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.

ICRU Director
Bob Kirby
bob-kirby@uiowa.edu

ICRU Assistant Director
Lindsay Marshall
lindsay-marshall@uiowa.edu

www.uiowa.edu/icru
319-335-8336
icru@uiowa.edu
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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)

Lef-1 Over-expression Significantly Improves Innate Immune System

- Submucosal glands are essential for proper airway function and assist in lung innate immune response. Submucosal glands harbor an array of stem cells and the submucosal glands are considered the “stem cell niche” of the airway. During early development of the glands, induction of a transcription factor called lymphoid enhancer-binding factor 1 (Lef-1) is required. Since Lef-1 is needed in glandular development, we sought to ask two questions: Does the overexpression of Lef-1 increase the size of submucosal glands and does Lef-1 expression change the types of cells in glands? When Lef-1 is overexpressed, we found significantly more cells in the submucosal glands and more proliferating cells. Specifically we found an increase of lysozyme expressing serous cells. Lysozyme is very important for an innate immune response because it lyses gram-positive bacteria. This is very relevant to a number of diseases such as cystic fibrosis, chronic bronchitis and asthma. Each of these disease promote changes in airway gland mass and can also alter the ability of the lung to kill inhaled bacteria (for example as in cystic fibrosis).

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

- Commercially available onium salt photoinitiators (PIs) absorb UV light to form active centers for cationic photopolymerization. However, the number of photons produced by commonly used Hg lamps is relatively low in the spectral region of the onium salts. Coumarin is a photosensitizer that can be mixed with these PIs 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. In this research, we characterize the UV-vis absorption of these Coumarin-modified PIs and compare their efficiency in initiating polymerization with various wavelengths of light with respect to traditional PI systems, as well as those combined in solution with Coumarin.
5. Lok-hang Au
    Hau-Yih Chang

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

Relationship between healthcare spending and morality rate state by state

- We would like to find out if there is a pattern among medical expenditure and death rate by state. Whether it is directly proportional or inversely proportional to each other, we are going to use a linear regression model to investigate the correlation coefficient. If the correlation coefficient is close to 1, they correlate positively. If the correlation coefficient is close to -1, they correlate negatively. If the correlation coefficient is close to 0, they do not correlate.

7. Rebecca Barrett

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

Direct Bioprinting of Vascular Contructs 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 preferred material for such a profusion system, because Alginate is biocompatible, and is cost effective. The inability to adequately perfuse media to interior tissue results in decreased cell viability and decreased coherence of printed tissue. As a result only very small thickness structures have been printed. To help improve the cell viability of printed structures we are developing artificial vascular conduits vessel using biomaterials / 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 pure alginate vasculatures. /

9. Jay Blomme

Major(s) - Health and Human Physiology
Mentor(s) - Vitor Lira (Health and Human Physiology)

Role of Autophagy in Skeletal Muscle Re-Growth After Ischemia

- Peripheral Artery Disease (PAD) affects around 8 million people in the U.S., but treatment is lacking. Autophagy, a catabolic process required for cell efficiency and energy homeostasis, may
hold therapeutic potential. In this experiment, we used a mouse model of PAD. The left femoral artery was ligated, causing profound ischemia and muscle atrophy, while keeping the right artery open to serve as a control. The goal was to define the flux and overall activation of autophagy shortly after the ischemia onset and during the 1st and 2nd week of recovery as blood flow was slowly re-established. Analysis of samples from the tibialis anterior muscle revealed that signaling for autophagy stimulation (i.e., increased phosphorylation of AMPK (Thr172) and of ULK1 (Ser555)) occurred at both 1h and 3h post-surgery; however this was not immediately translated into higher autophagy flux (assessed via LC3-II/LC3-I and p62 protein levels). Interestingly, high autophagy flux was observed at 1 week post-surgery based on a ~60% increase in LC3 II/I and a ~90% decrease in p62. At this point blood flow had recovered to about 60% of the contralateral leg. These preliminary findings suggest that autophagy may play an important role in muscle recovery and re-growth after ischemia.

11. Alex Brown

Major(s) - Biomedical Engineering
Mentor(s) - James Ankrum (Biomedical Engineering)

Controlled Flow Focusing of Injectable Mesenchymal Stem Cell Microcarriers

- Chronic inflammation and damage to the vasculature prevent diabetic wounds from undergoing the normal healing process. Mesenchymal stem cells (MSCs) have shown promise in the treatment of diabetic wounds by reducing local inflammation as well as promoting tissue and vasculature regeneration. Currently, delivery of MSCs is limited by poor short-term engraftment and survival. To retain MSCs after injection, we are developing injectable biodegradable microcarriers. We have designed flow focusing emulsion devices capable of creating monodisperse microparticles 50µm – 250µm in diameter. Poly(lactic-co-glycolic acid) (PLGA) microparticles are generated by creating emulsion droplets when disperse phase (QD) PLGA in dichloromethane and continuous phase (QC) 1% solution of polyvinyl alcohol meet a common orifice. Casting PDMS from high-resolution 3D printed molds and focusing devices created from standard hypodermic needles generates these emulsion droplets. Oxygen-plasma surface treatment of 3 mins at 200W, facilitates conjugation of 1mg/ml fibronectin to the microparticle surface; promoting 88% of carriers to be loaded with MSCs. The next steps are to optimize cell attachment and evaluate phenotypic changes to MSCs seeded on microcarriers, when in the presence of lymphocytes.

13. Emma Buchele

Major(s) - Nursing
Mentor(s) - Daniel Lusche (Biology)

PTEN Redundancy in Cancer: Overexpressing PTEN Homologs as a strategy to normalize Cancer cells.

- Mutations in the tumor suppressor gene PTEN are associated with a significant proportion of human cancers. Because the human genome also contains several homologs of PTEN, we
considered the hypothesis that if a homolog, functionally redundant with PTEN, can be overexpressed, it may rescue the defects of a PTEN mutant. We have performed an initial test of this hypothesis in the model system Dictyostelium discoideum, which contains an ortholog of human PTEN, ptenA. Deletion of ptenA results in defects in motility, chemotaxis, aggregation and multicellular morphogenesis. D. discoideum also contains lpten, a newly discovered homolog of ptenA. Overexpressing lpten completely rescues all developmental and behavioral defects of the D. discoideum mutant ptenA-. We now test this hypothesis in human cells using a breast cancer cell line model. First, we describe phentotypic differences between a cell line, PTEN-/-, that was somatically mutated by eliminating Exon 2 of PTEN and wiltype MCF10A cells. Secondly, we identify PTEN homologs in this cell lines to overexpress them in PTEN-/- 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 using Johnstone's Triangle for levels of representations, Toulmin's Model of Argumentation, and the Inquiry Oriented Discursive Moves frameworks. 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 an electronic device used to treat individuals with profound hearing loss. Rather than simply amplifying sound, CIs work by stimulating the auditory nerve directly. Since the mid-1990's, CIs have been equipped with neural response telemetry systems (NRT) that allow electrically evoked compound action potentials (ECAP) to be measured. ECAPs are used to program the implant. Since the mid-1990's, cochlear implant technology has improved considerably. Many of those changes affect the way ECAPs are measured. The goal of this retrospective study was to describe how these changes in the implanted electronic components impact ECAP threshold and growth functions. Data from 42 Nucleus CI24M and 26 Nucleus CI24RE CI users was analyzed. Results show that individuals who use the older CI24M device have higher thresholds and steeper growth functions than individuals who used the newer CI24RE system. These differences in the ECAP growth functions can be attributed to two basic
design differences: the intracochlear electrode in the CI24RE device sits closer to the surviving auditory nerve fibers and the noise floor of the measurement system is lower. Clinical implications of these findings are discussed. / / This work was supported by a grant from the NIH/NIDCD: P50 DC000242 /

19. Samantha Crooks

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

A comprehensive examination of procedural memory abilities following Traumatic Brain Injury

- Traumatic brain injury (TBI) is a complex injury that results in many cognitive impairments including in attention, communication, and memory. The traditional view on memory and TBI is that declarative memory is impaired, while procedural memory is intact. However, little work has been conducted systematically testing procedural memory abilities in TBI. This study examines the acquisition and retention of different procedural memory abilities following TBI. We hypothesized that, due to diffuse damage following TBI, the underlying neural structures supporting procedural memory would not be left uniformly intact. Given the heterogeneity of the population, we also hypothesized variability in procedural memory status. We tested these hypotheses in a group of individuals with TBI (n=18) and a healthy comparison group. Participants completed a comprehensive battery of procedural memory tasks including Rotor Pursuit (RP), Mirror Tracing (MT), and the Serial Reaction Time task (SRT). 17 of 18 participants with TBI were impaired on at least one task and 8 of the 18 were impaired on 2 or more. These findings suggest that the procedural memory system is not uniformly intact following TBI. 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)

Examining the interaction of feedback and training schedule during motor-skill learning

- Understanding the factors that promote motor skill learning is useful for everyone, including athletes and clinical populations. Rewarding feedback on a motor task and a variable training schedule has been found to individually promote motor skill retention. However, the effects of combining rewarding feedback and a variable training schedule have yet to be examined. The current experiment examines the interaction between feedback and type of training schedule by dividing participants into four groups (Reward-Variability, Reward-Blocked, Punished-Variability, and Punished-Blocked). Participants performed a motor skill task in which they traced a path on a screen using a mouse. The reward groups started the experiment with zero dollars and gained five cents for every correct tracing and the punishment groups started with nine dollars and lost five cents for every unsuccessful trace. The blocked groups practiced three different mazes for 60 trials, whereas the variable groups experienced a random assortment of the three mazes for 180 trials. Surprisingly, the Reward-Variable group experienced significantly reduced motor skill retention the next day (Interaction – p < 0.001, η_p^2 = 0.338). 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)

Investigating the role of Srs2 in the Double Strand Break repair pathway Break-induced Replication (BIR)

- Break-induced Replication (BIR) is a conservative DNA repair pathway that specifically repairs double stranded DNA breaks (DSB) and is known to be highly mutagenic and can lead to various chromosomal rearrangements. Recent studies have revealed important features of BIR, however, many aspects of this pathway remain unknown. Currently, I aim to understand how the helicase protein Srs2 functions during BIR. I will focus on how particular domains of this protein interact with Rad51 and PCNA during BIR. Using the yeast Saccharomyces cerevisiae as a model organism, I have used genetic analysis to examine the viability of various srs2 mutants, and the chromosomal structures of BIR repair products after repair of a DSB by analysis of Pulse Field Gel Electrophoresis (PFGE). During the BIR repair event I collected samples to analyze the structure of BIR intermediates, which produced a phenotype that indicates an arrested branched intermediate structure approximately 4-6 hours after BIR started. The prolonged arrest of these
intermediates leads to the loss of the donor chromosome. These data indicate that Srs2 is required for BIR. Hereafter, I plan to continue experiments to further determine the interactions of SRS2 with other proteins and to uncover the role of Srs2 during BIR.

27. Michael Dolan

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

Particulate Emissions From Globally Important Biomasses

- 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 via gas chromatography mass spectrometry. 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 composition 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 specific knockout of glucose transporter 1 leads to gender specific alterations in metabolism, platelet activation, and bleeding

- Patients with diabetes display increased thrombosis, platelet activation in conjunction with increased circulating glucose. For glucose to enter a platelet under basal conditions, it must be taken up by the glucose transporter 1 (GLUT1) protein. To test the hypothesis that decreased GLUT1-mediated glucose uptake will lead to decreased glucose metabolism and energy production causing a decrease in platelet activation; we generated mice with a platelet specific knockout of GLUT1. Post embryonic day 1 (P1) mice are born at expected mendelian frequencies, however by P7 male knockout (KO) mice displayed a 50% reduction in survival, with no further alteration until at least P35. No alteration in mouse survival was observed in female KO mice. Glycolysis measured using the Seahorse XF24 analyzer revealed that male KO mice had a decreased glycolysis rate while female KO mice displayed no impairment. In vitro platelet
activation analysis revealed that male KO mice were hypersensitive to collagen-mediated activation whereas females displayed decreased sensitivity. Finally, tail-bleed analysis indicated male KO mice experienced increased thrombosis while no alteration was observed in females. Together these data indicate that GLUT1-mediated glucose metabolism has gender dependent consequences leading to increased thrombosis and decreased survival in male KO mice.

31. Jacqueline Dunning

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

**Vulnerabilities and Strengths of the Developing Brain: Astrocyte and Polydendrocyte Response in a Mouse Model of Fetal Alcohol Syndrome**

- Fetal alcohol spectrum disorders 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 attacks neuronal GABA and NMDA glutamate receptors which induces robust excitotoxic neurodegeneration. Less is understood about glial cells’ vulnerability to alcohol. I focused on alcohol’s effects on two of the four types of glial cells: astrocytes and polydendrocytes. By comparing healthy 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. Immunohistochemical staining of mouse brain tissues allows us to assess glial cell morphology, density, and activation levels in control and alcohol-exposed animals. If we can more fully understand the mechanisms by which alcohol affects particular cells of the brain, it is possible to more fully understand the causes, treatments, and preventions of fetal alcohol spectrum disorders.

