



**The 10th Annual
Spring
Undergraduate
Research
Festival**

**Celebrating undergraduate
involvement in research &
creative projects at the
University of Iowa**

**Wednesday, April 9, 2014
4:30pm-6:30pm**

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

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

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

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

Students have been asked to stand by their posters for either the first or second hour, and then are free to visit their fellow presenter's 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

Many thanks to the over 100 graduate students who have 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.

We hope that you enjoy talking with these outstanding students and will see you again in December 2014 for the Fall Undergraduate Research Festival!

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Joseph	Drum
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Thomas	Heiderscheit
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Julia	Jessen
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Andre	Metzger
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Jason	Mixdorf
Christina	Moscatel
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Erin	Naffziger
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Vida	Pandzic
Tyler	Pecora

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Colin	Peterson
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Rachel	Raupp
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Christopher	Sande
Jonathan	Schacherer
Hannah	Shows
Sarah	Strack
Madeline	Strange
Katherine	Strickland
Luke	Stroth
Kyle	Strouse
Karlin	Stutzman
Fanya	Sun
Lauren	Suhl
Keshav	Sutrave
Ericka	Tank
Yuejia	Teng
Keara	Turkington
Lauren	Vanchina
Madeline	Walkner
McKenzie	Wallace
Kelsey	Warner
Christopher	Winters
Haoyang	Yan
Grant	Young
Kasra	Zarei
Melissa	Zemke
Mara	Zuckerman

Presenters

1 - Oil and Water: A Sephardic Christian's Search for Spirituality

Presenter: Sophie Amado

Majors: English (Creative Writing) and Spanish

Mentor: Inara Verzemnieks (English)

- This thesis focuses on the effects of storytelling through the genre of the memoir. Like many aspiring writers who study English at the University of Iowa, I entered this institution convinced that I only wanted to write fiction, as fiction is by far the genre that possesses the most popular readership. However, after being exposed to the nonfiction writing genre as a student in the undergraduate creative writing track, I found that there was something much more captivating about telling one's own story and the stories of others rather than constructing a made-up universe. Therefore, through this thesis project, I decided to analyze what the "telling of the self" function of memoir writing does for the writer and to assess the effects of writing one's own memoir on the psyche of the writer as a search in progress. I analyzed the literary craft of the memoir by working through my own creative process and looking at parallel works to determine how an "I" is constructed in memoir.

2 - Discovery of Unique 3D Behaviors in Human Melanoma: New Targets for Anti-Cancer Drug Treatments

Presenter: Joseph Ambrose

Major: Biology

Mentor: David Soll & Deborah Wessels (Biology)

- We developed a high-resolution 3D motion analysis system to reconstruct, motion analyze and test drug responses of tumors formed in a model tumor 3D culture system. Application of this 3D tumorigenesis model to tumor explants from cancer patients led to the discovery of unique behaviors in cancer cells that are not observed in normal cell preparations including high levels of single cell motility through a dense fibrous matrix and aggregate (model tumor) formation. We also identified specialized cell types that facilitate model tumor formation. We have documented these behaviors in many different cancers including breast, paraganglioma, lung, peritoneal fluid, brain and now melanoma (skin cancer). In addition, initial experiments with fresh melanoma preparations revealed behaviors not observed in other tumors. These include extremely high single cell velocities and fusion of aggregates via tunneling of a highly aggressive subpopulation of cells through the dense matrix. If these differences hold true for other aggressive melanoma cells, then very different targets may have to be considered for melanoma drug development than those targeted for other cancers. We are now analyzing additional melanoma tissue as well as the ability of anti-cancer drugs to inhibit the unique melanoma behaviors.

3 - Text Messaging to Improve Sexual Assault Care Follow Up: A Feasibility Study

Presenter: Eleanor Andersen

Major: Nursing

Mentors: Nancy Downing (Nursing)

- Patients who have been sexually assaulted face multiple potential medical sequela, including sexually transmitted infections, pregnancy, and mental health issues. Follow-up care is essential, but has been complicated by difficulty re-contacting patients by phone. Text messaging is emerging as an alternative method of follow-up care but has not been tested in sexual assault patients. Ninety-seven

percent of people aged 18-29 use text messaging. This age group comprises the majority of patients seen in sexual assault nurse examiner (SANE) programs. This study will evaluate the feasibility and acceptability of a text messaging follow-up program for SANE patients.

4 - What Favorite Words Reveal

Presenters: Robin Anderson & Lauren Suhl

Majors: Speech and Hearing Sciences

Mentor: Karla McGregor (Communication Sciences and Disorders)

- When asked, “what’s your favorite word?” most people readily reply. But what makes a word preferred? Is it a pleasant meaning or is it the word form—a pleasing pattern of consonants and vowels? While adults often report favorite words that are mellifluous like “shenanigans,” children often report words for favorite activities like “basketball.” Young children use many words but they cannot tell you what a word is. Such explicit analysis of language (termed metalinguistic capacity) develops throughout childhood. We hypothesized that favorite words reflect metalinguistic capacity. We tested this hypothesis in two studies. In the first, 500 adults answered What is your favorite word? and Why is that your favorite word? The 'what' answers were coded for meaning (positive, negative, neutral) and form (e.g., type of consonants and vowels). The 'why' answers were coded for rationales based on meaning or form. In the second study, 60 children answered the same questions and completed tests of metalinguistic capacity. Results confirm that adults’ favorite words have a characteristic form and children’s favorite words acquire these characteristics as they gain metalinguistic control. Ultimately, professionals who evaluate children’s language development may find it useful to add a “favorite word inquiry” to their evaluations.

5 - Evaluation of APCs and Tregs in Lesions from Patients with the Autoimmune Blistering Disease, Bullous pemphigoid

Presenter: Samantha Aust

Majors: Biology and Psychology

Mentors: Kelly Messingham & Janet A. Fairley (Dermatology)

- Autoimmunity results from the inability of the immune system to discriminate between self and non-self. Bullous pemphigoid (BP) is an autoimmune disease targeting epidermal attachment proteins resulting in inflammation and blistering of the skin. Recent studies suggest that responses to epidermal antigens are generated largely within the skin itself through antigen presenting cell (APC)-mediated activation of regulatory T cells (Treg). Others noted fewer T-cells in BP skin compared to normal skin. Since differences in antigen presentation could contribute to autoimmunity, the goal of these studies was to evaluate the number of APCs and Treg in BP vs. healthy skin. To test this, BP or control skin samples were cryosectioned and stained with fluorescent antibodies specific for APC’s and T cells, then visualized using epifluorescent or confocal microscopy. Staining for MHC class II and/or langerin, revealed a decrease in the overall number of APC and Langerhans cells in BP skin, compared to control. Preliminary studies suggest a decrease in the number of Treg (CD3+FoxP3+) in BP skin, which could contribute to loss of immunologic tolerance. Future experiments will quantitate the number and colocalization of these cell types within the skin using multicolor confocal microscopy and NIH ImageJ software.

6 - Improving Patient Safety: Understanding Door Openings in a Cesarean Section Operating Room

Presenter: Brennan Ayres

Major: Biomedical Engineering

Mentors: Priyadarshini Pennathur (Mechanical & Industrial Engineering) & Loreen Herwaldt (Internal Medicine, Public Health)

- Outcomes of surgical procedures are influenced by factors such as surgical skill, patient conditions, and the surgical environment. Environmental factors include operating room (OR) layout and organization as well as distractors such as operating room door openings. This human factors work focuses on identifying the frequency and rationale for door openings in a university hospital labor and delivery (L&D) OR. Numerous studies have been performed for orthopedic ORs, correlating door openings with an increased risk of surgical site infections from distractions and worsening air quality. Previous studies have not addressed door openings in specialized ORs such as L&D. Project methods included: a Qualtrics survey to assess staff perceptions of door openings; observations during 14 Cesarean sections to gather data on door opening frequency, duration, and reasons for occurrence; and interviews with L&D OB/GYN nurses and physicians to further explore reasons for door openings and discuss the application of proposed recommendations. Survey results suggested nurses as opening the most doors and observations supported this result. Findings from this study will help staff develop recommendations and interventions to reduce the number of door openings and in the long run possibly help decrease the rate of surgical site infections after Cesarean sections.

7 - Modeling Skin Blistering Disease in Drosophila

Presenter: Gabriel Baccam

Major: Biochemistry

Mentor: Lori Wallrath (Biochemistry)

- Epidermyolysis Bullosa Simplex- Dowling Mera (EBS-DM) is a human skin blistering disease characterized by fluid filled blisters that form at friction sites of the body. EBS is caused by dominant mutations in Keratin 14 (K14) gene. Keratins are intermediate filaments that heterodimerize and form filament bundles in the cytoplasm of epithelial cells. K14 binds to Keratin 5 (K5) to form a dimer that then forms filaments in the basal layer of the skin. How mutant K14 causes skin blistering is not known. To determine the disease mechanism, we developed a genetic model using Drosophila (fruit fly) to study keratin function in epithelial cells. The Drosophila genome does not encode for keratins. Expressing wild type K14 and K5 in transgenic flies causes the formation of cytoplasmic bundles without apparent phenotypes. In contrast, expression of mutant K14 and wild type K5 produces blistered wings; two epithelial cell layers made up the wild type wing. We are determining whether the blistered wing phenotype is due to loss of cell-cell adhesion between the epithelial layers and/or altered biological signaling pathways. Our results will provide potential avenues for therapy.

