wing bone belonging to a duck genus that is only found in Johnson County during spring and fall migration. The animal bones showed evidence of fall and winter hunting and therefore a fall/winter occupation.

**40. Natani Gallagher**

**Major(s)** - Psychology  
**Mentor(s)** - Arianna Rigon (Interdisciplinary Program)

**Emotion Recognition in the Brain**

- Theory of mind (ToM) is known as the ability to infer others’ mental states, and it is a necessary component of social interaction. ToM is impaired in several neuropsychiatric conditions (e.g., Autism, Asperger’s, Schizophrenia), making understanding this process, even in non-clinical populations, crucial for the development of effective diagnostic tools. We administered two tasks to a group of female students (N=20): a) the Interpersonal Reactivity Inventory (IRI), which measures self-reported ability to understand other’s emotions, and b) the Reading the Mind in the Eyes task, a visual task which assess ToM deficits. Participants then had an fMRI: they would lie still in the MRI scanner and let their mind wander, allowing us to record brain activity at rest. We discovered that participants with higher scores in both tests also displayed more synchronous activity at rest between brain systems important for ToM. Our data is innovative, as it shows that analyzing how different regions activate synchronously at rest could serve as a predictive measure of future social behavior. These findings further our
understanding of how regions of the brain interact to produce ToM, and can direct research on disorders characterized by ToM impairment toward new potential assessment methods. / 

42. Sarah Gillespie

Major(s) - Speech and Hearing Science
Mentor(s) - Amanda Van Horne (Communication Sciences and Disorders)

A Skill for School Readiness: Increasing Complex Language Input in Head Start Preschool Classrooms

- Learning to express multiple related ideas is critical for success both in and out of school. This skill requires the use of complex syntax, or saying two main ideas in the same sentence. Learning complex syntax is influenced by the language use of children’s caregivers—parents who use a wide variety of sentence and verb types have children who develop better language skills. Children from low socioeconomic status are likely to be exposed to less of this complex language than their peers. In this study, we wanted to determine if materials focused on cognitive verbs would lead to greater complex syntax use than materials focused on action verbs. Six Head Start classrooms participated in ten weeks of classroom activities, with half using cognitive verbs and half using action verbs. Recordings of teacher talk showed that teachers used more complex syntax when using cognitive verbs. Sixty-six children from these classrooms were pre- and post-tested on a variety of language tasks, including a story retell that is our current focus. Analysis of the children’s language reveals significant growth in the complexity of their language from pre- to post-test, but no differences were attributable to the different learning conditions.

44. Ryan Glanz

Major(s) - Chemistry, Psychology
Mentor(s) - Jason Radley (Psychology)

Chronic Cocaine Use Decreases Prefrontal Neuronal Plasticity

- The medial prefrontal cortex (mPFC) is an important brain region implicated in human cognitive functioning, and has recently been implicated in controlling drug-seeking behavior and relapse in drug addicts. The connections between nerve cells within the mPFC, called synapses, are critical for prefrontal function. Cognitive dysfunction in aging, stress, and psychiatric illnesses are all characterized by a loss of prefrontal synapses. However, no studies have examined this synaptic remodeling in drug addiction. In this study, we utilized state-of-the-art microscopic imaging and analytical methods to examine whether repeated cocaine administration in rats leads to synaptic changes in prefrontal neurons. We found that rats that repeatedly self-administered cocaine for 12 days showed synapse loss in prefrontal neurons as compared with control groups. Moreover, cocaine use was also accompanied by deficits in short-term memory function, tested by a maze-learning task in which the mPFC has been shown to be a critical mediator. These studies have important implications for understanding how repeated drug use may lead to impaired cognitive functioning.
46. Thomas Heiderscheit

Major(s) - Chemistry  
Mentor(s) - Amanda Haes (Chemistry)

Evaluating Aggregation Dynamics of Gold Nanoparticles using SERS

- When suspended in water, gold particles with diameters less than 10 – 1000 millionth of a meter appear as colored solutions. As the size and shape of these nanoparticles and the chemical composition of their environment change, the colors can be tuned from red to blue. Furthermore, when a matter binds to the particle surfaces, molecules are more easily detected vs. in solution via enhanced fingerprinting but these signals are often irreproducible. In this poster, the size dependent optical properties and molecular fingerprinting capabilities of gold nanoparticles are evaluated as a function of gold nanoparticle size. These time dependent chemical signatures reveal interesting trends regarding how quickly and reproducibly molecular detection can be achieved. Through this understanding, strategies for overcoming issues of irreproducibility for future applications in biological and chemical sensing can be achieved.

48. Marisa Henze

Major(s) - Psychology  
Mentor(s) - Samuel Van Horne (Office of Teaching, Learning, and Technology)

e-Textbook Satisfaction and Adoption with use of a Promotional Video

- E-textbooks are gradually becoming more prevalent in classrooms in place of traditional paper textbooks. The purpose of this research was to encourage better adoption of an e-textbook. This study was conducted from 239 participants in the Foundations of Biology course at the University of Iowa. First we tested e-textbook usage by giving a pre-survey to establish current usage and behavior towards e-textbooks. We then intervened and showed a treatment group a video detailing the most beneficial ways to interact with an e-textbook. A post-survey was given to students to determine any differences between attitudes towards online textbooks between the treatment and control groups. Additional data was also collected regarding time spent taking online quizzes through their e-textbooks and the outcome of these quizzes. After analyzing student’s usage and learning outcomes from the e-textbook, evidence suggested that students who positively interacted with their e-textbook by reading material and using other tools had higher satisfaction with e-textbooks and a deeper understanding of the material. This information is beneficial to professors because it provides insight into how to better help their students succeed in a course that utilizes e-textbooks.