33. Jena Edwards

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

**CRISPR/Cas9 technology to knock out the Aryl Hydrocarbon Receptor**

- The Aryl Hydrocarbon Receptor (AhR) is a ligand-activated transcription factor that regulates responses to environmental toxins such as the aromatic hydrocarbon. Dioxin-like polychlorinated biphenyls (PCBs) are persistent organic pollutants that activate AhR and have been linked to human disease, including cancer and metabolic disorders. Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR)/Cas9 is a method to knock out genes using an endonuclease and a short guide RNA that binds to a target sequence of DNA. Our goal was to knock out AhR in cells using CRISPR/Cas9 technology. A human embryonic kidney cell line (HEK 293) was transfected with plasmids expressing single or double guide RNA and CRISPR/Cas9. Transfected cells were assessed for cuts at the AhR locus using PCR. Efficient cutting was seen with one pair of guide RNAs. Clones of transfected cells were isolated and assessed for deletions
at the AhR locus. A mixture of full-length and deleted alleles were observed in several clones, likely representing incomplete knockout of all the alleles present in polyploid HEK 293 cells. Further studies will address methods to achieve complete knockout. AhR knockout cells will be used in future applications to study how AhR activation by PCBs leads to changes in cell metabolism.

35. Emily Eilers

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

**Measuring Listening Effort**

- The purpose of this study is to determine the amount of listening effort needed to understand speech in noise while completing a secondary task at different signal-to-noise ratios (SNR). This is found through the use of a dual-task paradigm as a function of SNR. Twenty-five native speakers of American English with normal hearing and color vision took part in this study. This included 13 female participants and 12 male participants, ranging from ages 18 – 32. 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 to 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)

**Stock Market Response to Airplane Crashes**

- Stock prices of airline companies adjust quickly after a crash occurs, and the S&P 500 index reflects the general stock market. To test the hypothesis that airlines’ equity value would be significantly affected after crash date, I chose a sample of 29 airplane crashes from nine publicly traded airline companies in the United States since 1988. I then gathered 45 daily returns of those airline companies before, and 45 daily returns after each crash dates, as well as the S&P 500 returns of same ranges. I am about to run a regression model \( R_{jt} = \alpha + \beta R_{mt} + \varepsilon_{jt} \) to see if stock prices of airlines fall after airline accidents occur, and to see whether the result is statistically significant.

39. Mary Feng
Topological Data Analysis of General Social Survey

- Topological data analysis will be applied to sociology data from the General Social Survey, which contains demographic information of U.S. residents over the span of many years. 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, for example, class, income, and education. We will focus on analyzing persistent homology through persistence diagrams and barcodes. We will be interested 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)

A screen for enhancers integrating Suppressor of Hairless and other signaling pathways: decoding Notch-target enhancers

- Multicellular organisms develop by changes in their gene expression through enhancers. Enhancers are specific regions of DNA that contain motifs for transcription factors (TF) that bind and form various complexes. It is still unclear how enhancers are specifically integrating TF’s and regulating gene expression, preventing advances in both medicine and research. To understand this “enhancer logic”, we focused on locating and mutating Notch target enhancers within the developing wing of the model organism, Drosophila melanogaster. An in-silico screen for Suppressor of Hairless [Su(H)], a key TF for the Notch signaling pathway, was carried-out across different Drosophila species, and was narrowed with other TF’s to centralize a dataset of enhancers in the developing wing. The screen located enhancers encoding Su(H) in different ways in mostly wing tissue. We identified a dorsal wing margin enhancer (DWME) located within the intron of the nab locus, and through experimental evidence, suggest it is regulated through Notch signaling. Another enhancer, a proximal wing enhancer (PWE) downstream of the unkempt locus appears experimentally to utilize Su(H) as a repressor of the peripodial membrane independent of Notch. Our dataset also revealed an enhancer located within the intron of the A2bp1 locus, which drives intestinal expression.

43. Irina Gass

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

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

- My research investigates the perplexing political agenda of contemporary Israeli dance – specifically focusing on Ohad Naharin’s Batsheva Dance Company - by uncovering past Zionist influences on Israeli culture. 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 the creation of his work. Since Israel became a state, Zionism has heavily shaped Israeli culture. However, it did not foster the intended Judaism-centered culture. Due to the desperation to unify Israeli immigrants, along with the U.S. desire to rid its own country of Jewish inhabitants, Israel was given an American structure with which to build. American choreographers and ideology were exported to Israel, so Israeli art could not grow independently. 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 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)

**Preliminary Stages of Technology Development for a Sexual Education App for Teens with ASD**

- Teens with Autism Spectrum Disorder are disproportionately vulnerable to sexual health risks and lack opportunities for sexual education. A larger research project seeks to develop a mobile technology-based sexual education intervention targeted to this population. The purpose of this study evaluated elements of mobile device apps that would inform development of planned education intervention. An exploratory design was employed with apps targeting persons with ASD and addressing social or language development meeting inclusion criteria. A total of 158 apps were identified, most available on the Mac interface (n=115). The majority (n=104) targeted towards children 0-12 years (65.8%) with four (2.5%) targeted to adolescents. Twenty-nine no-cost apps were reviewed in greater detail finding most used animation (n=21; 72.4%) vs. realistic human characters to communicate information. Storytelling (n=8; 27.6%), gameplay (n=17; 58.6%), and realistic video (n=4; 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. Because the scope of examination was limited by cost of software application, those requiring purchase will need to be evaluated in subsequent research.

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 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. Twenty-five young adults with
normal hearing were recruited. Measurements were taken using a dual-task paradigm consisting of a primary word identification task and a secondary recall task. Changes in recall ability quantified changes listening effort required for different tasks. 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)

Morphological response of neuronal cells to the P7C3-S321 neuroprotective molecule.

- The P7C3-class of neuroprotective molecules potently blocks cell death in the 1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine (MPTP), 1-methyl-4-phenylpyridinium (MPP+), and 6-hydroxydopamine (6-OHDA) models of Parkinson’s Disease (PD). The 6-OHDA rat model of PD exhibits both dopaminergic neuron loss and related neurochemical and motor deficits, and treatment with P7C3-S321 protects rats from this toxicity. Here, we describe evaluation of morphological changes in primary cortical and hippocampal neurons, as well as PC6 and U2OS cell lines, as a function of exposure to this protective chemical. Neurite outgrowth was photographed daily until cells reached confluence. This line of investigation is facilitating our understanding of the underlying molecular mechanisms of action of this new class of neuroprotective molecules. Our hope is that this work will facilitate the 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)

Spatial and Temporal variations of airborne Polychlorinated Biphenyls (PCBs) in the Metropolitan Chicago area.

- Polychlorinated Biphenyls (PCBs) have been shown to exist as airborne species in densely populated areas, but the atmospheric sources of PCBs are relatively uncharacterized. This study utilizes a passive air sampling network to measure PCB concentrations in over 230 samples from 21 different sampling locations over a two year period from January 2012 to January 2014 in the Metropolitan Chicago area. These compounds will be measured using gas chromatography with tandem mass spectrometry (GC-MS/MS). Based on the 86 samples that have already been analyzed for PCBs, we have found an average ∑PCB concentration of $537 \pm 896$ 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.
Music anhedonia in patients with focal brain lesions

- Music anhedonia is a condition characterized by the selective loss of pleasurable responses to music. Music anhedonia can occur in two populations: some individuals have congenital music anhedonia, whereas other individuals show signs of music anhedonia following a brain injury. The only work done on this ‘acquired’ music anhedonia after brain injury has investigated single case studies. The present study is the first group-level investigation of the neural structures underlying music anhedonia. Using neuropsychological methods, patients with focal brain damage were given a psychological battery to identify individuals with music anhedonia. A series of questionnaires was administered to gather information about each patient’s musical experiences and behaviors before and after brain injury. The Montreal Battery of Evaluation of Amusia (MBEA) was used to measure the patients’ ability to perceive differences in pitch and other musical elements. Of the 62 patients to complete all the questionnaires, 12 individuals were found to have some signs of music anhedonia following brain injury. These individuals tended to have variable lesion locations. One particularly striking case of severe music anhedonia had focal damage to the striatum, a region important in reward processing.

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.
Hydrolysis of triglyceride-rich chylomicrons in the plasma by lipoprotein lipase (LPL) is one of the central events of fat metabolism and plays a key role in regulating plasma triglyceride levels. LPL is bound to the capillary wall by the protein GPIHBP1 and it is in this context that LPL can hydrolyze plasma chylomicrons. Previous studies have shown that Angiopoietin-like protein 3 (ANGPTL3) inactivates LPL, thereby raising plasma triglyceride levels. Evidence suggests that ANGPTL3 inactivates LPL by enhancing the cleavage of LPL by proprotein convertases into inactive monomers. This study investigates the interaction between ANGPTL3 and LPL and the interaction between ANGPTL3 and GPIHBP1/LPL complexes. We demonstrate that ANGPTL3 reduces LPL activity in a dose-dependent and time-dependent manner in vitro and in the absence of cells, and that enhanced cleavage of LPL in this process is not evident. Additionally, we show that ANGPTL3 is able to inhibit LPL bound to GPIHBP1 on a cell surface. ANGPTL3 is a potential target for therapeutically treating a wide range of obesity-related disease. Thus, it will be important to understand its interactions with LPL.

59. Brianna Hoffmann

**Major(s) -** Anthropology (B.S.)

**Mentor(s) -** Robert Franciscus (Anthropology)

**Skeletal 2nd/4th proximal hand phalangeal length ratios are associated with facial proportions in adult males**

Studies have demonstrated the effects of the prenatal environment on growth in the digits of the hand and facial development in humans. The ratio of the second and fourth digit ratios is sexually dimorphic and inversely related to prenatal testosterone (PT) levels in utero, with lower ratios in men (higher PT levels) and higher ratios in females (lower PT levels). This ratio has also been linked to facial development in male adults and subadults, with the association of relatively wider faces and lower digit length ratios demonstrated through the study of soft tissue measures. Other research has used the ratio of second and fourth hand proximal phalangeal (PP) length using skeletal elements as a means of predicting the social behaviors of extinct hominin species. This research, however, has not investigated the relationship between skeletal phalangeal ratios and measurements of the skull. The present study aims to test the hypothesis that the established relationship between the 2D:4D ratio and facial dimensions is maintained when skeletal remains are considered.

61. Colton Jensen

**Major(s) -** Chemistry

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

**Synthesis of Dimolybdenum Complexes with the Dinucleating hpp ligand**

There are no reported high-valent dimolybdenum compounds, and the mid- and low-valent compounds do not have practical syntheses. For organometallic chemists, a desirable mid-
valent molybdenum complex is the dimolybdenum paddlewheel $\text{Mo}_2(\text{hpp})_4$ (hpp = a bicyclic guanidinate ligand) since the ditungsten analog $\text{W}_2(\text{hpp})_4$ is the most strongly reducing substance known. The reduction of high-valent mono-molybdenum precursors is a plausible synthetic route to $\text{Mo}_2(\text{hpp})_4$ that has not been investigated. We are developing a new, straightforward synthesis to $\text{Mo}_2(\text{hpp})_4$ complex based on the reduction of higher valent molybdenum complexes. While developing our synthesis, we have prepared the novel compound $\text{Mo}_2(\text{hpp})_3\text{Cl}_3$ that may be an unrecognized intermediate in the known synthesis of $\text{Mo}_2(\text{hpp})_4$. The most intriguing part of the $\text{Mo}_2(\text{hpp})_3\text{Cl}_3$ complex is that the ligands are bridging in a novel, previously unseen kappa-dative manner. The synthetic utility of $\text{Mo}_2(\text{hpp})_3\text{Cl}_3$ as a precursor to $\text{Mo}_2(\text{hpp})_4$ will be investigated.

63. Blake Johnson

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

**Restoration of functional von Willebrand Factor levels in von Willebrand Disease through Piggy-bac mediated gene therapy**

- von Willebrand Disease (vWD), which results in a prolonged bleeding phenotype due to either qualitative or quantitative deficiencies in von Willebrand Factor (vWF), affects more people than any other genetically acquired bleeding disorder. We proposed gene transfer techniques can improve bleeding phenotypes in vWD patients through increased production of functional vWF. Using the piggyBac (PB) vector, we created DNA plasmids carrying vWF cDNA, for in vivo and in vitro studies. PB carrying vWF cDNA was delivered to 5 vWF -/- mice and we continue to follow these mice with plans to evaluate vWF levels and vWF binding activity. Further studies are warranted to determine if the plasma vWF levels can be increased using this method. PB carrying vWF cDNA and puromycin resistance was transfected into a HepG2 cell line. Following one month of growth in media containing puromycin, cells receiving PB containing vWF cDNA and puromycin resistance gene displayed significantly more colonies than cells transfected with no plasmid, demonstrating integration of the puromycin resistance gene. vWF ELISA revealed increased production of von Willebrand factor protein by HepG2 cells transfected with vWF and puromycin resistance compared to cells transfected with a PB transposon lacking vWF cDNA. This indicates PB containing vWF does have the capability of integrating into the genome and producing von Willebrand factor protein.

65. Michelle Johnson

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

**Sleep Deprivation is Prevalent among College Students and Those with Learning Impairments are at Risk for Sleep Disorders**

- Optimal learning depends upon brain activity during nighttime sleep to strengthen the connections made that day. Our purpose was to describe the sleep habits of college students
with a focus on college students diagnosed with learning impairments (LI). Participants with LI were compared to typically developing (TD) peers matched for age, sex, and college attended. A total of 298 subjects completed a sleep diary, the Pittsburgh Sleep Quality Index, the Epworth Sleepiness Scale, and the Munich Chronotype Questionnaire. Overall, 47% reported less than the recommended 7 hours sleep on a typical night; 44% reported poor sleep quality; and 24% reported excessive daytime sleepiness. The majority of students reported a slightly late chronotype. Students with LI reported poorer quality sleep than those with TD, F(1, 293)=3.4, p=.06. A larger percentage of students with LI took medications (many to control attention deficit) known to affect sleep, χ2 = 3.29, df = 1, p = .06, and students who took these medications were more likely to present with disordered sleep quality, χ2 = 4.82, df = 1, p = .028. We conclude that sleep deprivation is prevalent among college students and those with LI are at-risk for sleep disorders.