8 - Hybrid Artificial Blood Vessels

Presenter: Rebecca Barrett

Major: Biomedical Engineering

Mentor: Ibrahim Ozbolat (Mechanical and Industrial Engineering)

- According to The Department of Health and Human Services, 18 people die every day waiting for an organ transplant. Despite an increased push to get more people to become organ donors there is still a large demand for healthy human organs. The goal of my research is to create a three dimensional

printing technology that has the capacity to print functioning human organs. These organs are still at the developmental stage. Eventually, we hope these organs will be able to be used in organ transplants. They would be custom printed using the patient's own cells, thus eliminating immune rejection of the transplanted organ by the patient. One of the main obstacles in organ fabrication is being able to create an efficient media exchange system. The cells on the outside have access to the nutrient rich media that keeps them alive, while the cells on the inside die. As a result only very small thickness structures have been printed. To help improve the cell viability, the survival rate of cells, of printed structures we are developing artificial blood vessels, or vasculatures, using a hydrogel called alginate. The goal of the experimental project is to create alginate vasculatures with properties that more closely biomimick those of natural human blood vessels by reinforcing them with collagen and elastin nanofibers. We will study the mechanical properties of these hybrid vasculatures, as well as short and long term cell viability. The project will be considered as successful if the hybrid vasculatures have increased cell viability, or properties closer to human blood vessels, than the unhybridized alginate vasculatures.

9 - Chitosan Wound Dressings to address deadly Superbugs

Presenter: Alexandra Bartlett

Majors: Chemical Engineering and Finance

Mentor: Allan Guymon (Chemical Engineering)

- With the increasing superbug (antibiotic-resistant bacteria) threat, new focus is being placed on new antibacterial treatments. Superbugs are an especially prominent threat for the treatment of trauma patients with open wounds. In order to heal most effectively, these wounds require a dressing that promotes a moist and antimicrobial environment while also absorbing or helping to clot blood. Wound dressings that contain chitosan have become the subject of research because chitosan: is a naturally occurring polysaccharide, is biocompatible, and possesses antimicrobial and blood clotting properties. This study employs photopolymerization to achieve the necessary structure because photopolymerization is fast and does not create toxic byproducts. The created film has nanostructure that can help aid cell growth, improve absorption of inflammation fluids, and decrease pain by insulating nerve cells.

10 - Multiplication on the Punctured Torus

Presenter: Wade Bloomquist

Major: Mathematics

Mentor: Charles Frohman

- A torus is a mathematical surface that can be thought of as a square with opposite sides identified, first the right and the left are identified together to make a cylinder, then the top and the bottom are identified to make a torus (or the frosting on a doughnut). We are looking at the punctured torus so there is a point removed from our torus giving it a hole. We can then look at all of the simple closed curves, a curve that does not intersect itself and ends where it began, on the punctured torus. A multiplication operation can be defined on these curves making an algebra. We look to interpret this multiplication from a more geometrical viewpoint.

11 - Visual Attention is Affected by Uncertainty

Presenter: Frank Bowers

Major: Psychology

Mentors: Shaun Vecera (Psychology)

- The environment is littered with unimportant information. We use target templates to find items in the environment that are relevant and rejection templates to reject irrelevant items. While crossing the street, for example, we might use a target template to look for a cars, and a rejection template to ignore irrelevant information, such as a parked car instead of a moving one. Previous research has suggested that response times using the target template are lower than response times using the rejection template. Target templates may be faster merely because they contain more information about the target item. The present experiment manipulated amount of information held in the template. The present experiment found that response times were negatively correlated with information, and suggest the difference in response time between the target and rejection templates is not as great as first appeared.

12 - Examining the function of akir-1 in C. elegans development

Presenter: Rich Bowman

Major: Biology – Comprehensive

Mentor: Sarit Smolikove (Biology)

- Akirin is a conserved nuclear protein that has numerous functions. We are studying a deletion mutant in the gene encoding for Akirin in *C. elegans* (*akir-1*) to determine if it has functions in this model organism similar to those in *Drosophila* and mice. While we have shown that AKIR-1 is required for meiosis in *C. elegans*, its other potential biological function have not been studied. We are examining the potential interaction between AKIR-1 and TGF- β signaling in the Sma/Mab pathway that regulates body size. We are also examining possible somatic rescue of the *akir-1* phenotype through selective expression of AKIR-1 with *ajm-1* (embryonic elongation), *lim-7* (embryonic morphological defects); *unc-54* (muscle myosin expression), and *unc-119* (nervous system development) via extra-chromosomal arrays. Our data indicates that *akir-1* impacts formation of vulva muscle precursor cells resulting in a bursting vulva phenotype, as well as resulting in slower movement and reduced thrashing rates. Our data suggests that AKIR-1 has a broad and conserved function in muscle formation and we are examining the impact *akir-1* has on normal muscle development and function throughout the body of *C. elegans*.

13 - Factors that Predict Theory of Mind in School-Aged Children Who Are Hard of Hearing

Presenter: Lauren Bricker

Major: Speech and Hearing Sciences

Mentors: Elizabeth Walkner (Communication Sciences and Disorders)

- Purpose: Previous research indicates that children who are deaf demonstrate delays in Theory-of-Mind (ToM); however, there are no studies on advanced ToM in children who are hard of hearing (HH). The primary objective of this thesis was to compare school-age children who are HH to normal hearing (NH) peers on ToM tasks. The second objective was to examine the possible factors that predictor ToM. A tertiary objective was to investigate ToM development longitudinally. Methods: Participants included 34 children, 12 children with NH and 22 children who were HH. All participants had completed second grade. Examiners assessed advanced ToM using two second-order false-belief

tasks, two hidden emotion stories, and sixteen sarcasm items. Results/Conclusions: There were no significant differences in ToM scores between groups; most children performed at ceiling on all measures. Language ability, specifically expressive grammar, was significantly correlated with ToM. When examining the data longitudinally, ToM scores in 5 year olds did not predict later ToM scores at 8 years of age, when language skills were controlled for in the analysis. In summary, most participants (NH and HH) performed well on advanced ToM measures, suggesting that social-cognitive abilities may be an area of relative strength for children who are HH.

14 - Daisy Bates: The Mayor of Ninth Street

Presenter: Maddie Bro

Majors: Journalism & Mass Communication and Gender, Women's & Sexuality Studies

Mentor: Stephen Berry (Journalism & Mass Communication)

- This project examines the life and challenges of Daisy Bates, journalist and president of the Arkansas NAACP, who played a major role in the struggle for civil rights in Arkansas during the Little Rock Desegregation Crisis of 1957-59. The confrontation was a pivotal test of the Southern strategy of massive resistance to the landmark Brown vs. Board of Education ruling that outlawed school segregation. Despite additional pushback from Arkansas' conservative black community, Bates fostered support and resources largely from her involvement in the State Press, where she served as writer, editor and co-owner with her husband, L.C. Bates. Harry Ashmore, editor of the Arkansas Gazette, played an important role in Bates' efforts. Ashmore, the winner of the 1958 Pulitzer Prize for his Little Rock editorials, is the central figure of UI Associate Professor Stephen J. Berry's ongoing book project. Harry Scott Ashmore: A Southern Liberal on the Road to Little Rock, Berry's working title, will not only be the first biography about the editor, it will provide new knowledge of the civil rights struggle and a streamlined definition of "southern liberalism." My in-depth study of Bates will contribute to Berry's analysis of the political spectrum of the South.

15 - Coarse Grain Modeling of DNA and RNA Duplexes

Presenter: Reid Brown

Majors: Biochemistry and Spanish

Mentor: Adrian Elcock (Biochemistry)

- My research has focused on the development of a medium detail Brownian Dynamics (BD) coarse grain model of RNA and DNA duplexes. The model is being parameterized from all-atom Molecular Dynamics (MD) simulation of a partially exhaustive set of double stranded DNA and RNA octomers (8 bases in length). The resulting model will be validated against a variety of experimentally obtainable values and will hopefully be able to predict chemically accurate descriptions of DNA and RNA behavior in novel situations at less computational cost than all-atom MD

16 - All-Atom Molecular-Dynamics Simulations of DNA-Amino Acid Interactions

Presenter: Brady Campbell

Major: Biochemistry

Mentor: Adrian Elcock (Biochemistry)

- Protein and DNA interactions have always been a topic of great discussion, and it is for that reason that we are working at creating a Coarse-Grained model of these interactions for larger scale

simulations. For this to be accomplished though, the individual interactions of all Amino Acid residues with all Nucleotide bases must be sampled. To fully sample this, I have run an All-Atom Molecular Dynamics simulation of a 70 Nucleotide DNA double helix, ordered in such a way that every Trinucleotide sequence was present. This double stranded helix was then simulated individually with every Amino Acid residue. Many aspects of these interactions were then measured, and will help us derive a Coarse-Grained Force Field in the near future.