50. Ashley Horne

Major(s) - Anthropology, Interdepartmental Studies - Health Science Track  
Mentor(s) - Erica Prussing (Anthropology)
The Working Mother: Negotiating New Identities After Childbirth

- Expectant mothers in the US are exposed to a variety of professional and popular messages about breastfeeding and its importance in child development. This study examines how first-time mothers in the Midwestern U.S. encounter these messages, develop personal expectations before giving birth, and then renegotiate these expectations while facing numerous barriers to nursing while they return to work after giving birth. Participants were interviewed prenatally and postnatally, and the qualitative data collected was then analyzed for reoccurring themes that show how women’s choices are shaped by contexts that are currently not fully considered in public health and popular messages about breastfeeding. One theme that emerged is explanations for why mothers change their work plans as a result of unexpected child care situations: Are these changes purely due to logistics, and/or also shaped by the challenges of negotiating new identities as both mothers and workers? Such findings of suggest that support for breastfeeding would be strengthened by offering troubleshooting strategies that reflect common challenges that new mothers experience in balancing home and work life. These findings demonstrate how health interventions for new mothers can benefit from attending closely to the mother’s point of view through qualitative research.

52. Nate Hua

Major(s) - Chemistry
Mentor(s) - Chris Cheatum (Chemistry)

Characterizing the Protein Dynamics in the Active Site of Human Carbonic Anhydrase II Using an Infrared Laser

- The dynamic motions of enzymes and how those motions affect the behavior of small molecules in the active site are important to models used for drug design. Using a femtosecond laser to fire a sequence of infrared light pulses at a molecular probe in the active site of wild-type Human Carbonic Anhydrase II (HCA II), we observe that the probe can occupy two states in the active site. We hypothesize that by blocking access to one of the states through a mutation of the amino acid sequence in the active site—we replace the leucine at position 198 with a phenylalanine (a big bulky carbon ring)—we can isolate the behavior of a single state and analyze it. Fitting the wild-type and mutant data to a model based on two states in the wild-type, one of which corresponds to the behavior of the mutant, we are able to calculate the dynamic parameters that characterize both states.

54. Younis Ibrahim

Major(s) - biology
Mentor(s) - Malkova Anna and Cynthia Sakofsky (Biology)

Understanding the role replicative polymerase (Polε) in Break-induced replication (BIR)
• Double stranded breaks (DSBs) are one of the most dangerous forms of damage in DNA. Even one unrepaired double strand break can lead to cellular death. Fortunately, organisms have evolved multiple repair pathways that can repair DSBs; one such pathway is break-induced replication (BIR). Interestingly, even though BIR is a repair pathway, it has been shown to be highly mutagenic and can generate gross chromosomal rearrangements. Little is known about the mechanisms contributing to BIR mutagenesis. I aim to study the role of replicative polymerase (Polε) that may be involved in BIR and may be causing it to have a high mutation rate. I will also determine the types of mutations commonly formed during BIR using genetic reporters that detect frameshift mutations. My preliminary data shows that there is no significant difference between BIR mutation rates in wild-type versus Polε mutants. This suggests that Polε may therefore not play a major role in BIR. I have also found that the types of mutations formed during BIR are predominantly deletion frameshift mutations. This may be a unique mutation signature associated with BIR replication. Overall, understanding what promotes mutagenesis during BIR will provide insight into how this pathway contributes to genome instability.

56. Chen Jing
Zuoyuan Zhao

Major(s) - Math and Statistics
Major(s) - Math and Computer Science
Mentor(s) - Isabel Darcy (Math)

What is the factor really effect our Bike Sharing System?
• Bike sharing system is quiet popular in our life right now. To help improve the system, it is important to find the factor effect the system most. To do that, our project use both math and Stats way to analysis data to find the answer and check the accuracy.

58. Zehra Khan

Major(s) - Chemistry
Mentor(s) - Elizabeth Stone (Chemistry)

Air Pollution at its Finest: Analysis of Particulate Matter in Karachi, Pakistan
• There has been increasing evidence pointing towards poor air quality in many of the mega-cities of South Asia. Specifically, Karachi, Pakistan has been suffering from diminished air quality due to increased private vehicle ownership, absence of public transport, high population growth, as well as having a large industrial base. This study mainly focuses on detecting and measuring the organic components of PM2.5 (particulate matter of less than 2.5 micrometers in diameter) and identifying its sources in Karachi, Pakistan. Filter measurements were collected at location site every 24 hours from January 8th-January 29th, 2006. Following mass measurements taken of samples, the samples were subjected to various instrumental and chemical analyses involving the use of extraction, gas chromatography-mass spectrometry, and total organic carbon analysis. Results show that 24-hour average PM2.5 mass measurements of 170.8μg/m3 exceed
the WHO guidelines of 25μg/m³ by more than seven times. An organic tracer of particulate matter, levoglucosan, produced a 24-hour average of 535.32 ng/m³, indicating that biomass burning was a significant source of organic particulate matter. In addition, other organic tracers for cooking, vehicles, and combustion were also detected. We found that there was not a significant difference between day-of-the-week and weekend concentrations of levoglucosan.

60. Tyler Klenske

Major(s) - Music, Human Physiology
Mentor(s) - Junko Kasuya and Toshi Kitamoto (Anesthesia)

Study of the Relationship Between Epilepsy and Anesthesia Using a Genetic Model Organism, the Fruit Fly

- General anesthesia is used in surgical procedures around the world. It allows for a patient to be unconscious and pain-free during an operation, among other benefits. However, like most drugs, it can have drawbacks. It is well known that general anesthetics can have unpredictable (positive or negative) effects on symptoms of epilepsy, a common brain disorder characterized by seizures. How and why these effects take place is not well understood. Our lab administered commonly used general anesthetics to fruit flies with seizure-like behavior (caused by very specific genetic mutations). After observing these flies as they made the transition to unconsciousness and back, we found that their response to inhaled anesthetics varied greatly based on only a minor change in ion channel genes implicated in epilepsy. Since these ion channels are central aspects of brain function in both flies and humans, our ongoing study is expected to shed light on the relationship between epilepsy and general anesthesia.