67. Hyejung Kim

**Major(s) -** Finance  
**Mentor(s) -** Tong Yao (Finance)

**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 model of 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 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 Decisions and Complex Financial Decisions**

- 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 – heart rate, heart rate variability, pupil dilation,
respiration, and electrodermal activity. These decisions and their 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 of real-money futures. 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**

- **Purpose:** Little research has been devoted to describing the educational support services for children who are hard-of-hearing (HH). The primary objective of this project was to quantify the percentage of children who are HH who are receiving Individualized Education Programs (IEP), 504 plans, or no plans. The secondary objective was to examine what factors predict whether or not 6 year olds who are HH receive special education services.

- **Methods:** Participants included 132 children who are HH. Thirty-six had mild HL, 57 had moderate HL, and 31 had severe HL. Measures included demographic, audiometric, and speech/language information.

- **Results/Conclusions:** Seventy-six percent of children had an IEP, 21% received no special education services, and 3% had a 504. Children with IEPs had significantly poorer expressive and receptive syntax, speech intelligibility, and pragmatics skills compared to children who did not receive special education services. Participants who were 90% intelligible or less on a conversational language sample were 5.9 times more likely to have an IEP, after controlling for language skills. Many 6 year olds who are HH receive special education services. Poorer speech intelligibility predicts the likelihood that a child will have an IEP.

73. Kelsey Kruse

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

**Patterns of development in CWS: persistent vs. recovered**

- **The purpose of this study was to examine patterns of development in children who stutter, since they may predict persistence and recovery from stuttering, over the course of 1 year. Measures included were severity, the Peabody Picture Vocabulary Test (PPVT-III), the Test of Early Language Development (TELD-3), and the Childhood Behavior Questionnaire (CBQ). The subjects were 25 children who stutter (9 females and 16 males) ages 31 to 70 months. The children are split into two groups: persistent and recovered. ANOVA revealed no significant of group on any of the dependent variables as a whole at visit 1. However, at visit 3 there was a statistically significant effect of group on clinician severity rating. 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)

The role of Nucleoporin 88 in Pena-Shokeir syndrome

- Pena-Shokeir is a rare autosomal recessive lethal disorder characterized by joint contractures, facial abnormalities, and pulmonary hypoplasia during fetal development. Affected fetuses are stillborn or die within few weeks of delivery due to pulmonary complications. The genetic basis of Pena-Shokeir syndrome is unknown. Analysis of genomic sequencing data from a family in which four of the seven children died of Pena-Shokeir syndrome revealed a single candidate gene. A single homozygous base pair change (G>T at position1300) was identified in the Nucleoporin 88 gene, encoding a nuclear pore protein. Nuclear pores regulate the flow of molecules in and out of the nucleus of a cell. The parents and all four unaffected children were found to be heterozygous for this point mutation. The single base pair change in the Nucleoporin 88 gene causes a D to Y amino acid substitution at position 434. The D434 residue is conserved among many organisms, including Drosophila. The D to Y substitution is predicted to be deleterious for protein function by in silico programs. We used the rapid genetics of Drosophila to assay for effects of D434Y on muscle function. The D434Y substitution was modeled in the Drosophila members only (mbo) gene and expressed in muscle. The resulting flies possessed a defect consistent with the loss of muscle function. These results support Nucleoporin 88 gene as a strong candidate gene for Pena-Shokeir.
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]
83. Alicia Means

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

Posttraumatic growth in ovarian cancer patients and adjustment outcomes 1-year post-surgery

- Background: Cancer diagnosis and treatment is traumatic and studies have shown that patients may grow from it, termed posttraumatic growth (PTG). In this study, PTG is operationalized as changes in purpose in life and spirituality, and its effect on 1-year outcomes of quality of life (QOL), depression, and positive affect is examined. Methods: Ovarian cancer patients (N=180) were given measures assessing purpose in life and 3 domains of spirituality (faith, meaning, and peace) at 3 different time points and PTG was the change from pre-surgery to 1-year follow-up. Regression analyses examined whether PTG predicted depression, positive affect, and quality of life (QOL) at 1-year, controlling for the baseline level of these variables and relevant clinical and demographic variables. Results: Faith and peace significantly increased from baseline to 1-year (p's < .05) whereas meaning and purpose in life did not change significantly. Positive change in peace was significantly related to better QOL (β=.35, p<.01), lower depression (β=-.43, p<.01), and higher positive affect (β=.44, p<.01) at 1-year. Faith was not significantly related. Discussion: The results of this study help further our understanding of which facets of PTG are most evident in cancer patients, as well as their importance for psychosocial outcomes.

85. Jason Mixdorf

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

Rhodium-Catalyzed Benzylic Fluorination of Trichloroacetimidates

- Benzylic fluorides were synthesized via rhodium-catalyzed nucleophilic fluorination of benzylic trichloroacetimidates. A variety of naphthyl, phenyl, and pyridinyl trichloroacetimidates were fluorinated with Et3N.3HF reagent to provide fluorine-containing compounds in moderate to high yields under mild and operationally simple conditions. Preliminary mechanistic studies suggest that while the naphthyl substrates are more likely to proceed via an η3-benzyl-rhodium complex due to the extended conjugation of the aromatic ring, the mono-cyclic phenyl substrates are more likely to proceed through a discrete benzylic cation intermediate.

87. Christina Moscatel

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

The Study of Filoviruses through the use of Computer Modeling

- Filoviruses circulating in bat populations often spillover into primates, where they cause local epidemics with high mortality. The ongoing Ebola virus (EBOV) epidemic in West Africa is an
exception to this pattern, with EBOV undergoing sustained transmission in humans. Sustained transmission of EBOV in a new host is hypothesized to have altered the selective regime under which EBOV evolves. Theoretically, a shift in selective regime might be apparent in an increase in substitution rate, as substitutions that were previously deleterious become less so or neutral, and the potential for the fixation of alleles under positive selection in a new host. To test this, we obtained a large dataset of Marburg viruses (MARV) and EBOV with known sampling dates from GenBank; as both MARV and EBOV have high mutation rates and accumulate diversity over short periods of time, their sampling times provide objective calibrations for substitution rate estimates. These data were analyzed in a Bayesian coalescent framework implemented in the BEAST software package, with an HKY+Γ+I substitution model, variable demographic priors, and both strict and relaxed clocks. We found that both MARV and EBOV have similar substitution rates, even when accounting for the epidemic EBOV-Zaire lineage currently circulating in West Africa.

89. Miranda Neff

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

Water-Soluble Organic Carbon and Iowa’s Changing Climate  

- Atmospheric aerosols 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 water-soluble organic carbon (WSOC) in the atmosphere is present. It has been determined that around 60-70% of carbon in the atmosphere is water soluble, indicating an effect on climate change. These measurements were taken with a Total Organic Carbon (TOC) analyzer, through a water extraction via sonication. 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 an interactive, inquiry-based public learning project featuring a county-searchable, digital map of Iowa that displays both past and recent severe weather stories from across the state. Within the past decade, increasing amounts of scientific data about severe weather events and climate change have become available to the public over the Internet. Anthony Leiserowitz of Yale Climate Communications identified what they call the “six Americas” — six audiences in the U.S. who perceive climate issues with varying levels of concern and
engagement — ranging from “the alarmed” to “the dismissive.” The Peoples’ Weather Map tries to involve those in the middle of this spectrum who range from “the concerned” to “the doubtful.” In order to accomplish this, the project emphasizes peoples’ stories to demonstrate how Iowans perceive and experience severe weather while placing these stories within a larger framework/discussion about global climate change (Howard Zinn’s The People’s History of the United States inspired the project). Much of the information collected for each map comes from letters, postcards and oral histories where people’s memories may not always be factually accurate; however, like the oral history scholar Alessandro Portelli asserts, errors of fact render more visible individual and community values.

93. Brian Paul

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

Mutations in ARHGAP29 and MAFB lead to craniofacial defects in mice

- In this study we characterized the effects of human mutations in two novel genes associated with cleft lip and/or palate (CL/P). These mutations are in ARHGAP29 and MAFB, genes identified by a genome-wide association study (GWAS) to be associated with CL/P. Genetic sequencing found specific mutations in each gene that may be damaging. To study these human mutations, H131Q in MAFB and K326X in ARHGAP29 were knocked in and incorporated into separate murine lines via germline transmission. Murine embryos were analyzed through serial sectioning at the embryological day 14.5 (e14.5) and e18.5 time points. The absence of Arhgap29K326X/K326X embryos in all 17 litters suggests that the mutation is embryonic lethal. Arhgap29K326X/+ mice at e14.5 exhibit a high rate of oral adhesions, a phenotype previously shown in Irf6 knockouts. This is significant because it has been determined that mutations in IRF6 cause Van der Woude syndrome, a syndrome which includes orofacial clefting. Preliminary data show that MafbH131Q/H131Q e14.5 exhibit delayed palatogenesis, but this is complicated by high wild type variability. Further investigation is ongoing (immunohistochemistry, analyzing different embryonic time points, increasing N values) 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: The Great Dictator and the Holocaust

- This research looks at Charles Chaplin’s The Great Dictator (1940) from the perspective of a present-day audience. While the film is often praised for lampooning Adolf Hitler in the pre-war United States, Chaplin’s depiction of discrimination towards the Jewish characters is often overlooked. In my project, I examine this portrayal in order to determine what was known about the Holocaust in the United States at the time. I discuss key scenes from the film, and juxtapose them against contextual historical information and other influential films, in order to reveal the
connections between the events of the Holocaust and their depiction on film in the early 1940s. I argue that although Chaplin maintains his signature style of physical and satirical humor to comment on social problems 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. In conclusion, this project, by closely examining The Great Dictator, 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 altered speaking effort on bilabial contact pressures and intraoral air pressure, and the difference between these pressures during electrolarynx speech and laryngeal speech

- Speech production is a complex motor action that requires the precise coordination of breathing, laryngeal, and articulatory gestures. The upper and lower lips are important active articulators that are used especially when producing stops such as /p/ and /b/. People who undergo a laryngectomy change the way they articulate their speech to be more intelligible. Examples of this are increased intraoral air pressure on stops and fricatives, prolonged consonants and vowels, and altered velopharyngeal activity (Searl, 2007). Individuals who have had laryngectomies use “clear speech” and use strategies such as increasing phoneme duration, increasing intensity of stop bursts, and using sharply segmented speech units (Searl, 2007). If the bilabial contact pressure is increased during electro-laryngeal speech, it may be due to the desire to be better understood, not to contain air in the oral cavity. In the current study, the effect of altered speaking effort on bilabial contact pressures and intraoral air pressures is further investigated. Also, the bilabial contact pressures observed during electro-laryngeal speech is compared to pressures observed during laryngeal speech.

99. Daniel Plebanek

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

The Role of Property-Property Mappings on Cognitive Flexibility

- Cognitive flexibility is the mental ability to switch between perspectives, tasks, or rules. A canonical probe of cognitive flexibility during early childhood is the dimensional change card sort (DCCS) task. The DCCS requires children to sort two-dimensional cards (e.g., red stars and blue circles) to target cards that match on one dimension by one rule (e.g., by color) before switching to another rule (e.g., by shape). Under conditions where the sorting values are identical, 4- and 5-year-old, but not 3-year-old, children are able to flexibly switch rules. Interestingly, the ability to make property-property mappings (i.e., selecting identical values on the same dimension) in the absence of instruction also has a delayed developmental trajectory
Thus, the ability to make property-property mappings may influence developmental change in children’s cognitive flexibility in the DCCS task. In this experiment, we tested whether children’s ability to make property-property mappings is connected to their ability to think flexibly in our category version of the DCCS task. Children participated in a property mapping task in which they were presented with target cards that matched on one dimension and asked to select matches from a collection of cards. Results indicate a relationship between cognitive flexibility and attention to dimensions.

101. Anthony Rogers

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

A Variable Frequency, Mis-Match Tolerant, Inductive Plasma Source

- Presented here is a survey and analysis of an inductively coupled, magnetically confined, singly ionized Argon plasma generated by a square-wave, variable frequency plasma source. The helicon-style antenna is driven directly by the class “D” amplifier without matching network for increased efficiency while maintaining independent control of frequency and applied power at the feed point. The survey is compared to similar data taken using a traditional exciter---power amplifier---matching network source. Specifically, the flexibility of this plasma source in terms of the independent control of electron plasma temperature and density is discussed in comparison to traditional source arrangements.