17 - Popular Music in Musical Theatre: The Evolution of the Showtune

Presenter: Kayla Caryl

Majors: Political Science, Pre-law

Mentor: Donna Parsons (Music, Honors)

- Musical theatre has transformed and evolved alongside the development of popular music. Beginning with the introduction of rock 'n' roll into musicals during the 1960s and with the influence of jazz, Motown, and soul, musical theatre has reflected American popular culture. When George Gershwin's Porgy and Bess was first staged in 1935 not only was jazz brought into opera but the cast was entirely black. The Wiz transformed The Wizard of Oz in 1975 with a soul music influence as well as how the role one's history played in creating a sense of identity. Inspired by the musical lives of Jackie Wilson, James Brown, and Marvin Gaye Dreamgirls underlies the difficulties black musicians encountered in launching and maintaining their careers. Songs that were previously popular with mainstream audiences began to be interwoven throughout the musical score of jukebox musicals. In turn this particular genre opened doors for future popular musicians such as Billie Armstrong and Bono to write their own scores. My research focused exclusively on the development of the singing style in male roles in several musicals from 1927 to the present day and how that style helped evolve the musical's thematic content.

18 - Temporal Discounting, Risk Aversion and Dental Decisions

Presenter: Yanting Chen

Major: Microbiology

Mentor: Michelle McQuistan (Preventive & Community Dentistry)

- Objective: To determine which variables are associated with making hypothetical dental-related decisions. Methods: Adult patients seeking care at the UI College of Dentistry were recruited for this study. An on-line survey was conducted which presented five hypothetical dental scenarios pertaining to retaining teeth and economic questions related to temporal discounting and risk aversion. Data analyses were conducted to assess correlations and associations among variables. Results: N=66. All dental scenarios were correlated with each other. The economic scenarios were correlated with each other, but rarely with the dental scenarios. Multiple patient characteristics were associated with the dental scenarios, but they were infrequently associated with the economic scenarios. Respondents who reported seeking dental care regularly were more willing than irregular attendees to: pay more money, be in pain for a longer duration prior to treatment, and accept a lower potential success rate of the treatment in order to retain their teeth. Male respondents were willing to spend more money than female respondents to retain their teeth, and they were also willing to accept a lower potential success rate. Conclusion: This study suggests that patient characteristics are more likely than economic decision making processes to be associated with making hypothetical dental decisions.

19 - Proton NMR Studies of Functionalized Mesoporous Silica Nanoparticles in Aqueous Solution

Presenter: Stephanie Chin

Major: Chemistry

Mentor: Sarah Larsen (Chemistry)

- Nanoparticles modified with organic molecules have the potential to be utilized in applications such as catalysis, medical treatment, environmental remediation, and electronics. These organic molecules have been shown to be covalently bound to the surfaces of nanoparticles in both the solid state and in solution, but the interactions that occur on the particle surface when the nanoparticles are introduced into solution are not well-understood. Understanding the surface interactions of functionalized nanoparticles is crucial to their development for use in aqueous solutions. In this study, mesoporous silica nanoparticles modified with 3-aminopropyltrimethoxysilane (APTMS) have dispersed in aqueous solution and the surface chemistry was probed with 2D NOESY and DOSY proton NMR. A fast exchange of ligands between the particle surface and the free organic molecules in solution was observed to take place. The exchange was monitored over a temperature range from 6-70°C with solution proton NMR spectroscopy.

20 - Use of emotion words by dementia caregivers in an disclosure task: handwriting versus typing

Presenter: Jun Young Cho

Major: Speech and Hearing Sciences

Mentor: Jean Gordon (Communication Sciences and Disorders)

- Providing care to individuals with a progressive disease like dementia puts great burden on caregivers. Increased burden often results in physical illness and depression (e.g. Schulz et al., 1995). A number of therapeutic interventions are available. However, not all of these are accessible to caregivers, given the time constraints and financial limitations of caregiving. Experimental disclosure, in which participants write about their deepest emotions surrounding a stressful experience, is a simple, time- and cost-efficient intervention that shows potential to reduce caregiver burden. The current study analyzes caregivers' writing samples from two studies that followed the same protocol except for the method of administration – handwriting vs. typing (Butcher, PI; Ko, 2011). In each study, experimental participants wrote about their deepest emotions about caregiving while control participants wrote about topics not related to care. We hypothesize that experimental participants use more emotion words than control participants. Furthermore, if caregivers find handwriting more comfortable than typing, we expect that participants who handwrite will use more emotion words than those who type. The results of this study will reveal information about which writing conditions lead to greater emotion disclosure and, therefore, may be more effective in reducing caregiver stress.

21 - Enhancing the Accuracy of Undergraduates' Perceptions of Women's Sexual-Interest Cues

Presenter: Erin Church

Major: Psychology

Mentor: Teresa Treat (Psychology)

- Introduction: Studies have shown that misperception of women's dating-relevant cues is associated with sexual coercion and aggression. The present study examines whether explicit instruction regarding the meaning of sexual interest increases judgment accuracy, and whether gender moderates this effect. Methods: 222 undergraduates viewed 130 full-body photographs of college-aged women who varied in affect (rejecting to sexually interested), provocativeness of dress (POD; modest to

sexually provocative), and normative attractiveness. Participants rated each woman's sexual interest on a 21 point scale, in which -10 = "Woman Expressing Extreme Rejection", and +10 = "Woman Expressing Extreme Sexual Interest." Half of the participants received additional instructions to focus on facial expression and body language and to ignore attractiveness and clothing style. Results: Explicit instruction increased utilization of sexual interest and reduced utilization of POD and attractiveness. Men relied more on attractiveness than women did. Discussion: These findings suggest that explicit instruction of what to focus on when judging a woman's sexual interest may be beneficial. Both men and women focus more on sexual interest and less on POD and attractiveness when they receive explicit instruction. This study supports the use of explicit instruction in enhancing the accuracy of perceptions of women's emotional cues.

22 - Identifying the Devonian-Carboniferous Boundary in the Mid-Continent of North America

Presenter: Christopher Coble

Major: Geosciences

Mentor: Bradley Cramer (Earth and Environmental Sciences)

- A section of core was taken from the bedrock of Pike County, Indiana, to re-evaluate the Devonian-Carboniferous Boundary interval (~ 359 Ma) in the Mid-Continent of North America. This boundary between the Devonian Period and Carboniferous Period was a time of significant global extinction, known as the Hangenberg Extinction Event, as well as a major perturbation to the global carbon cycle, known as the Hangenberg Positive Carbon Isotope ($\delta^{13}C$) Excursion. This change in global carbon isotopes was also coupled with a significant fall in global sea level, and as a result, there are very few places on Earth with a thick stratigraphic record of the Devonian-Carboniferous Boundary interval. However, the Mid-Continent of North-America contains a good record of the late Devonian and early Carboniferous, which is the main focus of this study. Currently, the global standard reference point for this boundary, also known as the Global Boundary Stratotype Section and Point (GSSP), is located in La Serre, France. Recent unresolved stratigraphic problems within the La Serre section have provoked a search for a suitable replacement section with a significant record of the Devonian-Carboniferous boundary interval. In order for this section to be found, new research must be done to better understand this timeframe. The Hangenberg Extinction Event has been proposed as a possible marker for this boundary. To that end, Organic carbon isotope ($\delta^{13}C_{org}$) stratigraphy of the late Devonian through early Carboniferous was analyzed in search of the Hangenberg Carbon Isotope Excursion to determine if it is well represented in the Mid-Continent of North America. Preliminary results suggest the presence of a significant positive carbon isotope excursion, but further biostratigraphic studies, currently in progress, are required to confirm the presence of the Hangenberg Excursion in the drill core.

23 - Microwear Analysis of Stone Tool Scrapers

Presenter: Delaney Cooley

Major: Anthropology

Mentor: Matthew E. Hill (Anthropology)

- This research examines the Protohistoric (AD 1685 to 1885) occupation at the archaeological site 14SC409 in Scott County, Kansas. Using data from chipped stone artifacts, this study examines past economic and subsistence practices of the local population. These artifacts were classified based on their morphological shape and revealed a high reliance on scrapers. The energy placed into creating

and maintaining this one tool type over others implies that the tool served a function integral to their lifestyle. This study also made microscopic observations of damage and wear patterns along the used edges of stone tools to determine tool function. The primary results revealed the use of scrapers to work hide and bone and unmodified stone tools for cutting and butchering. Observations were also made on prehensile (hand-held) and hafting polishes to determine whether these implements were formal (long-life use) or informal (short-use life) tools. The combination of morphological and microwear evidence suggests that the site was a short-occupation used primarily for hide processing. A hide-based economy in the area is consistent with historical reports of Apache occupying Scott County after being displaced by European colonization.