62. Michael Korobov

Major(s) - Finance
Mentor(s) - Shagun Pant (Finance)

Impact of Presidential Elections on Gold Prices

- Gold has historically been viewed as a “safe haven” for investors, especially during periods of instability. Various conditions including political instability, uncertainty in the capital markets, rapid inflation, a weak U.S. dollar, and other variables have caused gold prices to rise and fall at various times. These conditions are often very difficult to predict and so profiting on the variability of gold prices becomes a challenge. In the U.S., we have certain periods of time where uncertainty is particularly high. These are the cycles of presidential elections. As each candidate brings along their own unique agenda, political and economic uncertainty is elevated. This paper will attempt to find relationships between the price of gold and these time periods. It will observe 10 presidential cycles and use the year of the election as well as the year prior as the designated “election years”. If such a correlation does exist, investors may be able to obtain a higher level of certainty in their investment of gold bullion during these years.
64. Andrew Kral

Major(s) - Chemistry
Mentor(s) - Tori Forbes (Chemistry)

Uranium Nanotubes Are Capable of Selective Water Uptake

- In the ever expanding universe of nanotechnology, metal organic nanotubes appear to be a sort of dark energy, accelerating us infinitely outward, up along the exponential curve of scientific progress. Some metal organic nanotubes containing uranium have been suggested to exhibit a unique selectivity towards water and, one day, could potentially serve as a pathway for small molecule nano-transport. Much like the mains beneath our streets, metal organic nanotubes could channel and direct water to locations of our choosing, selecting exclusively for water, isolating it from harmful impurities. Fine-tuning this selectivity has been a challenging endeavor and our project set out to uncover more information regarding these nanotubes’ unique properties. We looked at the selectivity of three distinct varieties of uranium nanotubes, and in the end found all three were selective towards water; however, their selectivity depended on humidity, prompting further investigation.

66. Janet Lawler

Major(s) - Political Science, Classical Languages, Journalism
Mentor(s) - David Dowling (Journalism)

Imgur: The Simple Culture Generator

- A banana for scale. A photo essay on a woman’s struggle through weight loss. A “cake day” cat photo. An impromptu support group for a veteran suffering from post-traumatic stress disorder. A series of bird photos, with dogs’ faces expertly photo-shopped to create a collection of “dirds.” These might be found individually anywhere in the innumerable niches of the internet, but they can only be found and rated on their relative importance together in one specific corner of the internet – Imgur, the simple image sharer. Imgur has become much more than its name suggests. No longer is it just an image sharer, in fact it has started a community of Imgur users who react to web material in unique and perpetually changing ways. The Imgur community is the first internet microcosm that shows how the internet can change and generate a new culture. By closing examining the phenomena occurring on Imgur, from culture generation to new language creation and created and enforced community standards, it can more easily be seen as a formula for how the entirety of the internet can change us as a community. Imgur acts as a beacon of what the internet is capable of according not only to social networking theory but also collective action. Imgur stands as a real-time evolving culture generator.

68. Lu Liu

Major(s) - Chemical engineering
Conversion Quantification in Epoxides Annealed after Cationic Photopolymerization

- Annealing, a baking process, is widely used in industry because of its ability to improve the film quality of polymer films. This research looks at the effects of annealing time and temperature on photopolymerized films of an epoxide monomer. Each film was held at a temperature for a specific time period. Because epoxide monomers experience dark cure, annealing was done at 0, 1, or 2 days after curing. A differential scanning calorimeter was used to anneal the polymer, and Raman spectroscopy was used to determine the monomer conversion before and after annealing.

70. Spencer Lundquist

Major(s) - BFA Painting
Mentor(s) - Lynne Lanning (School of Art and Art History)

University of Iowa School of Art and Art History ICRU Involvement

- The Iowa Center for Research by Undergraduates or ICRU program, promotes undergraduate involvement in mentored research and creative projects at the University of Iowa. Statistically the School of Art and Art History has received substantially less ICRU grants than many other colleges at the University of Iowa. We are in the process of conducting research to identify the factors that have led to this discrepancy and hope to find strategies to encourage more undergraduate research in the School of Art and Art History.

72. Jordan Mattis

Major(s) - Psychology; Communication Sciences and Disorders
Mentor(s) - Larissa Samuelson (Psychology)

Decision Making During a Novel Noun Generalization Task

- In order to learn words, young children must pair novel words with novel objects and generalize those newly learned words to other instances. The current study examines children’s decision-making processes as they complete this second task. Previous research has demonstrated that individuals look to visual stimuli when deciding what auditory stimuli mean, suggesting that looking behavior can reveal what people think about while completing different tasks. Other research suggests that after children have a certain vocabulary size, they begin to generalize.
labels to objects as adults do, by choosing objects with the same shape. In the present study, we merged these lines of research by naming a novel object and then asking 17-30-month-old children to pick which of two test objects can be called by the same label. The two test objects matched the named exemplar in either material or shape. Throughout the procedure, we recorded looking behavior to determine when children decide which of the test objects the label applies to. As expected, participants with larger vocabularies more often generalized names for solid objects to test objects that are the same shape, and the looking times suggest that as children’s vocabularies grow, their decision-making times are faster.

74. Nicholas McCarty

**Major(s)** - Biochemistry and Microbiology  
**Mentor(s)** - E. Dale Abel (Internal Medicine/Biochemistry)

**Role of Essential Insulin Pathway Proteins IRS1/2 in the Preservation of Cardiac Function**

- Type 2 diabetes (T2D) is characterized by insulin resistance. Insulin is produced within specialized cells in the pancreas called beta-cells. Insulin then circulates throughout the bloodstream, binding to Insulin Receptor (IR) and Insulin-like Growth Factor 1 (IGF1). The Abel lab seeks to understand essential proteins within this insulin-signaling pathway, which is very important for the maintenance of the heart under conditions of T2D. The present study utilized a mouse in which IRS1 and 2, essential proteins that are activated immediately after IR and IGF-1 in this pathway, were deleted. The mice ended up having heart failure after only ten weeks, which is 60% of all diabetes-related deaths in humans. The mechanism by which this heart failure occurs has been increasingly revealed in the last few months, with additional insight into three essential muscle proteins – Acta1, Tnni1 and Tnni2. Therefore, we have increasing evidence to support the fact that insulin signaling is essential to maintain healthy cardiovascular function. We were able to trace this progression of heart failure with echocardiography (similar to ultrasound) and by looking at the disarray of the heart cells (cardiomyocytes) under a microscope.