103. Chelsea Ryan

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

BLA Projection Modulation of Memory Consolidation

- The basolateral amygdala (BLA) has been shown to modulate memory consolidation for many types of learning whereas other brain regions, like the ventral hippocampus (VH) play selective roles (i.e. processing emotion-related learning). Whether the BLA->VH pathway modulates consolidation in a learning-specific manner is unknown. In the present study, BLA terminals in the VH were optogenetically stimulated or inhibited after training in a modified contextual fear conditioning (CFC) task that separates context and footshock learning. The BLA of male Sprague-Dawley rats was bilaterally transduced to express ChR2(E123A) or eArchT3.0. Fiber optic probes were implanted to illuminate BLA terminals in the VH. For CFC, rats received 3 min of pre-exposure to the apparatus on day 1. On day 2, rats were placed into the apparatus, received an immediate footshock, and were quickly removed. Retention was tested on day 4. Optical stimulation of the BLA->VH pathway following footshock, but not context, training using trains of 40 Hz light pulses selectively enhanced retention. Continuous (15 min) inhibition of this pathway 25 min after footshock, but not context, training impaired retention. These findings indicate the BLA->VH pathway influences the consolidation of footshock learning suggesting different BLA projections modulate memory consolidation differently depending on the learning.
105. Brett Schneider

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

Retrieving Conceptual Knowledge: Role of the Left Temporal Pole

- Producing the names of famous people, landmarks, and melodies from seeing or hearing the associated item has been associated with specific brain regions, particularly in the left temporal pole in the left temporal lobe. However, the reverse action of producing knowledge from seeing the name of the item has not been explored for unique entities like the three mentioned above. In this study, the lesion method is used to determine whether lesions (damaged areas of the brain caused by strokes, head injuries, etc.) in the left temporal pole cause deficits in this task. Various participants with a wide array of lesion locations were recruited for the task, along with a normal comparison group of healthy adults with similar demographics. The task involved producing conceptual knowledge from seeing only the name of a variety of unique items in the categories of faces and landmarks. Participants were asked to sing, hum, or tap each melody. We collected data using an audio recorder. A group of three individuals will be presented with the patients’ descriptions and recording of their melody productions. Data collection has only just begun, and therefore no preliminary data exists to state any initial conclusions. However, we expect to find a deficit in task performance in all three categories in left temporal pole groups when compared to the other lesion participants and the normal comparison group.

107. Jassi Singh

Major(s) - Health and Human Physiology
Mentor(s) - Mercedes Bern-Klug (Social Work)

Prospect Theory: An Analysis of Medical Decision Making Under Risk 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. Common themes among the journal articles included a discussion of key elements of Prospect Theory such as reference point, framing effects, and loss aversion. Many journal articles supported prospect theory as useful in health decisions, but others did not. 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.
Spermidine-induced autophagy as a potential intervention to protect cardiomyocytes against apoptosis associated with obesity and diabetes

- Diabetes and obesity have been increasing significantly in the United States, with heart failure being much more common among these patients. In this context, there are multiple metabolic unbalances contributing to cardiac dysfunction, and the development of new treatments is becoming more important. Of note, the quality control process of autophagy, which is required for turnover of proteins and organelles, can be insufficient in the diabetic heart. This experiment was designed to test if up regulation of autophagy using the naturally occurring molecule spermidine would protect H9C2 cardiac fibroblast cells from apoptosis induced by a high glucose and high fatty acid environment. Cells were incubated in high glucose (4.5g/mL) and palmitate (250 μM) conditions with or without spermidine (8 μM) for 24 hours. Western Blot analysis revealed an increase in autophagy (reduction of p62 and increase of LC3-II/LC3-I) in all spermidine treated groups. Flow Cytometry experiments are currently underway to access cell apoptosis among groups using Annexin V/PI co-staining. These preliminary experiments suggest that enhancing autophagy via naturally occurring substances, such as spermidine, has a potential protective effect against cardiac cell apoptosis induced by a diabetic environment characterized by high glucose and high fatty acid availability.

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

- As humans age, the hippocampus, a brain region affected in memory diseases such as Alzheimer’s, experiences anatomical and functional deterioration. Memory tasks that can be administered repeatedly with stable performance are needed for reliably assessing hippocampal functioning. Tasks with test-retest reliability can provide a means to monitor the health of this brain region and could lead to earlier detection of diseases affecting the hippocampus. This study assessed test-retest reliability and age differences on four error metrics (misplacement, edge deflection, edge resizing, and swaps per relation) of a Spatial Reconstruction Task. We hypothesized that older subjects would have higher error rates across all four metrics compared to younger subjects (Nolder=30, Nyoung=54). Consistent with the hypothesis, there was a main effect of age for all error metrics, (F1,81=19.817, 21.909, 15.017, 11.062, all p-values <0.0001), respectively. To assess test-retest reliability of the task, a subset of participants (Nolder=16, Nyoung=25) completed the task at three different sessions. There was no significant main effect of session for any metrics (F2,76= 1.029, 0.378, 0.749, 0.581, all p-values ns), respectively, nor was there a significant interaction between session and age group. Results support that this spatial reconstruction task can be used for reliable assessment over repeated sessions.
113. Brittany Todd

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

The Role of Interleukin-1 in Traumatic Brain Injury Pathogenesis

- Traumatic brain injury (TBI) is the leading cause of death and disability in children and young adults. Inflammation is a secondary response to TBI that may worsen tissue injury and outcome. Neuroinflammation is mediated in part by the interleukin-1 family of cytokines. IL-1α and IL-1β are the best characterized cytokines of this family and signal through the IL-1 receptor (IL-1RI). We aim to characterize the IL-1 response to experimental TBI using the lateral fluid percussion injury model in mice. Using real time PCR, IL-1α and IL-1β expression were measured following TBI. Motor outcome was assessed using a rotarod assay. Lesion volume was measured by microscopy from serial coronal sections. Following TBI, IL-1 β expression was increased in the ipsilateral parietal cortex at 2 hrs (3.16 FPI vs 1.40 sham, p<0.05) and 6 hrs (3.22 FPI vs 1.30 sham, p<0.05) and in the ipsilateral hippocampus at 6 hrs (75.43 FPI vs 1.13 sham, p<0.05). Impaired rotarod performance was observed for 3 days post injury, with recovery on day 8. Finally, there was substantial cortical tissue loss following injury. Ongoing studies in IL-1α, IL-1β, and IL-1RI knockout mice will assess the impact of the IL-1 pathway on outcome following experimental TBI.

115. Michael Turek

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

Novel phosphatase activity associated with RNA Polymerase II elongation complexes

- The C-terminal domain (CTD) of the large subunit of human RNA Polymerase II (Pol II) is largely made up of heptapeptide repeats of Tyr1–Ser2–Pro3–Thr4–Ser5–Pro6–Ser7. These repeats are phosphorylated throughout the transcription cycle by a number of regulatory kinases and in turn these changes indirectly affect the transcription cycle through recruitment of factors to Pol II. Multiple CTD phosphatases have been identified including Fcp1, SCP’s, RPAP2, and Ssu72. Using an electrophoretic mobility shift assay utilizing immobilized Pol II elongation complexes with radioactive transcripts we detected a novel phosphatase activity. This activity was associated with elongation complexes and acted in a processive manner. Importantly, it was magnesium independent. Using this assay, purification and identification of the phosphatase is possible and this will enable us to unravel its regulatory role in the transcription cycle.

117. Johanna Uthoff

Major(s) - Biomedical Engineering
Mentor(s) - Jessica Sieren (Departments of Radiology and Biomedical Engineering)
Surveys of Robustness, Repeatability, and Efficiency of Semi-Automatic Segmentation Tools when applied to Lung Nodules

- Thoracic CT screenings are an important detection tool for lung cancer. However, the gold standard for diagnosis involves invasive procedures to produce pathology-confirmed results and over 95% of suspicious lesions identified in CT are ultimately found to be benign upon further investigation. Our lab has developed a computer-aided diagnosis (CAD) tool to predict lung cancer diagnosis from the non-invasive CT data; however, this currently requires manual segmentation of the nodule and the surrounding lung tissue, or parenchyma. To reduce segmentation time and user-variation, several semi-automatic segmentation tools (MeVisLab, FIJI-ImageJ, ITK-Snap) were surveyed on a comprehensive subset of twelve cases (6 malignant, 6 benign) of ranging difficulty and CT imaging protocols. Each case was segmented five times per tool using a standardized protocol to assess platform stability. The resulting nodule and parenchyma masks were compared to the previous manual segmentation; no statistical significance was found between segmentation techniques and manual segmentation for nodule volume (p = 0.159-0.254), nodule surface area (p = 0.456-0.654), or parenchyma volume (p = 0.112-0.298). Visual inspection shows variation of individual voxel selection between the tools. Future development includes determining if this selection variance alters the selection of significant features and the performance of the CAD tool.

119. Russell Valentin

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

Probing Deficits in Visuospatial Attention in High-risk preterms with the Infant Orienting With Attention (IOWA) task

- Data from a task designed to assess individual differences in infant attention, the Infant Orienting With Attention (IOWA) task, was collected and analyzed. The IOWA task was designed to assess visual orienting proficiency (speed and accuracy) across varying degrees of visual competition, and relies on well-established spatial cueing effects to detect and measure each infant’s ability to covertly shift attention and to make fast and accurate eye movements to a peripherally appealing target. The task consists of several different spatial cue conditions, each providing an indicator of attentional development. Data from these conditions provide rich descriptive information regarding the development of covert attention, saccade planning, visual competition, and orienting speed. Moreover, these measures can be combined into competitive scores, providing specific measures of attentional development for each infant that are directly comparable across ages. Here, data from the IOWA task collected from 10- to 12-month-old preterm infants of similar gestational age are presented. These data reveal striking changes in attention and eye movements during gestational development, perhaps establishing a new marker of neural development in the unborn infant.

121. Jia Lui

Major(s) - Accounting
Accounting Study of Mergers and Acquisition - Do Target Firm Benefit From Being Honest

- I examine whether target firms benefit from high quality financial reporting during mergers and acquisitions transactions. Here I use the premium that the acquirers pay to measure the profitability of the targets. I define high quality financial statements faithfully represented. I predict that the target firms are better off when they provide high quality financial statements. I assume that the internal control effectiveness influences the faithful representation attribute of the financial statements positively. The acquirers infer effective internal controls and high credibility of the targets from high quality financial statements. Therefore, I argue that the acquirers are willing 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 providing high quality financial statements, it does not necessarily mean that the acquirers have overpaid for the acquisition. The acquirers can benefit from the unidentified intangible assets, such as the effective internal control of the target firm and 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
REM Sleep Twitches Activate a Sensorimotor Pathway in Sleeping Infant Rats

- In early infancy, mammals spend a significant portion of their time asleep. Human infants sleep up to 18 hours per day. Infant rats are no different and we hypothesize that myoclonic twitching during sleep is vital for the proper development of animals. In this study, we examine various brain areas that are activated during twitching. To do this, we gathered and analyzed data from previous experiments on certain brainstem and cortical areas. Electromyographic and extracellular electrodes were used to record muscle and neural activity, respectively. By comparing how a variety of brain areas are activated by twitches, a sensorimotor pathway can be distinguished. Therefore, we hope to map the precise pathway between the 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)

Quantified Progression and Phenotyping of Glaucoma in DBA/2J, Nee, and TBK1 Genetic Models

- Glaucoma is a disease of the optic nerve (ON) and the second leading cause of blindness, characterized by apoptosis of the retinal ganglion cells (RGCs) and their axons. The precise mechanism of ganglion cell and axon loss in glaucoma is not well understood and the focus has been on glaucoma-associated genes like TANK binding kinase 1 in the TBK1 mice strain, SH3PXD2B in the nee mice strain, and the melanosomal genes Tyrp1(b) and Gpnmb(R150X) in the DBA/2J mice strain. These mutations are suspected to be causative of Glaucoma in humans, but further testing in animal models is needed to vet genes that cause severe neurodegeneration and can be targeted for gene therapy in future studies. In a separate study, a novel medical imaging software was developed and validated that quantifies axons and ganglion cells in the ON, and generates ON heat maps to visualize axon loss between mutant and wild-type mice. In this study, the software package was applied to the ONs of the three aforementioned glaucoma models and age-matched controls (prepared using standard techniques), at varying timepoints (TBK1: 5 weeks, 3 months, 6 months, 12 months, 18 months; nee: 17 days and 3 months; DBA/2J: stages 1-5 according to the Disk Damage Likelihood Scale). Multiple metrics including nerve area, axon counts, and axon density were compared between mutant and wild-type mice, and across different time-points. The severity of neurodegeneration over time was compared across the three mice models.

129. Christopher Willauer

Major(s) - Intermedia BFA
Mentor(s) - Sarah Kanouse (Intermedia)
The Atomic Midwest: Mapping The Nuclear State of the United States

- While the popular conception of the nuclear complex is closely linked to the American Southwest, the US military has mobilized nearly every state in the country for the development, production, testing and disposal of nuclear weapons. As a hybrid of art and scholarly research, The National TLC Service charts these atomic geographies through creative research and public programming. “Atomic Midwest” is an online map presenting sites of nuclear production in Illinois, Iowa, Indiana, Kentucky, Missouri, and Ohio. As a visual presentation of the data, the “Atomic Midwest” map works to make this information accessible and understandable. The sites found in the Midwest range from appliance manufacturers turned into military hardware production to Iowa State University’s laboratory that has ties with the Manhattan Project’s physics program for the purposes for producing high-purity uranium. Databases such as the Formerly Utilized Sites Remedial Action Program (FUSRAP), EPA, Center for Land Use Interpretation, and Legacy Management are used to compile lists and information of sites throughout the United States. As a visual dataset, “Atomic Midwest” is among several creative initiatives of The National TLC that 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.