24 - Substance P Receptor Antagonist Inhibition of Neurogenic Inflammation

Presenter: Taylor Dalsing

Major: Health and Human Physiology

Mentors: Andrew Russo (Molecular Physiology and Biophysics)

- Migraine is a complex disorder that has many disabling effects, including photophobia and pain caused by neurogenic inflammation. While many aspects of migraine are unclear, calcitonin gene-related peptide (CGRP) is known to be active during migraine. We have previously shown that transgenic mice with overexpression of hRAMP1 (a subunit of the CGRP receptor) are sensitized to CGRP and are photophobic. As a measure of neurogenic inflammation we have also shown that these hRAMP1 transgenic mice have increased plasma extravasation. In this study we wanted to determine if this extravasation was dependent on the neuropeptide substance P, which is known to cause plasma extravasation. In addition, a role for substance P was predicted by our observation that CGRP triggers the release of substance P from trigeminal ganglion neurons. Plasma extravasation was measured by leakage of Evans Blue dye into mice hind paws. Overexpression of hRAMP1 in nestin/hRAMP1 mice increased CGRP-induced plasma extravasation by two-fold. Our initial results indicate that a co-injection of an NK1 substance P receptor antagonist, (CP-96345), blocked this subcutaneous extravasation.

25 - Determining Handedness From Flake Production

Presenter: Chloe Daniel

Majors: Anthropology and Psychology

Mentor: Shelby Putt (Anthropology)

- This study is intended to investigate the possibilities of determining handedness in flake production during lithic reduction. This will be done by using debitage collected from novice college student flintknappers and documenting the dominant hand used by each person during flake production. Then multiple techniques will be applied in observing the resultant flakes and attempting to find patterns between right handed and left handed flake production. If the methods used are successful these results can be applied to the archaeological record and help determine which hand was preferred by hominin ancestors and shed light on the development of brain lateralization.

26 - Effects of Caffeine on the Circadian Activity in K⁺ Channel *Drosophila* Mutants

Presenters: Andre DeGroot & Andrew Metzger

Majors: Biomedical Engineering & Physics

Mentor: Chun-Fang Wu (Biology)

- In *Drosophila*, the genes *quiver*, *shaker*, and *hyperkinetic* have been identified as subunits in one of four types of voltage-gated K⁺ channels. These channels are responsible for repolarizing the neuronal membrane during action potential propagation, with homologous channels existing in humans. As these channels are integral in creating a voltage threshold for action potential firing, mutations in these channels and their subunits produce abnormal neuronal activity. The majority of these mutations cause a decreased repolarizing K⁺ current, resulting in a hyperexcitable neuron. This well-characterized hyperexcitability manifests as altered activity patterns and decreased sleep. We have examined the fly activity patterns of these K⁺ channels mutants with and without treatment with caffeine. Caffeine's properties as an alertness aid make it an interesting effector molecule for mutants showing irregular activity and sleep patterns. Caffeine inhibits the activity of phosphodiesterase on cyclic AMP (cAMP) degradation, leading to elevated levels of cAMP. Cyclic AMP is an important second messenger in the altering of the opening and closing of K⁺ channels. We observed the effects of caffeine on K⁺ channel mutants in a single subunit as well as mutants of two discrete subunits.

27 - A controlled study to test the effect of verbal and nonverbal instruction on experimental handaxe symmetry

Presenter: Emma Dellopoulos

Major: Anthropology

Mentor: Robert Franciscus & Shelby Putt (Anthropology)

- In this project, I plan to investigate if novice flintknappers were able to create symmetrical bifaces, based on the methods they were taught. I want to use flip test analysis to compare values of symmetry over time for both the progress of novice flintknappers learning from both verbal and nonverbal teaching methods and, going forward, handaxes from the archaeological record. In this study, I will be using the values of symmetry provided by the flip test to assess skill acquisition of the flintknappers. I also plan to assess skill using analysis of miss strikes present on the cores. My hope is that this study will help to better the understanding of the skill acquisition present in the Lower Paleolithic, and whether it was through verbal and nonverbal methods of teaching when the Acheulian toolkit was used. This study may also provide a premise for analyzing and identifying novice products in the archeological record.

28 - Evolution of Meiosis Genes in Lichens

Presenter: Joseph Drum

Major: Biology

Mentor: John Logsdon (Biology)

- My research is focused around understanding the evolutionary history of meiosis. In lab I utilized modern molecular techniques to amplify, clone, and sequence the given genes of interest. I have primarily been focusing on using lichens as my organism of study. Lichens consist of a fungal and algal component that have a symbiotic relationship. Different species of lichens provide an interesting research organism because of their ability to adapt and evolve with the help of their symbiont. By tracking these meiosis specific genes in different species of lichens we can begin to gain a better understanding of how meiosis evolved, and how it is maintained in nature.

29 - The Aftermath of Alcohol Exposure: A Survey of Glial Activity in a Mouse Model of Fetal Alcohol Syndrome

Presenter: Jacqueline Dunning

Majors: Neuro-Biology and Philosophy

Mentors: Michael Dailey & Kate Ahlers (Biology)

- When a pregnant mother consumes alcohol, she exposes her fetus to its damaging effects. Fetal Alcohol Syndrome is a diagnosis that encompasses neurological and physical abnormalities including a spectrum of both growth and mental retardation caused by prenatal exposure to alcohol. These symptoms follow from the damage and death of neurons. Glial cells, however, react differently. Glial cells are the most abundant cells in the central nervous system. They provide physical, immunological, and metabolic support for neurons. Astrocytes, oligodendrocytes, polydendrocytes, and microglia are four major populations of glial cells classified by their different functions. Astrocytes contribute to the formation of the blood-brain barrier. Myelin, which insulates neurons, is produced by oligodendrocytes. Polydendrocytes play a role in regeneration of the CNS. Microglia are the brain's resident immune cells. In a brain under distress, each class provides a specific support. Because seven-day-old mice are comparable to third trimester human fetuses, we can get a snapshot of the brain after alcohol exposure by fluorescently staining tissues exposed to alcohol and imaging those tissues using a confocal microscope. By exploring the interactions of glial cells during alcohol-induced distress, we can better understand how the brain fights back.

30 - Can Hypothetical Scenarios Be Used to Predict Actual Dental Treatment Decisions?

Presenter: Callie Espanto

Majors: Pre-Dentistry, Human Physiology

Mentor: Michelle McQuistan (Preventive and Community Dentistry)

- **Objective:** To determine if associations exist between making hypothetical dental treatment and general economic decisions with real-life dental treatment decisions. **Methods:** Patients seeking care at the University of Iowa College of Dentistry were recruited for the study. Participants completed a survey to assess how they would respond to hypothetical dental scenarios pertaining to retaining or extracting teeth and economic questions modeling temporal discounting and risk aversion concepts. Participants' records were reviewed to determine the actual treatment they selected at their dental appointment. Chi-Square and Fisher's Exact Tests were used to determine associations ($p < 0.05$). **Results:** $N=66$. 44% of participants opted for extraction, 26% opted to keep their teeth, and 30% had other treatment needs. Participants in pain were more likely to select an extraction than to keep their teeth. Participants who chose to keep their teeth in the hypothetical dental situations were also more likely to choose to keep their teeth during their dental appointment compared to the extraction and reference groups. **Conclusion:** Hypothetical dental scenarios, but not economic decisions, were associated with participants' real-life dental treatment choices. Dentists may be able to predict patients' real-life treatment preferences based on hypothetical dental scenarios.

31 - Withstanding Physical, Cognitive, and Emotional Distress: Toward a Unified Model of Distress Tolerance

Presenter: Emma Evanovich

Major: Psychology

Mentor: Michael O'Hara (Psychology)

- The purpose of the present study is to examine the psychological construct of distress tolerance (DT) including its latent structure and associations with related constructs. Distress tolerance (DT) can be defined as a person's ability to withstand negative emotional and/or other aversive states. The construct of DT has been identified as a contributing factor to the development and maintenance of psychopathology. Indeed a number of empirically supported psychotherapy treatments promote the acceptance/tolerance of personal distress. Despite the importance of the DT construct in research literature, a unified theoretical model has not yet been established. Researchers have conceptualized DT in numerous ways. Despite the wide range of ways that DT has been conceptualized, there has been little work to unify these perspectives into a single theoretical model. The literature would greatly benefit from a study that provides an empirically supported latent model of DT that incorporates the entire range of conceptualizations of DT as used in the literature. Such a latent model will serve to unify the DT literature and validate DT as a construct that is distinct from other, theoretically related constructs in the study of psychopathology.