76. Astrid Montuclard

**Major(s)** - Chinese, Asian Literature and Languages  
**Mentor(s)** - Helena Laroche (Internal Medicine)

**Water vs. Soft Drinks: what influences undergraduates' choice in UIowa Dining Halls.**

- Sugary soft drinks contribute to obesity and diabetes especially among the youth. In order to understand the water/soft drink consumption patterns of students in in Burge Market Place of the University of Iowa, our research team conducted an intervention study and surveys in September and November 2015. The main questions were: Does promotion of water consumption increase the number of students who ever drink water in the cafeteria? Why do students not consume water? Are students who drink soft drinks in Burge Market place more likely to consume soft drinks outside the cafeteria and inversely? And how often do students plan on drinking water but eventually serve themselves with sugar-containing beverage when
they are in front of the Coca-Cola dispensers in the cafeterias? Over three hundred students filled up the survey each time. The results showed that clearly marking the location of the water dispenser in the dining hall increased the percentage of students ever drinking water with their meal. The main reason given for not drinking water was that they prefer other drinks. Since water shares the same dispenser as soda, once facing the dispenser around 1/3 of students reported switching their choice to soda over half the time.

78. Hain Moon

Major(s) - Science Education
Mentor(s) - Renee Cole and Jennifer Schmidt (Chemistry)

Writing Exam Questions that Elicit Evidence of Process Skills

- As instructors adopt more student-centered instructional strategies that place more emphasis on process skills such as problem solving, information processing, and critical thinking, there is a need to assess these skills as well. For the ANAPOGIL project, exam questions were designed to elicit evidence of process skills in students’ responses. These questions covered broad topic area of analytical chemistry and were embedded in regular course exams at several institutions over a period of years. Student responses were analyzed and coded to document evidence of process skills codes. The data was examined to look for trends among individual students in the same semester, for the patterns in individual schools across multiple years and across institutions coding were generated for information processing, critical thinking, problem solving, and content knowledge. Insights from the analysis will help instructors write exam questions and evaluate student responses to assess and provide feedback on chemistry content knowledge and process skills.

80. Elaine Mou

Major(s) - Electrical and Computer Engineering
Mentor(s) - Yusung Kim (Radiation Oncology)

Evaluating Delivered Dosages of Radiotherapy and Brachytherapy in Cervical Cancer

- Cervical cancer is treated using combined external beam radiation therapy (EBRT) and high-dose-rate brachytherapy (HDR) - which involves implanting radioactive sources within the body – with concurrent chemotherapy. Twelve cervical cancer patients with positive lymph nodes were retrospectively analyzed, all who underwent staging 18F-FDG PET/CT imaging. All patients received 45-Gy EBRT and 28-Gy HDR plans, and seven patients received parametrial or paraaortic boost treatments. A radiation oncologist retrospectively contoured EBRT lymph node treatments by mapping between two scans. The full HDR doses of lymph nodes were calculated by multiplying the first HDR fraction dose by the number of fractions. Four different dosimetric metrics for lymph nodes were recorded to access whether lymph nodes receives clinically appropriate radiation doses through combined external beam radiotherapy and brachytherapy; D100 (the minimum dose of 100% volume of lymph node), D90, mean dose and maximum dose. To normalize fractionation differences, the raw doses were converted into equivalent-dose-in-2-
Gy fractions of external beam radiotherapy (EQD2). The mean EBRT D90 value was 56.1 Gy from the current standard radiation therapy scheme. The additional doses from full HDR fractions were much smaller than prescribed though significant. These dose findings should be considered by clinicians to design dose boosts and avoid toxicity.

82. Hayley Nelson

Major(s) - Psychology
Mentor(s) - Cathleen Moore (Psychology)

Are eye movements and attention affected by 3D surface structure?

- We frequently move our eyes to shift attention between different objects in the environment. Thus, eye movements and attention likely operate with the same visual information. The way we pay attention in our world is also affected by the 3D construction of object surfaces. Because attention is affected by surface structure, and attention and eye movements may rely on the same visual information, we sought to understand whether eye movements are also affected by surface structure. We measured people's eye movements to a target. Sometimes there was also a distractor present, and sometimes there was surface structure such that the target and distractor could appear to be placed on the same or different surfaces. Experiments 1 and 2 found that distractors made eye movements less accurate and slower, but surfaces had no such effects. In a final experiment we added multiple distractors and found that surface structure did significantly affect eye movements: people tended to accidentally look at distractors, but they were more successful at avoiding the distractors when the distractor was on a different surface than the target. This new finding suggests distractors are not always distracting: a complex environment with surfaces can actually help our visual system avoid distraction.

84. Emily O'Brien

Major(s) - Human Physiology
Mentor(s) - Edward Bell (Pediatrics)

Body Temperatures of Very Low Birth Weight Infants on Admission to a Neonatal Intensive Care Unit

- Low body temperature is a common finding in preterm infants. Because preterm infants have immature thermoregulatory capacity, they require a protected thermal environment to limit body heat loss and avoid hypothermia, a potentially dangerous complication. Our study examined the first recorded temperatures of 667 very low birth weight (VLBW <1500 g) infants admitted to the UI Children’s Hospital Neonatal Intensive Care Unit (NICU) between May 1, 2008 and April 30, 2013. The study sought to examine the relationship between birth weight and gestational age with admission temperature for both inborn and outborn infants as well as the frequency of hypothermic and hyperthemic body temperatures among VLBW infants. For purposes of this study, hypothermia was subcategorized into severe (<35°C), moderate (35.0-35.9°C), and mild 36.0-36.4°C). Normothermia was defined as 36.0-37.4°C and hyperthermia was > 37.5°C. Of the infants admitted into the NICU during this time, 75% of admission
temperatures were hypothermic (severe, moderate, or mild), 24% were normothermic, and <1% were hyperthermic. Infant body temperature and its regulation with in the first hours of life are crucial to health and survival. Reducing hypothermia soon after birth has the potential to reduce mortality and improve outcome of preterm infants.