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, the normal aging process is accompanied by neural and cognitive changes that may compromise an older adult’s ability to make such decisions. Recent investigations have shown that age-related changes in decision-making may be further modified by individual difference variables such as personality traits (e.g., conscientiousness aids decision-making while neuroticism compromises decision-making). The aim of the current study was to investigate whether the ease (being “decisive”) versus difficulty (being “indecisive”) one has in making decisions is related to decision-making performance. We hypothesized that decision-making performance and indecisiveness would be inversely related. Twenty-seven older adults (Mean age = 74.0, SD = 7.4 years; 52% female; 120.3 Full Scale IQ) completed a validated, self-report measure of indecisiveness, as well as a measure of complex decision-making. Consistent with our prediction, we found that indecisiveness generally, and fears about decision-making more specifically, were related to poorer decision-making (p < .05). Implications of our findings will be discussed.
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.**

- Growing evidence suggests that physical activity improves working memory performance, but little is known about the underlying neural mechanisms that support this heightened performance. The purpose of this study was to investigate the effects of one session of moderate intensity aerobic exercise on working memory task-related brain activity. Investigating 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 aerobic exercise would increase brain activity in regions involved in working memory. A within-subjects design was employed where 20 participants performed two conditions of exercise, counterbalanced in their order: an active moderate intensity aerobic cycling and a passive motor-driven cycling. Each exercise lasted for 30 minutes and occurred on separate occasions. Before and immediately after each exercise, participants performed a working memory task while in a functional Magnetic Resonance Imaging (fMRI) scanner. Results show greater task-related brain activity after the active exercise compared to the passive exercise. These findings suggest one way to improve working memory is through physical activity which increases working memory task-related brain activity.

6. Maya Amjadi

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

**Ectosomes from human neutrophils laden with Staphylococcus aureus induce a pro-inflammatory response in macrophages**

- Diseases caused by Staphylococcus aureus (SA) manifest as mild skin infections and life-threatening diseases, including endocarditis and pneumonia. Initially, neutrophils (PMN) are the predominant cell type involved in the innate host defense against SA. Whereas PMN kill the majority of the ingested inoculum, some SA survive within the PMN phagosome. PMN laden with viable SA resist engulfment by macrophages and alter the macrophage inflammatory response. Phagocytosis of SA by PMN also induces PMN production of ectosomes, particles 100 to 1000 nanometers in size that bud off of the plasma membrane of neutrophils. We hypothesize that ectosomes arising from PMN-SA contribute to the amplification of local inflammation that accompanies staphylococcal infections. We used differential ultracentrifugation to isolate ectosomes from human PMN fed SA and quantitated recovered protein using the bicinchoninic acid (BCA) assay. Using flow cytometry and immunoblotting, we demonstrated that ectosomes expressed CD66b and contained myeloperoxidase, markers for PMN membranes and granules, respectively. In addition, the ectosomes stimulated the release of the pro-inflammatory cytokine TNF-α by macrophages. These data support the hypothesis
that ectosomes from PMN-SA are pro-inflammatory and contribute to exuberant inflammation during staphylococcal disease.

8. Yuanyaun Bai

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

Use Atomic Force Microscopy to analysis the 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 cocrystal system prepared in different synthetic methods. The technique used here is called AFM based nanoindentation. In our experiments, force-distance curves collected using AFM are used to extract the Young's modulus of samples using well known Hertzian contact model. Overall, AFM based nanoindentations has successfully been used in the mechanical characterization.

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 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 valuable information from an area of incredible biodiversity, the Coral Triangle. This is the world’s largest and richest area of coral reefs, but is also a disaster risk hot-spot because 95% of the coral reefs are so severely damaged as to have lost most of their ecosystem function, biodiversity, fisheries, shore protection, sand supply, and ecotourism potential. This is due to fishing damage, disease, pollution, sedimentation from deforested land, and climate change. The complex dynamics of environmental and biotic processes of this reef system make it extremely difficult to predict long-term ecologic responses to global environmental change and develop large-scale reef conservation management. This is where the fossil record comes in and can provide millions of years-worth of evidence of changing marine biodiversity. These corals are mostly documented from the Miocene when large-scale ecological changes led to the rise of
corals as the dominant carbonate producers. The Frost Collection provides more information about corals at this time and will help determine how to conserve modern corals.

12. Kenny Carlson

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

**Incidental learning of rewarded associations is modulated by reward context**

- Recently, Freedberg and colleagues (in prep) found that rewards can bolster the associative strength between a stimulus and a response. We asked whether these results depend on the context provided by rewards and their opposing outcomes. For example, a reward of $1 may modulate learning differently based on whether the opposing outcome is either $0 or $4. In this experiment, we used points as a reward system and participants responded on a keyboard to sets of faces on a computer screen. Half of the response sets led to a rewarded outcome, while the other sets led to a less desirable outcome. The Reward group received either a +4 or +1 outcome, and the Punishment group received either a +1 and +0 outcome. Finally the Neutral group received a +1 outcome in either green or gray font color depending on the combination they performed. Preliminary results demonstrate that learning differed between groups; In terms of a specific reward (e.g. +1) it is possible that its effects can be modulated by alternative outcome (e.g. +0, +4, or +1). These results show that reward context (created by alternative reward outcomes) may have a significant effect on associative learning.

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)

Using a Central Composite Design to Predict Cationic Active Center Mobility During Shadow Cure

- Cationic photopolymerizations offer unique advantages for many applications. The long-lived active centers may proceed long after the irradiation has ceased, leading to post-polymerization (dark cure). In addition, these active centers possess mobility through reactive diffusion and may lead to polymerization in unilluminated regions (shadow cure). Shadow cure may allow for effective polymerization in optically thick and pigmented systems and hard to illuminate areas. Preliminary models were created to determine the mobility limits of the cationic active centers (i.e., how far from the illuminated region of a sample can the active centers diffuse) and the factors that influence those limits.

18. Rae Ann Corrigan

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

Homology Model Optimization of Cancer Gene Wild-Types and Mutations: BRAF

- This project focuses on protein structural optimization of various possible oncogenes as identified by the Holden Comprehensive Cancer Center and their commonly cancerous mutations. The protein BRAF is a test case for the optimization and mutation modeling. Using a novel protocol of three computer algorithms developed by the Michael Schnieders lab, BRAF, along with other proteins, are computationally optimized in order to meet MolProbity quality assay standards. Optimization is achieved by finding the optimal root mean square (rms) energy gradient as defined by a convergence criteria and determining the optimal positioning of rotamer side chains. We are now working towards PolType modeling various sections of drugs – currently vemurafenib – commonly used to treat BRAF mutated cancers in order to study drug binding affinity with different protein mutations. Next steps include color-coding these improved protein 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 Determined by Eye-Tracking Paradigm
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 voice onset time of the initial consonant varied along a 0–40 millisecond continuum – either for /b-p/ or /ʃ-s/ minimal pairs. The goal was to determine if small within-category differences in voice onset time (VOT) affect speech perception and how that effect changes over the course of development. Previous models of speech perception have indicated that categorical boundaries are established after the first year of life; however, we challenge this idea in favor of gradient changes that are continuously refined through 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 Lithic 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 hominins may have important implications for the timing of the evolution of language. It has been argued that the hand preference of extinct hominins can be determined by the debitage left behind from stone tool manufacture; however, previous experimental studies have shown mixed results. We conducted an experiment using debitage collected from right- and left-handed novice flintknappers 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 flintknappers. These attributes included measuring the orientation of cortex, flake scars, bulb of percussion, and eraillure scars with a clear grid and the interior and exterior angles of the striking platform using a goniometer. Although previous experiments have reported differential flake attribute patterns for right- and left-handed flintknappers, 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?

- The gene Shaker encodes the α-subunit of a major voltage-gated K+ channel in Drosophila. This highly conserved channel repolarizes the neuronal membrane during an action potential, and many mutations in the Shaker gene result in neuronal hyperexcitability. This hyperexcitability can cause leg shaking under ether, altered locomotion, and decreased overall sleep. The stimulant caffeine causes similar sleep effects through the inhibition of cyclic AMP
degradation which alters overall circadian activity. We have found striking alterations in circadian patterns of the null Shaker mutant with tissue-specific defects when treated with caffeine. To pinpoint the caffeine response to specific loci in the null Shaker mutant, individual flies with localized mutations generated through the loss of an unstable X (Ring-X) chromosome in random tissue patches were analyzed for their circadian activity. Each individual “mosaic” fly has male, hemizygous-mutant (Sh-/O) tissue patches where Ring-X was lost and female, heterozygous-mutant (Sh-/Sh+) tissues where Ring-X was retained. Correlations between the distributions of male and female tissues and the circadian activity response to caffeine revealed the physical loci responsible for the null Shaker response to caffeine. Tracking these loci has enabled a more physically precise determination of the underlying structures behind these aberrant circadian behaviors.

26. Jessica Detrick

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

Evaluating the long-term maintenance of treatment when parents implement FCT within their homes with coaching provided via telehealth

- Evaluating long-term treatment maintenance is relevant to any treatment program, but especially when evaluating the use of telehealth to deliver behavior analytic services. As part of a federally funded project, we evaluated the long-term maintenance of functional communication training (FCT) with three children with autism. Parents conducted all procedures within their homes with coaching provided via telehealth by behavior analysts in a hospital located an average 134 miles from the participants’ homes. Results from functional analyses suggested the participants’ problem behavior was maintained, at least in part, by negative reinforcement. FCT was implemented within a noncurrent multiple baseline design across participants. FCT reduced problem behavior on average by 98% from baseline across participants. Maintenance probes were collected on a monthly basis following treatment. Maintenance probes involved the parents submitting video recordings of them conducting the treatment procedures independent of coaching. Problem behavior remained at or near zero for all participants across the maintenance probes. Treatment effects maintained at six months post treatment when parents conducted treatment procedures with the behavior analysts observing via telehealth. These results suggest that behavior analysts can use telehealth to implement FCT to achieve substantial reductions in children’s problem behavior and acceptable long-term treatment maintenance.

28. Benjamin Donovan

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

Development of Alignment Techniques for Off-plane X-ray Reflection Gratings
- X-ray grating spectrometers have been used onboard the Chandra X-ray Observatory and XMM-Newton for over a decade, providing astronomers with the tools necessary to study highly-energetic astrophysical processes. However, improvements can be made in both resolving power and effective area, setting the stage for a new generation of X-ray grating spectrometers. Off-plane reflection gratings can be used to provide high throughput and spectral resolution in the 0.3 – 1.5 keV band, making it an ideal technology for future soft X-ray spectrometers. A grating spectrometer consists of a Wolter-I telescope, which focuses the X-ray radiation, with grating modules inserted in the converging beam of the telescope to disperse the X-rays onto several detectors. Each grating will be aligned such that the diffracted spectra overlap at the spectrometer's focal plane. Misalignments will degrade both the spectral resolution and effective area of the telescope. Analytical alignment tolerances have been calculated, so laboratory techniques to achieve these tolerances 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)

**Polymorphic Hydrogen-bonding Motifs and Reactivity 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. We have elucidated a unique habit in co-crystals of 5-FU and bipyridine coformers, wherein the hydrogen bonding patterns of 5-FU in the co-crystals mimic very closely those of the pure 5-FU polymorphs. Co-crystals were obtained exhibiting hydrogen-bonding motifs similar to both Form I and Form II polymorphs of 5-FU. Additionally, molecular packing in the co-crystals conformed to the geometric requirements for a solid-state [2+2] photocycloaddition. After UV irradiation, it was observed that one co-crystal system achieved quantitative conversion to the anticipated cyclobutane cross product and the product was characterized by NMR spectroscopy.

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 stent fracture and expansion in the palliation of branch pulmonary artery stenosis

- Branch pulmonary artery stenosis (BPAS) is a common consequence of the repair of tetralogy of fallot in infants. Although a small, bare metal stent may be placed to expand the BPAS, this intervention is temporary as these infants will eventually outgrow the stent. The purpose of our study was to investigate the feasibility of a proposed method of catheter-based palliation of BPAS with stent placement which involves fracturing the stent with a high-pressure balloon and restenting the BPAS with an expandable stent. 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)

Extraction of Radiogallium with Polyether Sulfone Filters

- One of the most common medical imaging techniques, positron emission tomography (PET), utilizes radioactive metals to image biological systems, a common radioactive metal for this purpose is gallium-68 (68Ga). For onsite production, 68Ga is separated from its parent isotope, germanium-68 (68Ge) by the use of generator system in which 68Ge adhered to a solid substrate. Although this results in high purity 68Ga, the efficiency of this extraction decreases
dramatically over time resulting from radiolysis of the substrate. In every extraction, .01% of 68Ge contamination is found in eluded 68Ga. Although current technologies exist for bulk separations of 68Ga from 68Ge, there is a need for rapid and inexpensive post purifications. One promising technique is through the use of commercially available Polyether Sulfone filters. 68Ga/68Ge is added to materials either containing the functional groups of ethers or sulfones in 5.5 M HCl. Then, the amount of 68Ga/68Ge that is retained on these materials is measured by gamma spectrometry (NaI). Preliminary results indicate that the ether functional group selectively retains Ga. These results suggest the post separation purification of 68Ga from 68Ge can be simply performed by using inexpensive, commercially available materials.

38. Deidre Funk

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

Assessing the Seasonality of Use of a Late Woodland Rockshelter

- Woodpecker Cave is a rockshelter located near the Coralville Reservoir, occupied during the Late Woodland period (~800-1200 BP), when Native Americans began farming maize. They lived primarily in farming villages. If maize farming was the primary means of subsistence, why were people living in a rockshelter away from the farming villages? One possible explanation is that the rockshelter was a seasonal occupation site during the fall and winter to take food stress off the village area after the harvest. To test this hypothesis, I looked for evidence of seasonality in the faunal assemblage from Woodpecker Cave. I examined white-tailed deer (Odocoileus virginianus) deciduous dentition to determine age at death. Two sets were significant. One came from a fawn that died at around 6 months old, the other 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 species. I found one humerus belonging to a duck genus that is only found in Johnson County during migration. These data support the hypothesis that Woodpecker Cave was a fall/winter occupation site.