32 - You Are What You Eat: The Wahls™ Diet Improves Fatigue in Patients with Multiple Sclerosis

Presenter: Hanan Fadel

Major: Health and Human Physiology

Mentors: Cathy Chenard (Internal Medicine)

- Fatigue disability is the most common reason for persons with multiple sclerosis leaving the workforce; however, fatigue is very resistant to treatment. The aim of this study is to assess change in fatigue in subjects with multiple sclerosis following implementation of the Wahls™ diet or the Wahls Paleo Plus™ diet. Secondary measures include dietary adherence, blood biomarkers, nutrient intake, and change in blood vessel endothelial function. It is hypothesized that the Wahls™ diet and Wahls Paleo Plus™ groups will experience decreased fatigue compared to the control group. Subjects are randomized into three groups: the Wahls™ diet, the Wahls Paleo Plus™ diet, and a control group and are monitored over a twelve week period. Fatigue was measured using the Modified Fatigue Impact Scale (MFIS), the Fatigue Severity Scale (FSS), and the Medical Symptoms Questionnaire (MSQ). Data for the first three intervention subjects shows a greater median decrease between baseline and end-of-study in MFIS, FSS, and MSQ scores (18, 1.7, 33) compared to the one control subject (0, 0.1, 8). These findings suggest that adopting a Wahls™ diet or a Wahls Paleo Plus™ diet may decrease fatigue and medical symptoms in individuals with multiple sclerosis.

33 - Give Peace A Chance: How Music Shaped the 1960's Counterculture

Presenter: Taylor Finch

Major: History

Mentor: Donna Parsons (Music, Honors)

- My research explores how the music of the 1960's reflected the political and social world of America at the time. More specifically, it explores how popular musicians instigated and popularized the Counterculture. In a decade defined by a war in Viet Nam, the Civil Rights Movement, and the Women's Liberation Movement a new generation of young people became disillusioned with the American government and social structure. They envisioned a world without hate and used their vision to protest the war and the racist/sexist climate. These people flooded Haight Ashbury in San Francisco, California, which became a hotbed of political protests, "free love", and drug use. Popular musicians like Jefferson Airplane, The Doors, Janis Joplin, Jimi Hendrix, and Crosby Stills Nash and

Young emerged from this counterculture center. Joined by British Invasion bands like Cream and The Who, these acts used their unique musical talent to pen songs that defied authority and ignited a generation of protestors. The movement gained popular followers like Bob Dylan, The Beatles, and The Rolling Stones, who took the counterculture to a world stage and cemented the "Sex, Drugs, and Rock N' Roll" of the 60's in history forever.

34 - Trends in Secondary Organic Aerosol (SOA) Formation in Iowa City

Presenter: Kevin Frey

Major: Chemistry

Mentor: Elizabeth Stone (Chemistry)

- Secondary organic aerosols (SOAs) contribute to the overall particulate matter (PM) present in the atmosphere. SOAs form when precursor gases in the atmosphere react and partition into the particle phase. One of these precursor gases, isoprene (C₅H₈), is emitted from plants and estimated to have annual emissions of 17-20 TgCyr⁻¹ in the United States¹. In this study, PM was collected here in Iowa City and was analyzed using gas chromatography/mass spectrometry for organic tracers of isoprene SOA. Monthly samples were analyzed from August 2011 to September 2012. It was determined that the overall concentration of SOAs formed from isoprene peaked in the summer months and were lowest during the winter months. These SOAs include the high-NO_x pathway compound 2-methylglyceric acid and the low NO_x pathway compounds methylthreitol and methylerythritol. The relative amounts of these SOAs remained largely unchanged over the one year time frame. Daily samples were analyzed during the 2012 Iowa City landfill tire fire, which provided an opportunity to study how the tire fire influenced SOA formation within 4 kilometers of the fire. It was determined that the relative amounts of each SOA varied greatly during the fire, with a shift towards the high NO_x compound, 2-methylglyceric acid.

35 - A Role for TRAF3 in the Extended Survival of LMP1 Transformed B Cells

Presenter: Brett Hanson

Major: Microbiology

Mentor: Gail Bishop (Microbiology)

- Latent Membrane Protein 1 (LMP1), an EBV-encoded protein which acts as a constitutive signaling mimic of the normal B cell costimulatory receptor CD40, is necessary for EBV mediated transformation of B cells. TNF Receptor Associated Factor 3 (TRAF3), a cytoplasmic signaling protein, is necessary for LMP1 signaling to B lymphocytes, but in contrast inhibits CD40 signals. TRAF3 also restrains homeostatic B cell survival, and loss-of-function TRAF3 mutations are found in various B cell tumors. LMP1 recruits TRAF3 to the plasma membrane more effectively than does CD40, and LMP1 expression reduces association between TRAF3 and CD40. Interestingly, both LMP1-expressing B cells and TRAF3 deficient B cells exhibit abnormally extended survival. This led us to investigate whether LMP1, by altering cellular compartmentalization of TRAF3, causes an effective deficiency in cytoplasmic TRAF3, leading to extended B cell survival. To examine this question, a B cell line expressing both mouse CD40 and inducible LMP1 expression was employed. Following signaling, cytoplasmic and nuclear protein fractions were isolated. Initial data show an increase in the level of nuclear TRAF3 when LMP1 is expressed. In addition, data indicate that LMP1 expression decreases the level of cytosolic TRAF3 to a greater extent than CD40 signaling.

36 - Evaluating Aggregation Kinetics of Gold Nanoparticles using SERS

Presenter: Thomas Heiderscheid

Major: Chemistry

Mentor: Amanda Haes (Chemistry)

- Gold nanoparticles exhibit novel localized surface plasmon resonance (LSPR) 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 presentation, the time dependent LSPR spectral changes of solution-phase gold nanoparticles upon addition of small molecules are used to estimate the size of both primary and clustered nanoparticles. Impacts of primary nanoparticle concentration and size as well as molecular concentration reveal interesting size and time dependent trends. Next, evaluation of these data using reaction and diffusion-limited aggregation models suggests that all parameters (nanoparticle size, nanoparticle concentration, and molecular concentration) are relevant in understanding the time-dependent LSPR and SERS spectral results. 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.

37 - U-Pb ages of detrital zircons from the Dakota Formation, western Iowa and Eastern Nebraska: Evidence for mid-Cretaceous transcontinental fluvial systems

Presenter: Brittany Hendrix

Majors: Geoscience & Art History

Mentor: Emily Finzel (Earth and Environmental Science)

- It has been proposed that sandstones from the Woodbury and Nishnabotna members of the Dakota Formation in western Iowa represent channel deposits from a large fluvial system during the middle Cretaceous. Witzke and Ludvigson 1994, suggested that a large fluvial system drained portions of the Appalachian mountain belt and the Canadian shield and flowed west across the mid-continent to drain into the Western Interior Seaway during Cenomanian time. Detrital zircon study on the Dakota Formation of western Iowa will offer a quantitative solution to previously proposed provenance hypotheses for an eastern derived transcontinental fluvial system in the mid Cretaceous. Zircon for this study was collected from channel deposits in the Upper Woodbury Member and the Nishnabotna Member of the Dakota Formation. U/Pb analysis of 385 zircon grains, using LA-ICPMS at the Arizona Laserchron Center, yielded predominantly Appalachian and Grenvillian grains, 360-760 Ma and 1000-1300Ma respectively. This indicates an Appalachian or eastern provenance for the transcontinental fluvial system. However, detrital zircon analysis yielded few Canadian shield grains. The Canadian shield was likely not a contributor of sediment to the Dakota Formation.

38 - Investigating the Role of Cdc42 and Arf1 in GPIHBP1-mediated Transport of LPL Across Endothelial Cells

Presenters: Alex Hjelmaas & Hannah Shows

Majors: Biochemistry

Mentor: Brandon Davies (Biochemistry)

- Hydrolysis of triglyceride-rich chylomicrons by LPL is one of the central events of fat metabolism. Fats from our diet are initially broken down by various lipases in the intestines. The resulting fatty acids enter the intestinal epithelium where they are packaged as triglycerides into chylomicrons, which

deliver these triglycerides to various tissues via the bloodstream. Once the chylomicrons reach capillaries, the triglycerides can be hydrolyzed by LPL, liberating fatty acids that can then cross the capillary endothelial cells and be taken up by tissues. LPL, however, is not secreted by endothelial cells, but by adipocytes and myocytes and must therefore cross the endothelial cells that line capillaries to reach its site of action. It has been shown that the protein GPIHBP1 transports LPL across the endothelial cells into to the capillary lumen, where LPL is able to perform its function. Without GPIHBP1, chylomicrons are not hydrolyzed resulting in hypertriglyceridemia – a risk factor for forms of heart disease. Specifically, this project uses in vitro assays to investigate the role that the endocytosis-mediating genes Cdc42 and Arf1 play in LPL transport.

39 - Valuation of Ecosystem Services: Simultaneous Autoregressive Estimation of a Hedonic Price Function

Presenter: Cody Hodson

Majors: Geography and Japanese

Mentor: Heather Sander (Geographical and Sustainability Sciences)

- Valuation of ecosystem services (ES), the benefits people receive from ecosystems, involves placing a partial economic value on these services to determine the impact of actions affecting their provision and quality. Hedonic price modeling (HPM) offers one way to do this by analyzing the effects of ES on the market price of a commodity, typically home sale values, using linear regression. Researchers often use the ordinary least squares estimation of an equation to calculate this; however, this approach does not consider bias introduced by the spatially structured variables useful for modeling such a process. Simultaneous autoregressive (SAR) estimation can address this bias. This study uses urban home sales in two Twin Cities Metropolitan Area counties between January 1st and October 31st, 2012 to assess the partial value of ES provided by lakes and streams, natural land cover, trails, and six different types of green space through HPM employing SAR estimation. The results demonstrate the average partial economic value of ES across the study area, but a global approach can hide the local significance of these services and generalizes value to the entire population; therefore, this research can benefit greatly from considering a local approach in addition to a global one.