86. Dzevida Pandzic

Major(s) - Human Physiology  
Mentor(s) - Chi-Lien Cheng and Erin Irish (Biology)

Gene Regulation of Asexual Reproduction in Ceratopteris richardii

- In land plants, two distinct generations, gametophyte and sporophyte, alternate to complete the life cycle. Sporophytes undergo meiosis to produce spores, from which gametophytes develop. Gametophytes produce gametes, which participate in fertilization to produce the zygote, the first cell of the sporophyte generation. In addition to this sexual reproduction pathway, some fern species undergo apogamy, a process by which the gametophytes bypass fertilization to generate haploid sporophytes. The model fern Ceratopteris richardii does not reproduce asexually in nature, but apogamy can be induced in a laboratory setting. Here, we investigate the molecular mechanism underlying apogamy by studying the CrANT gene in C. richardii. CrANT belongs to the ANTEGUMENTA (ANT) clade. Members of the Arabidopsis ANT clade play important roles in the regulation of various developmental processes such as formation of stem cells, determination of organ size, and control of embryogenesis. In situ hybridization experiments revealed that CrANT is expressed during sexual reproduction in C. richardii. CrANT expression was seen in mature sperm cells and developing embryos. Further investigation of CrANT by overexpression of transgenic gametophytes resulted in spontaneous production of apogamous sporophytes in C. richardii. To our knowledge, this is the first time any fern gene has been shown to promote apogamy. This inroad will be key to unraveling the genetic regulation in apogamy.

88. Zhen Qin

Major(s) - Chemistry  
Mentor(s) - Vicki Grassian (Chemistry)

Water uptake properties of atmospheric particles

- Particles suspended in the air, aerosols, have great influence on the human health and climate. Aerosol particles can scatter and reflect incoming solar radiation and thus cool the atmosphere. They can facilitate the formation of clouds, which in turn also scatter and reflect sunlight not allowing it to reach the Earth’s surface. The scattering ability of particles depends on their size. As particles take up water they become larger and therefore scatter more light and better cool the surface of the Earth. Additionally, the presence of water molecules can assist reactions with gases that do not proceed on a dry particle’s surface. In this study we investigated how different components such as ammonium sulfate and sodium chloride, salts that are often found in the
atmosphere, interact with water vapor. Additionally, we have studied how mixtures of these salts with other compounds changes their water uptake behavior.

90. Naielah Roberts

Major(s) - Cultural Anthropology, French
Mentor(s) - Deirdre Egan (Rhetoric)

Power and Personal Space

- Comfortability for and respect in multi-racial/ethnic, co-ed spaces in exemplified by much more than verbal affirmations of liberaldom, progressiveness, or anti-racism. Instead, the way that people truly feel is most evident when they are absent-mindedly, or rather subconsciously navigating and occupying these spaces. people wish to carve out space for themselves to move from point A to point B comfortably, however, some people's wishes are obscured by those of others. through evidence from recorded observations, my research argues that within social context, particular individual's overburdening of public spaces is indicative of entitlement that they are afforded at the expense of others.

92. Brenda Rocha

Major(s) - Nursing
Mentor(s) - Sandra Daack-Hirsch (College of Nursing)

What makes the risk for T2DM matter to people who have a positive family history?

- The aim of the overall study is to understand how non-diabetic individuals internalize their own risk to develop Type 2 Diabetes. My focus is on a particular concept of the study, salience, defined as what makes Type 2 Diabetes matter to individuals who have had their family members diagnosed with the disease. We interviewed a diverse group of interested participants then used the resulting text to identify unique factors that participants expressed as salience: 1) Developing T2DM matters to me because (e.g., overall health) 2) I think about my risk because (e.g. event or educational experience) 3) Identification of components of the familial risk perception model 4) I feel at risk because (e.g., getting older) 5) I do/do not think about my risk. As a preliminary finding of this data, we conclude that risk perception of non-diabetic individuals whose family has been affected by Type 2 Diabetes is far more complex than previously thought.

94. Kristy Sakurai

Major(s) - Health & Human Physiology
Mentor(s) - Toshihiro Kitamoto and Patrick Lansdon (Anesthesia, Neurobiology)

Dietary Therapy for Epilepsy and Sleep Abnormality: a Fruit Fly Model
Most neurological disorders have strong genetic components, but disease severity can be heavily affected by a range of environmental factors. As food is one of the most influential and controllable factors in the environment, establishing dietary modifications that have beneficial effects on disease outcome is considered a promising approach for treatment. This expectation has led to the development of dietary therapies for various brain disorders, including epilepsy. They are particularly appealing in that they are natural, economical, non-invasive, and not expected to have serious side effects. Unfortunately, the mechanisms underlying their beneficial effects remain poorly understood. We are using a model animal, the fruit fly Drosophila melanogaster, to study how diets affect neurological defects caused by genetic mutations. Here we show that a simple dietary modification significantly improves seizures and sleep abnormality displayed by fly mutants with known genetic defects. Because basic biology is well conserved between flies and humans, our study is expected to provide fundamental information about the mechanisms underlying effective dietary therapies for epilepsy and sleep in humans.

96. Genna Schneeberger

Major(s) - Speech and Hearing Science
Mentor(s) - Alison Lemke (Communication Sciences and Disorders)

Aphasia Reading Club Outcomes and Best Practices

The purpose of this study is to examine the reading comprehension and social outcomes of the Aphasia Reading Club (ARC) at the University of Iowa. Aphasia is a language disorder due to damage to the areas of the brain responsible for the formulation and understanding of language and its components. ARC is a weekly opportunity for those with aphasia to work on reading skills in a group environment. Determining overall group satisfaction and perceived benefit over time will help us to assess the effectiveness of group therapy for reading, the social benefits of participation in a reading group, and thus to formulate best practices for individuals with aphasia. ARC participants are divided into blue group for those with less severe impairments and red group for those with more severe impairments. ARC sessions include separate small group sessions to review previously read material, a combined large group session with a review of reading strategies and a read aloud activity, and discussion of the text including basic content or inferential questions. Treatment outcomes, as perceived by participants, were measured with a questionnaire survey. Survey questions were organized into one of four categories: Mechanics, Group Goals, Improvement/Strategy Use, and Reading and Discussion Content.