40. Natani Gallagher

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

Exploring the Neural Correlates of Theory of Mind

- Theory of Mind (ToM) is the ability to comprehend the mental states of others and is impaired in several psychiatric disorders. To better understand ToM impairment in autistic patients, we decided to investigate the neural correlates of ToM in a healthy sample. We administered to a non-clinical population (N=20) two questionnaires assessing two different aspects of ToM. We used the Interpersonal Reactivity Index (IRI) Perspective Taking scale, which measures self-reported ability to take other’s viewpoints, and the Reading the Mind in the Eyes (EYES) test which assesses ability to infer states by looking at pictures of eyes. We also collected resting state fMRI (rs-fMRI) data to examine participants’ patterns of functional connectivity (FC) at rest.
IRI scores correlated positively ($r=.545, p<.01$) with FC between Frontal Executive Network and Default Mode Network (DMN); similarly, EYES performance was higher in participants who showed higher FC between the Mirror Neuron System and DMN ($r=.556, p<.01$). Our findings further our understanding of the biological bases of ToM and indicate that FC at rest could serve as an effective diagnostic tool for disorders characterized by ToM impairment.

42. Sarah Gillespie

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

**Increasing Input of Syntactic Structures to At-Risk Children: A Verb-Focused Intervention**

- Complex syntax input to children is associated with increased complex syntax used, and caregivers may change child use with targeted input. Children with low socioeconomic backgrounds are at risk of receiving less complex syntax input and therefore may benefit from having teachers and parents receive intervention to increase the amount of complex syntax that they hear. Six local Head Start preschool classrooms participated in ten weeks of classroom activities targeting verbs. Using data from CHILDES, verbs were selected on the basis of verb biases for simple (action verb) or complex (cognitive verb) syntax. Fidelity recordings taken in the classroom confirm that teachers’ use of verbs conformed to the verb bias expected from CHILDES. Sixty-six children completed pre- and post-testing consisting of receptive vocabulary tests, a sentence imitation task, and a retell of a narrative containing frequent use of complex syntax, with this project focusing on the narratives. Analysis of utterance complexity during the retell task reveals significant growth in participants in both the simple and complex input conditions, but nonsignificant effects of condition. A large amount of individual variance in complexity measures is highly predicted by PPVT scores at pretest, suggesting that child language level influences growth in syntax.

44. Ryan Glanz

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

**Cocaine Self-Administration in Rats Induces Regressive Prefrontal Structural and Functional Plasticity**

- The medial prefrontal cortex (mPFC) is a critical brain region that drives relapse of drug-seeking behavior. Other evidence indicates that drug addicts show inhibitory control deficits and hypoactivity in a prefrontal network. Optimal mPFC functioning relies on synaptic connections, and prefrontal dysfunction resulting from stress and mental illness are linked to decreased plasticity in mPFC. Paradoxically, the existing literature suggests that chronic cocaine administration increases structural plasticity in mPFC, raising questions as to how such alterations translate to understanding addiction-related mental disorders. 3-D imaging of dendritic spine morphology shows that following cocaine self-administration and a two-week withdrawal period, rats displayed impaired structural plasticity in mPFC compared to yoked
controls. Animals that self-administered cocaine were distinguished by adrenal hypertrophy and reduced weight gain, effects typically found in animals exposed to chronic stress. Sampling of corticosterone levels immediately following cocaine administration on the first and last sessions confirmed that adrenocortical activity remained elevated following cocaine self-administration as compared with control animals. Additional behavioral experiments identified working memory impairments following cocaine self-administration. These data suggest that the stress associated with cocaine self-administration may underlie prefrontal plasticity that contributes to addiction.

46. Thomas Heiderscheit

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

Evaluating Aggregation Dynamics of Gold Nanoparticles using SERS

- Gold nanoparticles exhibit novel localized surface plasmon resonance (LSPR) properties, which depend on their shape, size, and local dielectric environment and serve as substrates for the detection of small molecules using surface-enhanced Raman scattering (SERS). In this poster, dynamic light scattering (DLS) and time dependent SERS spectral changes of solution-phase gold nanospheres upon addition of small molecules are used to correlate critical nanoparticle cluster sizes, SERS enhancements, and cluster growth rates. Kinetic constants for gold nanospheres with primary diameters ranging from 10 – 60 nm are extracted. By relating the change of these spectroscopic signals to changes in nanoparticle cluster size, the kinetics of nanoparticle agglomeration and aggregation can be better understood and accounted for in future applications in biological and chemical sensing.

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 more prevalent in college courses, but prior research still shows that students prefer paper textbooks. The purpose of this research study was to test whether a simple intervention could promote better adoption of an interactive e-textbook in Foundations of Biology. Laboratory sections were randomly assigned to treatment or a control group, and we recruited a total of 239 participants. We tested e-textbook usage by giving a pre-test survey to determine students’ current attitudes toward using e-textbooks. We showed the treatment group a video detailing the most beneficial ways to interact with an e-textbook. A post-test 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)

Women’s Experiences of Breastfeeding as Shaped by Challenges of Work-Life Balance

- This qualitative study of the experiences of first-time mothers in the Midwestern U.S. on the narratives of women regarding breastfeeding as they return to work. Public health and popular media encouraging breastfeeding currently focus little attention on the challenges that nursing mothers may face, or on specific problem-solving strategies. Paired prenatal/postnatal interviews examine how women’s expectations regarding breastfeeding compare and contrast with the realities they experience following childbirth. Interviews were transcribed and content themes analyzed using MAXQDA software. This content analysis was based on a set of codes applied to topical themes in women’s narratives. The findings indicate that women’s experience of breastfeeding are shaped by their broader efforts to effectively function as both workers and mothers, which present not only logistical challenges but also new and often challenging negotiations of identity. These findings demonstrate how health interventions for new mothers can benefit from attending closely to mother’s point of view through qualitative research.

52. Nate Hua

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

Using 2DIR Spectroscopy to Characterize the Dynamics of Two Inhibitory Populations in the Active Site of Human Carbonic Anhydrase II

- 2D IR spectroscopy of a zinc-bound azide inhibitor in the active site of wild-type Human Carbonic Anhydrase II (HCA II) returns spectra exhibiting a unique “bent” lineshape. We attribute this lineshape to the existence of two, spectroscopically unresolvable populations with independent dynamics in the enzyme’s active site. We hypothesize that by introducing a mutation of an active-site leucine to phenylalanine, we impose restrictions on the conformational flexibility of the zinc-bound azide, therefore eliminating one of the populations. The 2D IR data for the mutated HCA II, L198F, confirmed our hypothesis—displaying a simple lineshape with no curved features, consistent with the existence of only one population. To characterize the dynamics of both populations in the wild-type HCA II, we assume that one of the wild-type populations corresponds to the population sampled in L198F. Following a multi-peak fitting procedure and performing a center line slope (CLS) analysis on both the wild-type HCA II and the L198F mutant, we were able to extract the frequency-frequency correlation function (FFCF) parameters for both systems and utilize them to back calculate the FFCF
parameters for the unknown second population in the wild-type HCA II, effectively characterizing the time dynamics of both populations present in the wild-type HCA II.

54. Younis Ibrahim

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

Elucidating the mechanisms contributing to mutagenesis of a DNA repair pathway

- DNA frequently incurs double stranded breaks (DSBs). One mechanism to repair this type of damage is Break-Induced Replication (BIR). Even though BIR can successfully repair DSBs, this repair pathway is known to be highly mutagenic. How this pathway generates mutations still remains unclear. One idea, is that mutations are formed as a result of faulty DNA synthesis by polymerases driving BIR. The focus of my project is studying processes that may be contributing to BIR mutagenesis. Specifically, using yeast as a model system, I will determine the role of the DNA polymerase Epsilon (Polε) in BIR by analyzing the frequency of BIR mutations in a Polε mutant. I will also determine the nature of mutations formed during BIR using different genetic reporters which allows us to detect frameshift mutations such as insertions or deletion. Preliminary data shows that Polε does not play a major role in BIR. I also observed an unusual mutation signature (-2deletions) in a particular genetic reporter that differs from what is found in S-phase replication. Overall, my data allows for a better understanding of what promotes mutagenesis during BIR and in the future will provide a better understand for how this pathway contributes to genome instability.

56. Chen Jing
Zuo Yuan Zhao

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

Bike Sharing System, Math, Statistics and computer science

- The demand in bike sharing system is determined by many factor, such as season, weather, holiday, temp, humidity, wind speed, etc. However, our project is trying to use math topology to view the data geometrically, erase the noise data by using barcode and also combine similar data through analysis complex. At the same time, we will run some hypothesis test on the software R to test the correct, also the Dummy variable and ANOVA table to test the F-value to test the outcome.

58. Zehra Khan

Major(s) - Chemistry
Identification of Organic Compounds and Source Apportionment of Particulate Matter in Karachi, Pakistan

- It has been established by atmospheric studies that Karachi, Pakistan has diminishing air quality due to increased private vehicle ownership, high population growth, and the presence of a large industrial base. This study focuses on detecting and measuring the organic components of PM2.5 and identifying its sources in Karachi. Filter measurements were taken every 24 hours using a cyclone separator from January 8-January 29th, 2006. Samples were then subjected to acetone/hexane solvent extraction from the aerosol filters. To analyze for PAH, alkanes, hopanes, steranes, levoglucosan, and cholesterol GC-MS was used, in some cases following silylation derivitization. The 24-hour average mass measurements for PM2.5 (170.8μg/m3) exceed the WHO guideline for 24-hour PM2.5 of 25 µg/m3 by more than seven times. We found that day-of-the-week variation of PM2.5 demonstrate Sundays have significantly lower concentrations (p=.0120). A significant negative correlation between daily 24-hour average levoglucosan concentrations and daily minimum temperature values was also observed (r=-0.606, p=0.003). A significant negative correlation was found between the daily levoglucosan values and daily average temperatures (r=-0.589, p=0.004). A correlation analysis performed between retene and levoglucosan produced a Pearson correlation coefficient of .468 (p=.028), indicating that there is some softwood burning contributing to the total biomass fuel burning.

60. Tyler Klenske

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

Effects of Epileptogenic Mutations on Behavioral Responses to General Anesthetics in Drosophila

- Epilepsy is one of the most common neurological disorders in the world and is characterized by uncontrolled firing of neurons in the brain. It is known that general anesthetics may have pro-epileptic or anti-epileptic effects. However, the underlying molecular and cellular mechanisms are not completely understood due to the complexity of the factors affecting epilepsy and anesthesia in humans. Here we took advantage of a genetic model organism, the fruit fly Drosophila melanogaster, to investigate the effects of seizure-causing mutations on behavioral response to inhaled general anesthetics. Our preliminary results using airtight glass chambers with defined amounts of ether, desflurane or sevoflurane showed that epileptogenic mutations in Drosophila ion channel genes significantly affect the time required for induction of and emergence from anesthesia, as well as the behavioral sequences during the transitions between an awake and an anesthetized state. Because the genes and genetic interactions important for brain function are largely shared by flies and humans, our study is expected to provide useful insights into the relationship between epilepsy and anesthesia in humans.

62. Michael Korobov
Impact of Presidential Elections on Gold Prices

- Due to the limited quantity and historic nature of gold, this commodity is perhaps the most popular in its use as a hedge against various forms of instability in fiat currency. The most common conditions associated with the volatility in gold prices are political instability, uncertainty in capital markets, rapid inflation changes, fluctuations in the strength of the dollar, changes in oil prices, and interest rate variations. While analysts at the top investment firms spend hundreds of hours to predict the movements of these variables, there is a constant that can be identified with certainty. Every four years, the United States has a presidential election. As each candidate brings along their own unique agenda, political and economic uncertainty is elevated. This paper will attempt to determine if a relationship exists between the price of gold and these time periods. Ten presidential election cycles will be observed. “Election years” will be designated as the year of the election and year prior. If such a correlation does exist, investors may be able to use this natural buildup of uncertainty for profitability.

64. Andrew Kral

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

H2O Selectivity in Uranium Metal Organic Nanotubes

- Uranium (IV) Metal Organic Nanotubes (MONs) have been reported to exhibit unique water selectivity properties in the literature, yet these properties haven’t been studied in depth. Our project, an effort to uncover evidence on the selectivity and potential applications of uranium MONs, began by synthesizing three types of nanotubes with two different linkers: Two iminodiacetate (IDA) linked nanotubes and a pyridine 2,6-dicarboxylate (PDC) linked nanotube. Upon synthesizing, crystals were filtered, heated and dehydrated by way of a gravimetric oven for at least twelve hours, and placed in a polar or non-polar solvent. The uptake of solvent into the uranium MONs was measured by thermogravimetric analysis (TGA), and the nature and identity of the solvent inside the tube was determined by Fourier Transformation Infrared Spectroscopy (FTIR). The integrity of the crystals after solvent uptake was then studied and confirmed by powder and single crystal X-ray diffraction. The uranium MONs showed selectivity towards water in the solvent studies, yet this exclusivity must be further analyzed as it remained dependent on atmospheric conditions.

66. Janet Lawler

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

Imgur: A Study in Connective Action
• Imgur is the outbreak internet community. By carefully aggregating, categorizing, contextualizing, and analyzing months’ worth of user submitted and virally aggregated images and .gif files, the creation of a globalized community and a particular culture emerges through the use of a purely visual platform. Imgur is a fascinating case study of collective and connective action. Using these two structural theories, the types of posts, themes of posts, and user comments reveal a set of totally unique vocabulary development as well as a set of self-policing community standards. The content analysis of posts reveals a self-actualizing and self-realizing community. These realizations point to the phenomenal capacity of the internet as a domain to enhance its own brand of unique culture. Research centering around internet community sites like Imgur is practically non-existent; however, these introductory findings show not only that more attention in virtual community building is warranted but also that it provides a unique insight into workings of collective action in the virtual realm.