40 - Determinants of Preferential Binding of Apo Calmodulin to the IQ Motif of Neuronal Sodium Channel NaV1.2

Presenter: Liam Hovey

Majors: Physics and Chemistry

Mentor: Madeline Shea (Biochemistry)

- The neuronal voltage-gated sodium channel (NaV1.2) is regulated by calmodulin (CaM), a highly conserved, ubiquitous eukaryotic protein that mediates many calcium-triggered signaling events. Fast inactivation of the channel depends on CaM-mediated feedback transduction of calcium flux during the repolarization phase of an action potential. CaM binds to an intracellular loop (the III-IV linker) and an IQ motif [IQRAYRRYLLK] in the cytosolic C-terminal tail of the channel. The NaV1.2 IQ motif binds only to the C-domain of CaM with high affinity to both its calcium-free (apo) and calcium-saturated states. However, the IQ motif binds more favorably to apo CaM than to calcium-saturated CaM. To determine the molecular basis for this calcium-dependent difference in association, mutational perturbations of residues in the NaV1.2 IQ motif were designed to disrupt close contacts observed in our solution (NMR) structure of the semi-open C-domain of apo-CaM bound to the IQ motif (2KXW.pdb). The contributions of these residues to binding energetics were determined by

monitoring CaM-induced disruption of FRET in biosensors containing wild-type or mutant sequences of the IQ motif bracketed by auto-fluorescent proteins YFP and CFP. All mutations lowered affinity for calcium-saturated CaM, but they had uniformly more deleterious effects on the binding of apo CaM. Furthermore, the decrease in affinity for apo CaM caused by loss of the Ile-Gln pair was 30-fold greater than that observed for loss of the Tyr-Tyr pair. Thus, the energy of interaction between the NaV1.2 IQ motif and semi-open apo CaM is not accounted for primarily by the classical “aromatic anchors” that dominate interactions of calcium-saturated CaM with its target sequences in kinases, receptors and other channels.

41 - Impact of Severe Life Adversity on Physiological Pathways and Symptoms in Interstitial Cystitis/Painful Bladder Syndrome: Early Findings From the Multidisciplinary Approach to Pelvic Pain (MAPP) Study.

Presenter: Lucille Howard

Major: Psychology, Pre-Medicine

Mentor: Susan Lutgendorf (Psychology)

- Previous research has found that people who have experienced childhood adversity have higher levels of depression, anxiety, inflammatory problems, and heightened reports of pain. This study examined urologic pelvic pain in women who had and had not suffered early childhood adversity. Sixty-five women enrolled in the Multidisciplinary Approach to the study of Chronic Pelvic Pain (MAPP) Research Network completed symptom questionnaires, psychological questionnaires, and provided blood and saliva samples. Participants with high levels of childhood adversity reported significantly higher depression, $p < .01$, anxiety, $p = .04$, and perceived stress, $p < .01$ in addition to more urinary problems on the subjective AUA Symptom Index, $p < .01$ and more negative thoughts about symptoms, $p < .01$. There were no significant differences between groups on more objective urological symptom measures, GUPI pain subscale, $p = .37$ and GUPI urinary subscale, $p = .12$. Women with childhood adversity had significantly higher levels of morning cortisol, $p = .04$, monocytes, $p = .03$, and lymphocytes, $p = .04$ though no significant differences between groups were observed in CRP, $p = .59$, IL-6, $p = .52$, afternoon or night cortisol, ($p = .19$, $p = 0.71$, respectively). These findings suggest that early childhood trauma is associated with long term changes in cortisol regulation, symptom burden, and psychological difficulties although, in this sample, pelvic pain symptoms appear not to be affected.

42 - Expanding Europe and the Globe, 1350-1700

Presenter: Julia Jessen

Majors: Art History, Journalism, Studio Arts

Mentor: Julie Hochstrasser (Art History)

- I am currently working with Professor Julie Hochstrasser to aid in expanding her contribution to the Oxford Bibliographies Online, Europe and the Globe, 1350-1700. This is a complex and detailed annotated bibliography chronicling sources on cross-cultural mingling of artistic traditions in the period between 1350-1700; this includes sources on the interactions of countries such as the Netherlands, France, Portugal, and Spain. As Professor Hochstrasser specializes in 17th century Dutch artwork, the Netherlands is, naturally, the most developed of section of the entry. My contribution to the research involves developing and cultivating an expanded list of the most important sources involving the other countries included in the bibliography: England, France, Spain, and Portugal. The goal of this work is to provide a comprehensive view of how the artistic cultures of these countries

interacted. Through this research, I have gained a fascinating glimpse into the globalization of art and how art provides evidence of the impact of interaction between countries.

43 - "This is my song!": Music-evoked autobiographical memories are less vivid in individuals with medial prefrontal cortex damage

Presenter: Brett Karlan

Majors: Biology (Neuro track), Philosophy

Mentor: Daniel Tranel (Neurology)

- Music is often intimately connected with memories. The medial prefrontal cortex (mPFC) has been identified in neuroimaging studies as a brain region involved in music-evoked autobiographical memories (MEAMs) (Janata, 2009). In this study, we used a neuropsychological approach to test the necessity of the mPFC in MEAM processing. Patients with damage to the mPFC, as well as neurologically normal and brain-damaged comparison groups, listened to 30 songs that were popular when the participants were 15-30 years old. As a comparison, the participants also viewed 30 faces of people who were famous during the same time period. After each stimulus, participants described evoked autobiographical memories. Memory descriptions were coded to quantify the amount of episodic and semantic details in each (Levine et al., 2002). In the comparison groups, MEAMs were more vivid: they had a higher ratio of episodic/total details compared to face-evoked memories. In patients with mPFC damage, MEAMs were not more vivid. These findings extend previous functional imaging work by demonstrating that the mPFC is necessary for normal MEAMs, and are consistent with the theory that the mPFC is a key region for binding music, emotion, and autobiographical memories.

44 - Are there specific anatomical foci that trigger seizures in Drosophila? (Maybe?)

Presenter: Tanzeh Khan

Majors: Biomedical Engineering, Pre-Medicine

Mentor: Chun-Fang Wu (Biology)

- Identifying the anatomical foci responsible for causing hyperexcitable behaviors such as seizures is important in understanding anatomical and physiological processes underlying epilepsy. A model of heritable epilepsy with *Drosophila* can be created with random, but discrete divisions of tissue expressing seizure mutations and normal tissue using the Ring X system. Spontaneous loss of an unstable X chromosome, the Ring X chromosome, during development creates mosaic gynandromorph flies that are part male, where the Ring X is lost, and part female, where the Ring X remains intact. The male tissue therefore expresses recessive phenotypes, while the female tissue is heterozygous and does not. We produced mosaics of the hyperexcitable mutants *Swd* and *bss* (alleles of the sodium channel gene, paralytic). We first identified the mutant body parts, characterized by recessive cuticular and eye color markers (e.g. yellow), and then observed hyperexcitable phenotypes, such as ether-induced shaking and mechanical shock triggered seizing. The phenotype is then mapped to the male tissue to pinpoint the locations responsible for mutant expression. The mosaic flies produced by the Ring X system have shown to be a valuable tool to localize tissues that trigger abnormal behavioral expression like seizing and can further help determine the etiology of other nervous system disorders in humans.

45 - Measuring Listening Effort: Developing Adaptive Testing Procedures for the Dual-Task Paradigm

Presenter: Sieon Kim

Major: Speech and Hearing Science

Mentor: Yu-Hsiang Wu (Communication Sciences and Disorders)

- Speech recognition involves not only perceptual factors, but also cognitive processing. When speech signals are degraded by the noise, the listening becomes effortful. The listener must allocate more cognitive resources to understand speech, which is often referred as the listening effort. One of the most widely used method for quantifying the listening effort is the dual-task paradigm, where the listener performs two tasks concurrently (a primary speech recognition task and a secondary task such as pushing a button to respond to a visual stimuli). The data from our previous study revealed that the selection of the test SNR (signal-to-noise ratio; the greater the SNR is, the optimal the speech signal is) greatly influences the result of the dual-task paradigm. The purpose of this study is to develop a dual-task methodology that could minimize the effect of SNR.