98. Katie Skinner

Major(s) - Dance, English
Mentor(s) - Rebekah Kowal (Dance)

Tracing Tracks: “Viewing” Dance in its Absence
For the past two years, my research has dealt with understanding “foreign” or “ethnic” dancers as situated in the United States in the 1940s-1950s. I began by questioning how American audiences perceived the performances of these “foreign” dancers. While the dancing itself is crucial to dance research, the inability to watch and experience live performances of the past requires a rendering of the viewing experience. My look at dancers Ram Gopal and Maria Tallchief led me through two opposing approaches in exploring, understanding, and extracting available archival information and artifacts. By researching Gopal’s situation in the U.S. from the outside in and Tallchief from the inside out, I confronted unexpected tracks that have caused me to take a step back and look at the record of my work done. In mapping the trail of my methodologies, I synthesize my research as a sample of possible routes taken by dance researchers in an effort to make sense of the irretrievable past of dance performance.

100. Katelyn Sobotka

Major(s) - B.B.A. Economics; B.S. Sport and Recreation Management
Mentor(s) - John Solow (Economics)

DI FBS Football Head Coaches -- Coaching for the Win or Coaching for the Draft?

What constitutes a successful Division I head football coach in the Football Bowl Subdivision (FBS) is often determined by their ability to add value to the team by generating on-field wins and post-season success. Another way in which a Division I head football coach can be considered successful is by their ability to add value to the individual players on their squad by getting them drafted into the National Football League (NFL). Highly regarded studies have been done and papers have been written concerning the former definition of a successful Division I head football coach. Our research is to determine the latter definition of what contributes to a head football coach’s ability to successfully add value to the individual player. We plan to do this by using various economic analysis tools on a large data set to determine which coaches are most successful at taking recruits, specifically low-star recruits, and having them drafted into the NFL after participation in their football program. We will also analyze characteristics of such coaches and use the similarities to attempt to create a model of what constitutes a head football coach that is successful at adding value to the individual player.

102. Hadiatou Sow

Major(s) - Human Physiology
Mentor(s) - Christopher Ahern (Molecular Physiology and Biophysics)

Expanding the genetic code

The targeted expression of unnatural amino acids (UAAs) is a powerful approach that has been used to divine atomic resolution insights into the function and pharmacology of more than 25 ion channels and receptors. The incorporation of UAAs in eukaryotic cells relies on the nonsense suppression methodology, in which a stop codon is incorporated in the gene at the site of interest that is subsequently ‘suppressed’ by a transfer RNA (tRNA) carrying the stop anti-codon. This tRNA is orthogonally prepared and chemically ligated in vitro to the desired UAA.
My work focuses on optimization of current tRNA acylation approaches, the use in the study of ion channel proteins and incorporation of novel fluorescent unnatural amino acids to explore the macromolecular composition and function of ion channel complexes.

104. John Staak

Major(s) - Marketing & Management
Mentor(s) - William Hedgcock and Nick Westergaard (Marketing)

What makes Facebook content engaging? An analysis of content from the 14 Big Ten Universities

- The purpose of this study was to investigate what makes Facebook content engaging to an audience. The two major factors studied were “Content Medium” (whether content contained text, photos, links, or embedded videos) and the “Nature of Content” (the theme associated with the post, such as athletics, research, student life, etc). The effect of text and video length on engagement was also considered. Posts were divided into the following categories in terms of “Content Medium”: Text, Text with Photo, Text with Link, Text with Link and Photo, and Video. Posts were also categorized by “Nature of Content,” which included over 60 possibilities. Only the most frequently recurring “Nature of Content” categories (minimum of 30 posts) were examined. In order to determine which types of posts are most engaging, the mean engagement rate (the percentage of likes, comments, and shares received by a page’s entire fan base) was compared between content categories.

106. Sarah Strack

Major(s) - Microbiology
Mentor(s) - John Kirby (Microbiology)

Myxococcus xanthus and Bacillus subtilis: A Bacterial Predator-Prey Interaction

- Myxococcus xanthus and Bacillus subtilis are soil-residing bacteria that display complex behavior in response to different environmental stressors. Both bacteria are able to make spores and biofilms and produce a wide range of secondary metabolites. Secondary metabolites are molecules that are not required for the survival of an organism, but serve other functions that may increase an organism’s fitness. They are commonly used for communication and defense. Some pigments and antibiotics are examples of secondary metabolites produced by many microbes. M. xanthus is a bacterial predator that utilizes direct cell contact, motility, and the secretion of lytic enzymes and secondary metabolites in order to efficiently consume a broad range of prey. In contrast, B. subtilis NCIB3610 resists predation by M. xanthus due to the production of a secondary metabolite. To identify genes involved in this interaction, we randomly mutagenized the M. xanthus genome and tested the mutants for their capacity to engage in predation of B. subtilis.
108. Collin Thatcher

Major(s) - Human Physiology  
Mentor(s) - Maurine Neiman (Biology)

Sexual Evolution of a New Zealand freshwater snail

- I am focused on analyzing nuclear-encoded mitochondrial genes in the freshwater New Zealand snail Potamopyrgus antipodarum. The species is unique in that some lineages are asexual while others reproduce sexually, all descending from a sexual lineage. Electron transport chain genes were chosen to analyze because they are encoded in the nucleus but function in the mitochondria (NEM), and because mitochondrial genomes are inherited maternally, they experience different selective pressures than the nuclear genome. In order to better understand what is causing this selective pressure to asexual reproduction, I am using PCR and other analytical methods to evaluate how reproductive mode influences coevolution of NEM genes versus the nuclear genome. Using the two, comparisons can be made to find mutation rates in sexual versus asexual lineages. In doing so, I will be able to find out why asexual reproduction, which tends to accumulate deleterious mutations, is being favored over sexual, which tends to eliminate these harmful mutations through recombination. The experiment is now in the process of sequencing the genes of an out-group Potamopyrgus estuarinus to have a comparison to see which genes are being undergoing selection.