68. Lu Liu

**Major(s)** - Chemical engineering
**Mentor(s)** - Julie Jessop (Chemical and biochemical engineering)

**Conversion Quantification in Epoxides Annealed after Cationic Photopolymerization**

- Cationic photopolymerizations offer unique advantages for many applications. For example, these systems are not inhibited by oxygen and are essentially non-terminating, leading to very long active-center lifetimes (hours or even days). As a consequence of the long-lived active centers, cationic polymerization may proceed long after the irradiation has ceased, leading to dark cure or post-polymerization. This dark cure may lead to further property development over the course of hours or days. The objective of this study is to determine the affect of annealing (temperature and duration), a common industrial treatment, on the conversion of epoxides after cationic photopolymerization. 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. Knowledge of the research process and research experience are valued by employers and graduate programs. Yet only 6/28 faculty members in Studio Art and 3/12 faculty members in Art History have received ICRU
grants since 2010. Many students haven’t heard of ICRU nor can they define research in studio art. We have been investigating the barriers preventing faculty and staff from applying for the ICRU grants and the barriers that prevent students from approaching faculty and staff about research. We are currently reviewing the data we have collected and are identifying possible strategies to overcome the barriers we have identified.

72. Jordan Mattis

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

**Decision Making During a Novel Noun Generalization Task**

- When learning new words, young children must first learn the word-object mapping and subsequently extend this mapping to new instances. Recent methodological advances have demonstrated that children increase their processing efficiency during referent selection between 15 and 24 months of age. However, no research to date examines the real-time processing associated with generalization. Moreover, no looking tasks used to assess processing efficiency in children have used real, three-dimensional objects that children can manipulate and explore. In the present study, 17-30-month-old children completed the standard NNG task with three-dimensional, novel solid stimuli while a table-top camera recorded their eye movements. Detailed analyses of looking behavior comparing children with different vocabulary sizes revealed changes in the decision processes that support novel noun generalization over the period of early vocabulary development. In particular, and as expected, participants with larger vocabularies more often generalize names for solid objects to test objects that are the same shape. Measures of looking behavior support the proposal that differences in visual exploration of the exemplar and test objects are related to the growing vocabulary. These preliminary data thus suggest that the specifics of early visual object processing and comparison may be shaped by children’s vocabulary size.

74. Nicholas McCarty

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

**Insulin Receptor Substrate (IRS) Signaling Preserves Contractile Function and Structure in the Adult Heart**

- Cardiac insulin signaling is transduced by insulin receptor substrates (IRS) 1 and 2. Previous studies have shown that mice with combined cardiomyocyte-specific deletions of IRS 1 and 2 die of early onset heart failure. To test the hypothesis that IRS proteins preserve cardiac structure and contractile function in the adult heart, we generated mice with inducible cardiomyocyte-specific knockouts of IRS 1 and 2 at 8 weeks of age. We observed dilated cardiomyopathy 4 weeks post transgene induction, with the majority of the mice dying by 10 weeks. Histological analysis revealed cardiomyocyte disarray 4 weeks post induction. Western blot analysis revealed increased pro-apoptotic signaling as early as 1 week post transgene
induction, when contractile function was still relatively preserved. This was further supported by qRT-PCR analysis revealing increased mRNA transcript levels of genes involved in cell death as early as 1 week post induction. Together, these data indicate that pro-apoptotic signaling precedes heart failure and may contribute to heart failure. Additional data indicates a loss of sarcomeric integrity (Acta1, Tnni1, Tnni2) following IRS1/2 deletion in the heart. Thus, IRS proteins preserve contractile function and structure in the adult heart, which if absent, results in increased cell death and heart failure.

76. Astrid Montuclard

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

UIowa Campus-Based Intervention Study of Students’ Water and Soft Drink Consumption

- In Fall 2014, our team conducted a campus-based research study in Burge Market Place, The University of Iowa, to determine which factors influence students’ soft drink and water consumption frequency in the campus dining halls. The participants were freshmen and upperclassmen of UIowa who eat at Burge Market Place during school weeks. A pre- and post-intervention survey (365 students pre-intervention and 302 post-intervention) were conducted four weeks apart; before and after an intervention consisting in placing a discreet sign indicating the location of the water dispenser on the Coca-Cola dispensers in Burge Dining Hall. The pre-survey and post-survey asked participants about their water consumption habits but the post-survey also asked the participants about their soft drink consumption habits. The Two-Sample Mann-Whitney U test, Fischer’s Exact Test, ordinal logistic regression, and linear regression were used to evaluate the significance of the results. The intervention positively impacted the number of students ever drinking water with their meal. The main reason given for not drinking water was that students preferred other drinks. The results also showed that 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)

Doses of Combined External Beam Radiotherapy and High-Dose-Rate Brachytherapy in
Lymph Nodes

- Locally advanced cervical cancer is treated through a combination of external beam radiation
therapy (EBRT) and high-dose-rate brachytherapy (HDR) with concurrent chemotherapy. /
Twelve lymph node positive patients with stage I-IV cervical cancer were retrospectively
analyzed. All patients received EBRT (45Gy with 1.8 Gy/fx) and Point-A based HDR plans (7Gy x 4
fractions or 5.5Gy x 5 fractions). Seven patients received parametrial or paraortic boosts, or both.
A radiation oncologist retrospectively contoured lymph nodes on CT of external beam
radiotherapy that were transferred into MRI of high-dose-rate brachytherapy through rigid
registration. The full HDR doses of lymph nodes were calculated by multiplying the first HDR
fraction dose by the fraction number. To normalize fractionation differences in EBRT and HDR,
the raw physical doses were converted into equivalent-dose in 2 Gy (EQD2) of EBRT using alpha
/ beta = 10 for lymph nodes. / We found lymph nodes received 56.1 ± 4.0 Gy (average ± std
dev) of D90 in EQD2 through combined EBRT and HDR. The doses from full HDR fractions were
recorded as 4.6 ± 3.0 Gy, 7.3 ± 14.8 Gy, 5.9 ± 3.6 Gy and 11.5 ± 7.8 Gy in EQD2 for D90, D100,
mean dose and maximum dose, respectively.

82. Hayley Nelson

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

Does oculomotor behavior reflect surface structure?

- People frequently use saccades to reallocate attention to targets. Attention and saccade
behavior (e.g., latency, curvature, capture) change when a distractor is present. Attention is also
affected by depth structure: processing occurs within surface-based representations, such that
search for a target is unaffected by distractors on a different surface (Atchley et al., 1997). Here
we ask whether saccades are sensitive to surface structure. In Experiment 1, participants made
saccades to targets. Control trials contained only the target, and other trials manipulated
distractor presence and surface structure. In no-surface displays, we replicated distractor effects:
saccades curved more, latencies were slower and landing positions were less accurate (all Fs > 8,
ps<.01). Surfaces, however, had no effect. In Experiments 2a&b surfaces were more realistic and
task-relevant. Again, distractors consistently affected saccades but surfaces did not. It is possible
that surfaces only affect attention (and saccades) in the presence of multiple distractors or high
perceptual load. In a multiple-distractor experiment we found surface structure and location cues reduced distraction for latency and initial curvature, and that surfaces were better than location cues at reducing distractor capture. Together, these experiments suggest saccade programming in the outside environment relies on complex surface representations and not just distracting objects.

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, especially during the first hours of life. 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. We examined the frequency and degree of low and high body temperature among very low birth weight (VLBW) infants at admission to the neonatal intensive care unit (NICU) as well as between inborn and outborn patients. The effects of birth weight and gestational age on admission temperature were also examined. 667 infants with birth weight < 1500 grams admitted to the UI Children’s Hospital NICU from May 1, 2008 through April 30, 2013 were studied. For purposes of the study, normothermic temperature was defined as 36.5-37.4°C. The distribution of admission temperatures for all infants admitted into the NICU was 12% at <35°C, 37% between 35.0-35.9°C, 26% between 36.0-36.4°C, 24% between 36.5-37.4°C, and <1% at > 37.5°C. 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 Apogamy 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 aerosol particles

- Aerosols are composed of solid particles or liquid droplets suspended in air. Atmospheric aerosols can be generated from different sources, such as biomass burning, windblown soil particles and marine emissions. In order to determine the size, physical state, reactivity, and climate impacts of this important component of the Earth’s atmosphere, understanding the interactions of these different types of atmospheric aerosols with water is crucial. Sea spray aerosol particles relevant to oceanic emission include sodium chloride, mixture of chlorides and sodium chloride mixed with malonic acid. Particles relevant to secondary organic aerosol formation include dicarboxylic acids mixed with ammonium sulfate. We show that the complexity of mixed particles leads to more complicated relationships with water than is the case of single-component particles. These results are important as the hygroscopicity of aerosols has great impacts on aerosol interactions with electromagnetic radiation, cloud formation and heterogeneous chemistry.

90. Nailah Roberts

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

Ethnography of Space: Observing Social Privilege and Occupation in the Co-Ed, Multi-Racial/Ethnic Public

- The moment an individual steps into a populated space they alter the dynamic of the space. The consequences of this spacial occupation are felt and responded to by other individuals in the area, which can be understood by examining pre-existing, institutionally reinforced social power dynamics. This research argues that whom gets to occupy space comfortably is deeply rooted in the way people subconsciously maintain racial and gender power dynamics through the positioning and repositioning their bodies in public, multiracial, co-ed spaces. The persistence of these dynamics underwrites the distinction between who is and is not really American and whose identities matter in the sociocultural and ultimately socioeconomic arenas.
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 overarching goal of this study is to explain how non-diabetic individuals personalize their risk to develop type 2 diabetes (T2DM) given a positive family history of T2DM. The purpose of this study is to elucidate layperson's perspectives on the concept of salience, defined as awareness of the disease and risk factors. Within the larger mixed-method study, semi-structured qualitative interviews were conducted with 112 ethnically diverse non-diabetic men and women, aged 19-47, with a family history of T2DM. Using content analysis, transcripts were coded in two steps: 1) We identified all text related to salience and then 2) assigned sub-codes to emerging themes specific to salience. Participants reported factors contributing to disease in family members. Salience was expressed through five statement types: 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. This data demonstrates that T2DM personal risk perception is driven by more than positive family risk. Participants included individuals motivated to talk about their risk, which may limit the applicability of the findings.

94. Kristy Sakurai

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

Effects of Diet on Sleep of Shudderer, a Drosophila Voltage-Gated Sodium Channel Mutant that Displays Seizure-like Behaviors

- Kristy Sakurai, Patrick Lansdon and Toshihiro Kitamoto / Voltage-gated sodium (Nav) channels are essential for generation and propagation of action potentials in the brain. Shudderer (Shu) is a gain-of-function mutant for the Drosophila Nav channel gene, showing seizure-like behavioral defects, including spontaneous tremors. Intriguingly, we have discovered that these epileptic phenotypes of Shu are drastically suppressed by dietary modification. This finding provides an excellent opportunity to examine how diet influences neuronal activity and behaviors, potentially shedding light on the mechanisms of effective nutritional therapies. In this study we investigated whether dietary modification could also improve abnormal sleep behavior in Shu. Sleep is an evolutionarily conserved, essential behavior, which requires higher-order brain function involving elaborate interactions of multiple neuronal circuits. Seizure disorders are often comorbid with disturbances in sleep, and seizure-prone, hyperexcitable Drosophila mutants display various sleep abnormalities. We found that Shu flies also exhibited aberrant sleep patterns – decreased total nighttime sleep with a decrease in sleep bout duration and an increase in sleep bout number as compared to controls. Further, we demonstrated the fragmented sleep phenotype of Shu was improved by dietary modification. This study is expected to help us better understand the intricate interplay among epilepsy, sleep and nutritional therapies.
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. Determining overall group satisfaction and perceived benefit over time will help us at the Wendell Johnson Speech and Hearing Clinic 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. The surveys were mailed out following each semester of ARC. Participants anonymously completed the surveys and mailed them back to the clinic in the envelope provided. Twenty-two questions were included and 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 the logistics, impressions, and assimilation of Indian dancer, Ram Gopal, and Native American dancer, Maria Tallchief, in the United States in the 1940s-1950s. As situated in the post-war period, how did Gopal arrive to the U.S. and how was his dancing perceived by the West? How did Tallchief work to legitimize ballet in the U.S. as a Native person and work through the tension around the phenomenon of “you’re white, but not white enough?” Two opposing approaches were required in an attempt to render the irretrievable pasts of live dance performance. Understanding Gopal’s situation from the outside in, and Tallchief from the inside out, I have united archival information and artifacts with present-day understandings to make sense of performance in its absence. As a meta-analysis, I now map the trail of my research methodologies and reflect on my record of work done. In synthesizing my research as a sample of the routes taken for study in the dance field, I unravel a reliance on personal inquiry, archival research, and translation of past acts in exploring the history of dance performance in its ghostly existence.

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

Coaching for the Win or Coaching for the Draft? An economic model of a successful Division I FBS Head Football Coach.