46 - Nutritional Modification Alleviates Seizure-like Phenotype in Shudderer, a Mutant of the Voltage-Gated Sodium Channel Gene in Drosophila

Presenter: Tyler Klenske

Majors: Music and Health and Human Physiology

Mentors: Junko Kasuya and Toshi Kitamoto (Anesthesia)

- Nutritional modification is known to have therapeutic effects on neurogenetic and neurodegenerative disorders, but the mechanism behind this action is poorly understood. Using the fruit fly *Drosophila melanogaster* as a model organism, this project seeks to gain a better understanding of the neurological response to dietary intervention through the systematic isolation of the diet's key ingredients. Many neurological disorders (such as Epilepsy, Multiple Sclerosis, and Autism) are caused by abnormal voltage-gated sodium channel (VGSC) activity, coded in fruit flies by a single gene known as Paralytic (*para*). A genetic mutant in *Drosophila* known as Shudderer (*Shu*) exhibits a misfunction in VGSC activity due to a point mutation on the *para* gene, resulting in strong seizure-like twitches among other physical markers. Recent findings in our lab have shown dry milk supplement to cause dramatic improvement in both seizure-like activity and associated phenotypes when implemented during development. Here we present new findings that point toward the lipid portion of dry milk as our sought after determinant, and preliminary findings that suggest medium chain triacylglycerols as a further isolated ingredient. Both supplements are seen to have therapeutic effects similar to a dry milk control. We trust that because the VGSC gene is well conserved between flies and humans, our conclusions will significantly inform the development of more effective dietary treatment for neurological disorders in humans.

47 - Phonological Development and Vocabulary in Bilingual Children

Presenter: Rebecca Koerner

Major: Speech and Hearing Sciences

Mentor: Christine Shea (Spanish and Portuguese)

- In the present study we examine phonological and phonetic development in children enrolled in a dual immersion (Spanish-English) program at an elementary school in Iowa. The children participated in a variety of tests in both languages such as: phoneme discrimination and identification, pronunciation, elision, blending words, memory of digits, non-word repetition, rapid digit naming,

rapid letter naming, and receptive and expressive one word picture vocabulary tests. We hypothesize that children with larger vocabularies in each language will be better at repeating non-words and have greater phonetic accuracy in picture naming tasks. We are still currently in the data collecting process and have not yet begun to analyze the data.

48 - Examining the effects of fluid shear stress on cells through micropipette aspiration

Presenter: Benjamin Krog

Major: Biomedical Engineering

Mentor: Michael Henry (Molecular Physiology and Biophysics)

- Cancer cells traveling to distant tissues during metastasis must survive passing through the circulation. The influence of the circulatory fluid microenvironment on these cells is poorly understood. It has been suggested that exposure to the shear forces within circulation was inhospitable to cancer cells, causing them to be destroyed. Recent evidence from our lab indicates that transformed cells selectively adapt following exposure to fluid shear forces and become resistant to subsequent exposure to shear force. These cells survive forces in excess of that may be experienced within circulation. However, the mechanism behind this induced resistance is unknown. Through micropipette aspiration, a technique used to measure mechanical properties of cells, we are able to examine changes in cells under various conditions, including fluid shear stress. One such mechanical property we evaluated is the elastic modulus. The elastic modulus, a measure of stiffness, is altered upon exposure to fluid shear stress. We are currently investigating the role of membrane stiffening in the fluid shear stress resistance response in cancer cells.

49 - The Role of Self-Presentation in Greco-Roman Generalship

Presenter: Ryan Kunkle

Majors: History

Mentor: Rosemary Moore (History)

- Our research examines Greco-Roman generalship, drawing upon ancient historical narratives by authors like Plutarch, Polybius, Caesar, Hirtius, and Frontinus. These works were written for the Greek and Roman social elite, who were often in the top echelon in politics and military appointments. Another facet of this society was the amateur nature of training for such positions, which involved not only informal mentoring, but also military manuals and historical narratives by writers like Plutarch and Frontinus, etc., for their training. One peculiar feature of narratives of military command is the commander's use of religious interpretations and, in particular, scientific explanations to justify military decisions. Although our research is still underway, we've discovered how Roman commanders, in strengthening their authority, relied upon not just conventional military discipline but also sought to bolster their image by utilizing scientific knowledge and, if necessary, by interpreting and appropriating religious omens.

50 - Breaking the Cycle: Meth in the Heartland

Presenter: Katherine Kuntz

Majors: Economics & Journalism and Mass Communication

Mentor: Charles Munro (Journalism and Mass Communication)

- This research project will culminate in a 30 minute video documentary as part of my work as an investigative student reporter with IowaWatch. The project follows two women who raised their children while under the influence of meth addiction and shows the ways in which children raised by meth-addicted mothers face unique physical and psychological health concerns and a greater risk of drug use themselves. As a researcher and reporter I evaluated some of the many ways meth may be treated and the lack of resources available to children who grow up in homes whether those resources come from hospitals, schools or the criminal justice system.

51 - When You Fail to Keep Your Eyes on the Prize: The Influence of Non-numeric Social Comparative Information on Judgments and Decisions

Presenter: Shuqi (Ariel) Li

Major: Psychology & Communication Studies

Mentors: Paul Windschitl (Psychology)

- Social Comparison Theory has long held that people self-evaluate by comparing themselves to others when objective, absolute information about their standing is not available (Festinger, 1954). A corollary suggests that when absolute information is available, people tend to use objective standards rather than comparative information to make judgments and decisions. The present study tested this corollary in an alternative situation in which both absolute and social comparative information were non-numeric. A confederate and a participant received different tools for a series of four tasks (e.g., knock down a stake by rolling a ball). The participant's judgments and hypothetical bets were measured. Contrary to Festinger's (1954) prediction, people were highly sensitive to objectively irrelevant social comparative information. Social comparison served as a determinant of optimism regarding success. Participants in downward social comparison situations were more optimistic in their judgments and betting decisions than were those in upward social comparison situations.

52 - Sick and tired: cytokines and symptoms in patients with advanced cancer

Presenter: Xiaoyue Liu

Major: Nursing

Mentors: Stephanie Gilbertson-White (Nursing)

- Patients with advanced cancer report multiple concurrent and distressing symptoms. It is believed that cytokines are released by the tumor or as an effect of the cancer treatments are the cause of these symptoms. Cytokines are small proteins critical in inflammatory cell signaling pathways. The purposes of this literature review are to describe what is known about the relationships between cytokine levels and symptoms in people who are diagnosed with advanced cancers and to identify the gaps in current knowledge. Comprehensive literature searches were completed using PubMed, PsycINFO, CINAHL, and SCOPUS. Twenty-six studies met the inclusion criteria. The majority of these studies used blood tests and common symptom assessment scales. The most common cytokines reported were Interleukin-1 beta, Interleukin-6, Interleukin-8, Tumor necrosis factors and C-reactive protein. Lack of appetite, fatigue, and pain were the most frequently studied symptoms. However, inconsistencies were found across studies in the relationships between the cytokines and the symptoms. Future studies are needed: to determine the causal relationships between cytokines and symptoms in patients with advanced cancer; to explore the relationships among genetic variability, cytokines levels and symptom phenotypes; and to identify targets for future symptom management interventions.

53 - Influence of intraoral air pressure and auditory feedback on velopharyngeal closure during normal, whispered, pantomime, and electrolarynx speech

Presenter: Nicole Martin

Major: Speech and Hearing Sciences

Mentor: Jerald Moon (Communication Sciences and Disorders)

- This study addressed on the role of the velopharyngeal mechanism as an important articulator for speech, allowing energy through the nasal cavity during nasal speech sounds and obstructing the nasal cavity during oral speech sounds. Closure of the velopharyngeal mechanism may be influenced by intraoral air pressure sensation and by auditory feedback during speech. Velopharyngeal opening and closing gestures were measured using an endoscopic light source and phototransducer assembly, which sensed the amount of light passing through the velopharyngeal port during speech. Four male and three female subjects produced three sentences containing either high intraoral pressure sounds, low intraoral pressure sounds, or nasal speech sounds. Each of the sentences was produced 6 times normally, whispered, pantomimed, and using an electrolarynx. Average percent closure and variability of velopharyngeal gestures were calculated. Average percent velopharyngeal closure was greatest in normal and whispered conditions for all sentences, while variability of closure across repeated productions was greatest in the pantomime condition. While removing oral pressure and auditory feedback had a significant negative influence on velar movement control the influence of oral pressure was greatest, highlighting the importance of air pressure sensation to velar control.

54 - The effectiveness of a group voice therapy approach to improve loudness in individuals with Parkinson's disease

Presenter: Marietta Mathis

Major: Speech and Hearing Science

Mentor: Ann Fennell (Communication Sciences and Disorders)

- The purpose of this study is a retrospective review of the clinic records of individuals who underwent 8 weeks of voice group therapy, to look for changes in vocal intensity. Standard clinical measures of vocal intensity were measured during sustained "a" productions, sentence reading, paragraph reading and during conversation pre- and post- treatment, and were the targeted treatment goal during voice group therapy.