110. Helaina Thompson

Major(s) - Health Science, Journalism, Engaged Social Innovation  
Mentor(s) - Christine Petersen (UI College of Public Health Department of Epidemiology)

Treatment of Canine Leishmaniasis with Canine Specific Antibodies

- Many dogs are susceptible to infectious or chronic disease similar to humans. Diseases and conditions such as cancer, arthritis, inflammatory bowel disease, leishmaniasis, toxoplasmosis, and Lyme disease are a few of the shared conditions between humans and dogs. Most of these diseases can be treated with supportive therapy, anti-inflammatory, antibacterial or antiparasitic drugs. However, some patients will not respond to treatment. Furthermore, most of these conditions go undiagnosed and after an extended period the individual can develop a weakened immune system. Not only does this lead to a poor outcome for the individual suffering from the disease but can drive other infections or opportunistic conditions. As the immune system becomes weak, there are ways to help facilitate recovery. Certain proteins can be targeted at a cellular level to allow for the immune system to recover. These proteins have been observed to be beneficial targets in many human diseases such as HIV/AIDS and cancer. To date there has been no clinical work to demonstrate immune recovery in dogs, however our laboratory research has given hope to possible treatment. The experiments performed will allow for development of immune strengthening proteins for many chronic diseases observed in dogs.

112. Jocelyn Todd
Finite Element Analysis of a Stemmed Total Ankle Replacement

- Osteoarthritis of the ankle can cause pain and hinder ankle movement. If non-surgical treatment methods, such as pain medication or rehabilitation, are unsuccessful, surgical intervention options may be implemented. These include ankle fusion or joint replacement. Ankle replacement offers a greater potential for joint mobility; however, if complications occur (such as loosening) the device is often removed and the joint is fused. Ankle replacement is still a relatively new technology and has experienced lower success rates than other joint replacement procedures, such as hip and knee replacements. Using finite element analysis, I am developing a computational model of a total ankle replacement which is available today to investigate its specific unique features. Ultimately, the model will include soft tissue such as cartilage and ligaments to increase its accuracy. A separate model of a normal ankle will also be created and the models will be compared to show how the implant replicates normal ankle stresses. Furthermore, the model with the implanted device may show areas where stress is concentrated and could indicate a higher risk of complication.

114. Heng-Wei Tsai

Major(s) - Civil/Environmental Engineering
Mentor(s) - Marian Muste (Department of Civil/Environmental Engineering)

Acoustic Mapping Velocimetry Proof-of-Concept Experiment

- Knowledge of sediment dynamics in rivers is very important for various purposes. Despite its high relevance in riverine environment processes, sediment rates monitoring remains a major task for both suspended load and bedload estimation. Although the measurement of suspended load is currently an active testing area, bedload measurement does not mark a similar progress. This research describes an innovative combination of measurements techniques and analysis protocols that establishes the proof-of-concept for a promising technique, labeled herein Acoustic Mapping Velocimetry (AMV), which estimates bedload using non-intrusive measurements acquired in rivers developing bedforms. The raw information for AMV is collected with acoustic multi-beam technology that provides maps of the river bathymetry over swaths of the river cross-section (acoustic mapping). When acoustic maps are acquired then the repetition rate for the mapping is commensurate with the movement of the bedforms. Conversion of the bed elevation maps in homologous gray-levels images following by application of particle image velocimetry concepts to the obtained maps. Afterwards, it transfers the bedform dynamics as two-dimensional velocity maps. The technique represents a solid approach for in-situ measurement of the bedform dynamics either as a distribution of bedload rates over the stream cross section or as a bulk bedload rate in the streamwise direction.

116. Sarah Van Dorin

Major(s) - Biochemistry
Mentor(s) - Ronald Weigel (Biochemistry)

Modifications of Transcription Factors are Associated with Cancer Stem Cells

- Cancer stem cells are characterized by their ability to metastasize and efficiently seed new sites. Our lab's goal is to identify the relationship between cancer stem cells and transcription factors. We hope this insight will reveal new strategies that might allow more targeted therapies against cancer stem cells. The current study utilizes anacardic acid as an inhibitor of SUMOylation, which is a known post-translational modification of various transcription factors. Treatment of breast cancer cells with anacardic acid decreased both brain and breast cancer cell viability in the test tube. To establish physiologic relevance, we xenografted anacardic acid pretreated breast cancer cells into mice. We found that pretreatment led to a decrease in tumor growth. Moreover, loss of SUMOylation resulted in a decrease in the amount of protein associated with cancer stem cells in both brain and breast cancer. Therefore, these results suggest that anacardic acid or other SUMOylation inhibitors might be novel therapeutics for the treatment of brain and breast cancer.

118. Rachel Vasquez

Major(s) - Psychology
Mentor(s) - Andrea Gutman and Caitlin Cosme (Psychology)

Utilizing lasers to silence neural systems involved in the consolidation of memory

- Addiction has enormous societal costs. Drug-seeking behavior along with relapse are common problems in society. The aim of the present study is to examine this latter aspect of addiction by isolating the neural system that is associated with these learned behaviors. Studies have shown that structures inside of the prefrontal cortex are associated with the consolidation of memory. The infralimbic cortex plays a key role in the consolidation of cocaine-seeking behavior and was examined in this particular study. Rats underwent a self-administration phase where they pressed a lever to receive infusions of cocaine. They were then removed from all cocaine in an extinction period. To model relapse in humans, rats underwent a reinstatement process allowing cocaine-seeking behavior to be observed. In the present study, optogenetics is being used to block the neural activity in the IL. Rats were attached to probes that utilized lasers to turn off and on the IL during the extinction training sessions. After inactivating the IL during the initial days of extinction training, we are now beginning to observe its affects on the consolidation of the learned task. Our hypotheses suggest that the inhibition of the IL by optogenetics would impair retention of the extinction training.

120. Josh Volker

Major(s) - Biomedical Engineering
Mentor(s) - Dale Abel and Rhonda Souvenir (Internal Medicine)

The Role of OPA-1 Protein on Mitochondrial and Platelet Function
Cardiovascular diseases are the leading cause of death in the United States according to the Center for Disease Control. Vascular occlusion, which is the blockage of a blood vessel typically caused by a clot, is a common condition of these diseases. Mitochondria are the powerhouses of cells that generate much of the energy required for cellular function. Our study seeks to determine the effect mitochondria have on platelets, and whether or not dysfunctional mitochondria can induce changes in platelets, which ultimately trigger this clotting. To determine this, we studied the role of Optic atrophy 1, a protein that is critical for mitochondrial health, with the direct purpose of establishing how the absence of this protein affects the function of mitochondria and subsequently the function of platelets. For these experiments we generated genetically modified mice that lack this protein in the platelets but not in other cells. We then collected the platelets from these mice and evaluated platelet and mitochondrial function. The genotypes of all mice were recorded, and the primary confounding variables were controlled for throughout the experiment. Ultimately, we found that dysfunctional mitochondria promote higher levels of clot formation.