- We have compiled a large data set containing information about Division I head football coaches in the Football Bowl Subdivision (FBS) from the years 2002-2007. This data includes years of experience, school affiliation, conference affiliation, salary, and recruiting classes for the selected years. We have also collected data from 2004-2012 that shows the year players from these recruiting classes were drafted into the National Football League (NFL) and the player’s draft selection number. We plan on creating using a mathematical function that measures not only a head coach’s ability to get recruited players drafted into the NFL but also their ability to take low-star recruits and get them drafted in higher selection pick numbers. We will then use the outcome of the function for each coach per year from 2002-2007 as the the dependent variable in a regression analysis to determine what variables statistically contribute to the success of a head coach to get players drafted into the NFL.

102. Hadiatou Sow

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

Incorporation of unnatural amino acids

- 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 different factors’ effect on the the level of engagement on Facebook content. The two major dependent variables 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. To gain insight about effects on engagement, Pairwise Comparisons of mean engagement rate were conducted for both “Content Medium” and “Nature of Content” dependent variables. /

106. Sarah Strack

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

**Identifying Factors Involved in the Predator-Prey Interaction of Myxococcus xanthus and Bacillus subtilis**

- Myxococcus xanthus and Bacillus subtilis are soil-residing bacteria that display complex behavior in response to starvation leading to the formation of spores. Additionally, M. xanthus is a microbial predator able to consume a broad range of prey. Direct cell contact, motility, and the secretion of lytic enzymes and secondary metabolites are all required for efficient predation by M. xanthus. B. subtilis has been characterized for its production of many bioactive molecules and we have determined that B. subtilis secretes a secondary metabolite to defend itself from predation by M. xanthus. To identify additional genes required for predation, we performed transposon mutagenesis of M. xanthus and assayed the resulting mutants for their capacity to engage in predation. An EZ-Tn5 transposon mutagenesis screen of the predator identified EPS production (dif pathway), c-di-GMP (hsf pathway), transporter systems, and the secondary metabolite myxoprincomide as additional factors involved in M. xanthus predation of B. subtilis.

108. Collin Thatcher

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

**Comparing patterns of molecular evolution in nuclear-encoded mitochondrial genes in sexual and asexual freshwater snails**

- Nuclear-encoded mitochondrial (NEM) proteins directly interact with mitochondrial-encoded (MT) proteins to form multi-subunit enzymes necessary for mitochondrial function. The cooperative nature of NEM and MT proteins suggests that the genes that encode these proteins coevolve. NEM and MT coevolution might itself be profoundly influenced by reproductive mode (sexual vs. asexual reproduction) because 1) NEM and MT genes are transmitted in complete linkage disequilibrium in asexuals, and 2), nuclear mutations may counter or compensate for harmful mtDNA mutations that are known to accumulate in asexuals at higher rates than related sexuals. I am using Potamopyrgus antipodarum, a New Zealand snail, to address these possibilities. Potamopyrgus antipodarum is ideally suited for
this study because there have been multiple independent transitions to asexuality in P. antipodarum, allowing for direct comparisons between sexuals and asexuals. I am currently sequencing NEM genes in multiple sexual and asexual P. antipodarum lineages to compare patterns of molecular evolution in NEM genes across reproductive modes. Regardless of outcome, the data we are collecting will provide new insights into how reproductive mode influences patterns of molecular evolution in coevolving genes, and more broadly, how the lack of sex affects molecular evolution in the nuclear vs. the mitochondrial genome.

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 PD1 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, such as PD1, can be targeted with antibodies 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

Major(s) - Biomedical Engineering
Mentor(s) - Jess Goetz (Orthopaedic Biomechanics Laboratory)

Finite Element Analysis of a Stemmed Total Ankle Replacement

- Osteoarthritis of the ankle can cause pain and decrease joint range of motion. If conservative treatment methods are unsuccessful, surgical intervention options include ankle arthrodesis (fusion) or arthroplasty (replacement). Ankle arthroplasty offers greater potential for joint mobility; however, if complications occur (such as loosening) the joint must be fused. Furthermore, ankle arthroplasty has experienced lower success rates than the more common arthroplasty procedures, such as hip and knee replacements. I am developing a finite element model of an ankle joint with an implanted stemmed total ankle replacement to investigate its features. Ultimately, the model will include soft tissue such as cartilage and ligaments to increase
physiological accuracy. A gait cycle will be applied to the joint through loading and rotation. A separate model of a native ankle joint will also be created and the models will be compared to show how the implant replicates normal ankle stresses. Also, the model with the implanted device may show areas where stress is concentrated and could indicate a higher risk of complication. To develop and analyze the models, software packages such as OsiriX, Geomagic Studio, TrueGrid, and ABAQUS are used.

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 and bedload estimation. Although 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 river bathymetry over swaths of river cross-section. 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 PIV concepts to the obtained maps. Furthermore, using velocity fields in conjunction with conventional analytical methods for estimation of bed movement enable estimation of bedload rates over the whole imaged area in any direction. 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)

Inhibition of the SUMOylation of TFAP2A in basal breast cancer and glioblastoma leads to a decrease in proliferation and the cancer stem cell population

- Introduction: Basal breast cancers are typically triple-negative, meaning they lack both gene expression and protein targets for inhibition. Basal breast cancers also harbor cancer stem cells, which increases the cancer’s efficiency in seeding new tumors at distant sites, and makes this cancer difficult to treat. Previous studies of basal breast cancer have shown that loss of SUMOylation of TFAP2A leads to clearance of the cancer stem cell population. We hypothesize
that inhibition of SUMOylation of TFAP2A will decrease both the cancer stem cell population and tumor growth in both basal breast cancer and glioblastoma.

- **Methods and Results:** Anacardic acid was used as a SUMOylation inhibitor. Treatment with anacardic acid demonstrated a decrease in expression of cancer stem cells markers (CD49f in breast cancer; CD44 in brain cancer) and SUMOylated AP2A after Western blot analysis. Flow cytometry displayed a decrease in fluorescence of CD49f after treatment, while a MTT and coulter counter revealed a decrease in the proliferation. Critically, pretreatment of 4T1 cells with anacardic acid resulted in slower tumor growth in xenografted mice.

- **Conclusion:** These results show that anacardic acid decreases the amount of SUMOylated TFAP2A, reduces the amount of proliferation in vitro, and diminishes tumor growth in mice. Further analysis of anacardic acid as a treatment for basal breast and brain cancer may result in additional insight in its use as a treatment for patients.

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**118. Rachel Vasquez**

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

**Inhibition of the infralimbic cortex by the utilization of optogenetics**

- Previous studies suggest the infralimbic cortex (IL) maintains the ability to regulate consolidation of extinction of cocaine-seeking behavior. Intra-IL microinjections have been used to inhibit the neural activity in the structure. In contrast, the present study examines the consolidation of cocaine-seeking behavior in the IL by utilizing optogenetics. The male Sprague-Dawley rats underwent cocaine self-administration followed by extinction training. Cannulae were implanted in the IL of the rats and are not employed until the extinction phase of the experiment. For the first days of extinction training, rats underwent brief extinction sessions. During these sessions, the cannulae were attached to fibers of the optogenetic interface and the rats received stimulation to the IL. The following days of extinction training involved full-length 2-hour sessions without any optogenetic stimulations. Our hypothesis would comply with the recent studies utilizing intra-IL microinjections suggesting that the inhibition of the IL by optogenetics would impair retention of the extinction training thus indicating that the IL regulates learning tasks.

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**120. Josh Volker**

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

**Altered Mitochondrial Dynamics in Platelets Resulted in a Prothrombotic Phenotype**

- Thrombosis is a characteristic of many cardiovascular diseases, and is often associated with platelet hyperactivity. Preliminary findings revealed an increase in transcripts for mitochondrial dynamic proteins including Optic Atrophy-1 (OPA1) in obese mice, which are correlated with thrombosis risk. This project seeks to determine if changes in mitochondrial dynamics, i.e. the
fusion/fission cycles of mitochondria, will induce platelet dysfunction and promote thrombosis. Mitochondrial dynamics was altered by platelet-specific deletion of a critical fusion protein OPA-1. Mitochondrial oxygen consumption, glycolysis rate, ATP production and respiratory capacity were reduced by 50% as assessed by Seahorse XF-24 extracellular flux. Reduced mitochondrial fission protein 1, complex I, II, IV, and increased mitochondrial fusion protein mitofusin 2 (P<0.05) were observed in OPA-1 knockouts as detected by western blotting and native PAGE. P-selectin binding and integrin αIIbβ3 externalization in response to agonists was significantly increased (P<0.05) in knockout mice. These findings, coupled with shortened time to stable occlusion of the carotid artery following photochemical injury (36.4 min vs 18.6 min), lead to the conclusion that mitochondrial dysfunction that develops on the basis of impaired mitochondrial fusion promotes platelet hyperactivity and thrombosis in mice.

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 Screening

- The purpose of this study was to determine demographic variables that contribute to an increase of children lost to follow-up after newborn hearing screenings. Zip code, maternal education, birth hospital, and results of any follow-up administered were taken from the electronic birth certificate database provided by the Early Hearing Detection and Intervention coordinator. A logistic regression was used to investigate the relationship between the independent variables (distance away from pediatric diagnostic audiology clinic, urban vs. rural, and maternal education level) and whether a child was lost to follow-up or received follow-up. According to the results, children who were lost to follow-up were more likely to live farther from a pediatric diagnostic audiology clinic, live in an urban area, and have a mother with lower education. A table was also provided displaying the numbers of children lost to follow-up and received follow-up from each Iowa hospital represented. Possible solutions discussed were training more audiologists to perform pediatric diagnostic services. Having targeted training for healthcare providers to develop strategies to show parents and/or guardians the importance of early detection. Finally, finding more effective ways to provide information on early detection and intervention that is understood by all education levels.

124. Tom Werner
    Max Clapp

Major(s) - Computer Science, Math
Major(s) - Computer Science
Mentor(s) - Octav Chipara (Computer Science)

Capturing Electronic Communication to Understand Cyberbullying
A 2007 survey by the National Crime Prevention Council on teens and cyberbullying reported that 43% of teens have been victims of cyberbullying in the last year. Despite the high numbers reported by teens, there is no concrete definition of what constitutes cyberbullying. Our study aims to empirically characterize cyberbullying by collecting a dataset of electronic communication between 100 teens from two Iowa middle schools. The dataset includes Facebook, Twitter, and text messages. The electronic data is augmented with data collected using surveys methods. The survey data provides a baseline for the exposure of teens to cyberbullying and an assessment of the social relationships among study participants. We will use the dataset to understand the vocabulary typically associated with cyberbullying, the frequency of cyberbullying events, and the impact that social relationships have on cyberbullying. 

The study, as of March of 2015, is still in progress. Thus far, there has been an estimated 20 unique code changes but none of them required updates to the mobile phone application, thanks to our server centric design decisions. In addition, the system has already collected 30,000 SMS messages and 20,000 Facebook messages, building one of the largest cyberbullying datasets.

126. Christopher Winters

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

CaMKII Inhibition in Type II Pneumocytes Protects From Bleomycin-Induced Pulmonary Fibrosis and Ca2+ Dependent Apoptosis

The Calcium and calmodulin-dependent kinase II (CaMKII) translates increases in intracellular Ca2+ and oxidative stress into downstream events. CaMKII has been identified as a mediator of disease in asthma, but its function in other pulmonary pathologies remains unknown. In this study, we established CaMKII was expressed in the respiratory epithelium, particularly in prosurfactant-C-positive type II pneumocytes. Apoptosis of this cell type leads to development of collagen depositions. CaMKII is a known mediator of apoptosis. Thus, we hypothesized CaMKII inhibition protects type II pneumocytes from apoptosis and alleviates fibrosis. We developed a transgenic model of inducible expression of a CaMKII inhibitor limited to type II pneumocytes (Tg SPC-AC3-I). After Bleomycin exposure, Tg SPC-AC3-I mice were protected from development of pulmonary fibrosis. For in vitro experiments, MLE-12 cells were transduced with an adenovirus expressing a CaMKII inhibitor peptide or control virus. With CaMKII inhibition, Bleomycin induced apoptosis was abolished. We also investigated whether Bleomycin induces intracellular Ca2+ release and whether CaMKII controls ER Ca2+ content in type II pneumocytes. CaMKII inhibition significantly blunted intracellular Ca2+ release upon Bleomycin exposure, and also decreased ER Ca2+ loading. These data demonstrate CaMKII inhibition 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 military service to academic and later professional careers. This is a free, couples-based, skill-building workshop with a “date night” theme. It uses a combination of couples theories combined into an original theory called the, “Collective Model of Relationship Relief.” Workshops emphasize a light-hearted, strengths-based approach, which has been well-received by early participants. These workshops are split into 3 sessions, meeting once a week, with a total of 6 hours contact time. 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. Although data is not available yet, research suggests that building better partner relationships will strengthen all 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)

Whole transcriptome analysis of healthy and diseased brain tissue from epileptic patients

- Here we present a transcriptome-scale survey of gene expression in healthy cortical and seizing hippocampal tissue. 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. Tophat2 was used to align reads to the hg19 human reference genome and identify splice junctions between exons. Using the BAM file generated from Tophat2, Cufflinks was then used to assemble transcripts and estimate their abundance in order to quantify the gene expression and assess differential expression (DE) between the healthy and diseased tissue. To rule out tissue-specific expression effects, we compared our results with a similar analysis of the BrainSpan expression data (control subjects, hippocampus vs. all other regions), and focused on genes whose DE was a substantial departure from that seen in the control subjects: these are candidate disease genes. Further, we performed gene set enrichment analysis with the R statistical software and found a number of signaling pathways that were significantly enriched for DE genes. Our findings are in agreement with, and expand upon, previously reported results using microarray technology.