122. Gabrielle Watson
Major(s) - Communication Sciences and Disorders
Mentor(s) - Lenore Holte and Amanda Owen Van Horne (Communication Sciences and Disorders)

Determining Demographic Factors That Cause Lost to Follow-up After Newborn Hearing Screenings

- Purpose: To determine demographic variables that may contribute to an increase of children lost to follow-up after a newborn hearing screening. To evaluate the performance of Iowa hospitals are at screening for hearing loss and entering child into early intervention.

Methods: By collecting information from the electronic birth certificate database, we were able to perform a linear regression to identify the relationship between distance from residence to pediatric diagnostic audiology clinic, urban or rural residence, and maternal education level and whether a child was lost to follow-up. The performance evaluation of Iowa hospitals was achieved counting the number of children who were lost to follow-up and who received follow-up at each hospital after being referred from a newborn hearing screening. Recording whether the child received any diagnosis of hearing loss, normal hearing, or lost contact after hearing screening gave us information on whether the child was lost to follow-up or received follow-up.

Results: Of the variables tested, distance away from pediatric diagnostic audiology clinic and lower maternal education level were significantly associated with children who were lost to follow-up.

Conclusion: Results suggests more targeted training for audiologists/health and more caregiver information materials written at a level appropriate for all education levels as possible solutions for decreasing the amount of children lost to follow-up.

124. Tom Werner
Max Clapp
Major(s) - Computer Science, Math
Major(s) - Computer Science
Capturing Middle School Messages to Understand Cyberbullying

- Finding cyberbullying is like looking for a needle in a haystack, except we don’t have a haystack and we don’t really know what the needle looks like. In order to identify occurrences of cyberbullying, we have to know what it looks like when someone is being bullying online and we also need to have the haystack, or the context and information in that person’s online life. Our study focuses on collecting that haystack of data to find what cyberbullying really looks like. To do this we developed an application to capture the Facebook, Twitter, and SMS data from middle school students. We do this using an Android app, a server based data collection suite, and a server for storing and analyzing the data. Finally, we also gain context on the downloaded information by periodically sending out surveys to the study participants to allow them to identify when they feel bullied. Through this multifaceted approach, we can securely collect the data of all of our study participants, analyze it, and allow for their input on when they see bullying. With all of this we will be able to better define and pinpoint occurrences of cyberbullying.

126. Christopher Winters

Major(s) - Biomedical Engineering
Mentor(s) - Isabella Grumbach (UIHC Internal Medicine)

CaMKII Inhibition Prevents the Development of Pulmonary Fibrosis

- Pulmonary fibrosis is a progressive, terminal disease for which very few treatment options exist. In pulmonary fibrosis, the programmed cell death, called apoptosis, of cells called type II alveolar pneumocytes is known to happen early on in the development of the disease. Our laboratory studies the calcium and calmodulin-dependent kinase II (CaMKII) in various disease states. Because CaMKII is known to induce programmed cell death, in this study, we investigated whether the inhibition of CaMKII would diminish apoptosis and the development of pulmonary fibrosis. To do this, we first developed a transgenic mouse which exclusively expressed an inhibitor of CaMKII in type II pneumocytes. After inducing fibrosis in these mice, and their wild-type littermates, we found that CaMKII inhibition reduced the development of pulmonary fibrosis. Next, we grew a special line of mouse type II alveolar pneumocytes (MLE-12 cells) in culture, and selectively expressed a CaMKII inhibitor using a virus. By treating normal cells with Bleomycin we were able to induce apoptosis in normal cells, while in MLE-12 cells treated with Bleomycin where CaMKII was inhibited, apoptosis was reduced. These data suggest that the inhibition of CaMKII may be a promising approach to prevent the progression of pulmonary fibrosis.

128. Ashley Wiser

Major(s) - History
Mentor(s) - Michael Hall and Christine Skow (Military & Veteran Student Services)
**Development & Theory of Student Veteran Relationship Workshop**

- This is a program focused on the transition of service members from their service time to academic and later professional careers. These free, couples workshops are a light-hearted, strengths-based approach where the facilitators make no assumptions that couples are struggling in their relationships, and participants are not expected to share personal information with the group. Instead, this program is a skill-building course in a comfortable setting with a “date night” theme. These workshops are part of a larger project designed to assist current or former service members in their academic and professional careers with services such as career planning, community outreach, academic skills, and couples/parent workshops. While initial participant responses to these workshops are positive, data is not yet available. Research indicates that building better partner relationships will strengthen other areas of a student veteran’s life including academics and/or career.

**130. Angela Zhang**

**Major(s) -** Biochemistry, Statistics  
**Mentor(s) -** Jacob Michaelson (Psychiatry)

**Gene expression analysis of epilepsy**

- Epilepsy is a debilitating and complex brain disorder that affects more than two million people in the United States. There is strong evidence of a genetic basis, and presumably one of the primary molecular consequences of causal genetic variation are changes in gene expression. Recent advancements have enabled the large-scale survey of the expression of all genes simultaneously through the sequencing of mRNA molecules (RNA-seq). Here we present such a large-scale study of gene expression, comparing healthy and diseased brain tissue from the same patient. We hypothesize that genes differentially expressed between these tissues are involved in the pathology of epilepsy. In collaboration with the lab of Dr. Alex Bassuk, and with tissue procured by Dr. Andrew Grossbach, we have analyzed RNA-seq data from three patients with epilepsy. We also used publicly-available brain gene expression data from control subjects as a baseline. We found 144 genes to be significantly differentially expressed, and when these genes were assessed for functional enrichment, we found that a number of processes, including MAP kinase signaling, were perturbed in the diseased tissue of the epileptic patients. These findings underscore the important role of dysregulated signaling cascades in the pathology of epilepsy.