55 - Determining the Impact of IRS / Akt Signaling in Pressure Overload Hypertrophy and Human Heart Failure

Presenter: Nicholas McCarty

Major: Biochemistry

Mentors: E. Dale Abel (Internal Medicine, Biochemistry)

- Type 2 diabetes is a major public health problem with about 220 million people afflicted worldwide and characterized by peripheral insulin resistance. Clinical studies have suggested that hyperinsulinemia is an independent risk factor for heart failure, a main cause of death in the United States. This can be based on pressure overload (POH) as a consequence of arterial hypertension or valvular disease. The insulin / IGF-1 signaling cascade is a key mediator of cardiac growth and metabolism. These effects are transduced by insulin receptor substrates (IRS) 1 and 2, which orchestrate the activation of Akt, of which Akt1 and Akt2 are predominant isoforms in the heart. Animal models identified that sustained activation of Akt causes contractile dysfunction and

decreased Akt1 signaling is protective under conditions of POH. We identified that hyperinsulinemia accelerates adverse left ventricular remodeling induced by transverse aortic constriction (TAC). Furthermore, using mouse models with cardiomyocyte-specific deletion of either IRS1 (CIRS1KO) or IRS2 (CIRS2KO) deletion of IRS1 was beneficial following TAC, whereas deletion of IRS2 (in the presence of preserved IRS1 / Akt1 signaling) was detrimental. However, the underlying mechanisms are incompletely understood. Our preliminary data show that insulin receptor expression is increased in human heart failure samples.

56- Beyond the Bomb: Uranium and Amino Acid Chemistry

Presenter: Samuel Miller

Major: Chemistry

Mentor: Tori Forbes (Chemistry)

- The investigation of the fundamental chemistry of the actinides such as uranium is an important avenue of research due to a large number of potential applications, including cleaning/reusing spent nuclear fuel, environmental decontamination, and developing new metal catalysts and materials. A particularly promising area currently emerging in this field is the creation of new metal-organic “hybrid” uranium(VI) materials, as these compounds are easily altered to suit varying needs. Uranium chemistry is particularly interesting to our group, since it offers unique bonding properties not found anywhere else on the periodic table. We have utilized amino acids to develop novel uranium-based hybrid materials. Amino acids provide charge-assisted hydrogen bonds that aid in the assembly of such hybrid materials. The use of zwitterionic ligands, such as amino acids, shows promise in the development of special technologies for sensing or separations applications. In addition, new synthetic approaches combined with techniques such as single crystal X-ray diffraction then allow these materials to be characterized in great detail, providing a means to develop the rational design of new hybrid uranium(VI) compounds.

57 - Synthesis of Manzacidin B

Presenter: Jason Mixdorf

Major: Chemistry

Mentor: Hien Nguyen (Chemistry)

- Goal of this research is to create a unique synthesis pathway to creating Manzacidin B. The Manzacidin family has been found to have several pharmacological activities as alpha-adrenoreceptors blockers, actomyosin ATPase activators, and serotonin antagonists. My research has been focused on creating the racemic and now enantiospecific pathways to the precursors of the Manzacidin B product.

58 - Butchering Meat with Oldowan and Acheulian Cores

Presenters: Christina Moscatel, Seraphina Carey, Rylee Kerper

Majors: Anthropology

Mentor: Shelby Putt (Anthropology)

- We are working on a semester project for our Experimental Archeology class. This entails the observation of the efficiency of the removal of meat from bone using Oldowan and Acheulian cores. Also we are testing these tools in their ability to harvest bone marrow. Through a series of butchering experiments on a freshly butchered cow, we hope to learn not only the efficiency but the historical

context in which our late ancestors originally used these tools.

59 - Red Blood Cell Volume and Blood Volume Measurements in Premature Babies

Presenter: Sam Mueting

Major: Biochemistry

Mentor: John Widness (Pediatrics)

- Study of anemia of prematurity can be performed with direct measurement of red cell volume (RCV) using a few drops of blood. Our objective was to compare measurements of different RCV methods in infants. Eighteen preterm infants receiving clinically-indicated transfusions had concurrent flow cytometric determinations of RCV and 24 h red blood cell (RBC) recovery based on donor-recipient differences of biotin-labeled RBCs (BioRBCs) and HbF positive (HbF+) RBCs. Concurrent RCV measurements using BioRBCs and HbF flow cytometry were not statistically different compared to RCVs measured using the reference BioRBC density. All methods demonstrated 100% 24 h post-transfusion RBC recovery (PTR24). Because BioRBC and HbF flow cytometry are safe and accurate methods requiring only a few drops of patient blood to determine RCV and PTR24 in preterm infants, they can be useful in clinical and research studies of anemia and other conditions.

60 - The Role of the Dorsal Agranular Insular Cortex on Reinstatement of Drug-Seeking

Presenter: Erin Naffziger

Major: Psychology

Mentor: Ryan LaLumiere (Psychology)

- To better understand the neural circuitry underlying drug-seeking behavior, the present study sought to investigate the influence of the dorsal agranular insular cortex (AId) on the reinstatement of cocaine-seeking during multiple reinstatement tests. To examine this relationship, male Sprague-Dawley rats underwent self-administration for a minimum of 12 days, in which active lever presses resulted in an infusion of cocaine accompanied with a tone and light cue. Rats then underwent extinction before starting a series of reinstatement tests. All rats underwent cued, cocaine primed, and cue + cocaine primed reinstatement tests, and active lever pressing was returned to extinction baseline between each test. Prior to each test intra-AId microinjections of either vehicle or the GABA receptor agonists, baclofen and muscimol (BM), were administered. AId inactivation from BM during cued reinstatement tests decreased drug seeking (active lever presses) when compared to vehicle controls. In contrast, AId inactivation during a cocaine-primed reinstatement session, resulted in potentiation of drug seeking. AId inactivation during a cue + cocaine primed reinstatement test had no effect. These findings provide insight to the bi-directional role the AId plays in mediating different interoceptive cues presented from each of the various reinstatement tests.

61 - Timeliness of Follow-Up Following a Failed Newborn Hearing Screening in Iowa

Presenter: Michelle O'Brien

Major: Speech and Hearing Science

Mentor: Lenore Holt (Pediatrics - Audiology)

- Early detection of congenital hearing loss is critical for preventing and minimizing the negative impact of hearing loss on speech and language development, yet delayed detection occurs in one to three per thousand live births. Universal Newborn Hearing Screenings are mandated in the state of Iowa to

begin the detection and intervention process as soon as possible. Information is entered into the EHDI online e-Screener Plus (eSP) database, which tracks hearing related healthcare status such as birth information, hearing screening outcomes, and follow up visits. This information is critical for determining the factors that contribute to delayed detection—specifically for children who are lost to follow up. This poster will detail the reported factors contributing to the problem of lost to follow up in children born in Iowa between January 2007 and December 2010 who failed a newborn hearing screening and did not receive a necessary diagnostic ABR. Statistics will be broken down to identify the overall prevalence of each factor for children who are listed as “in process” and “lost contact” and the point at which breakdown occurs in the screening process. The reporting methods and suggestions for future improvements for healthcare professions will be discussed.

62 - Using Nostalgic Design in Facebook Advertising: When is it effective?

Presenter: Yuefeng Pan

Majors: Marketing and Finance

Mentor: Jing Wang and Catherine Cole (Marketing)

- The purpose of this research stream is to investigate the effects of nostalgic ad design in Facebook on sharing behavior and on attitudes toward the advertised product. In a completed first study, we find that when there is a match between consumers’ nostalgic mindset and the nostalgic feelings evoked by online advertising, consumers are more likely to share the advertising with others. In an on-going second study, we explore which advertising design characteristics induce nostalgic feelings. In a proposed third study, we investigate the underlying mechanisms.

63 - Effects of meiotic drive on chromosomal differences within the *Drosophila virilis* subgroup

Presenter: Dzavid Pandzic

Majors/Minor: Neurobiology & Human Physiology/Chemistry

Mentor: Bryant McAllister (Biology)

- A factor that can influence the probability of fixation of a new chromosomal variant and potentially contribute to speciation is meiotic drive. In contrast to the equal segregation expected under Mendelian inheritance, meiotic drive describes an unequal representation of alleles among the gametes of an individual as a consequence of the mechanics of meiotic divisions. The *Drosophila virilis* subgroup was chosen to investigate the effects of meiotic drive due to the major chromosomal rearrangements that have occurred within the subspecies of *Drosophila americana* in the last half-million years. These rearrangements include the centromeric fusion of the 2nd and 3rd chromosomes, and the centromeric fusion of the X and 4th chromosomes. Preliminary results have shown a 56.8% transmission bias for the derived fused X-4 chromosomal arrangement versus the ancestral unfused X and 4th arrangement in female *D. americana*, which is significantly higher than the 50% expected from 1:1 Mendelian segregation. Although this transmission bias is consistent with the effects of meiotic drive, differences other than the centromeric arrangement of the fused and unfused chromosomes could be responsible for the bias. For example, chromosomal inversions Xc, 4a, and 4b are also associated with the different centromeric arrangements. By establishing various crosses of *D. americana* and *D. novamexicana*, centromeric arrangement can be isolated as the target of meiotic drive of differing chromosomal forms within the *D. virilis* subgroup.

64 - Cytokinin Stimulates Asexual Reproduction in the Fern *Ceratopteris richardii*

Presenter: Dzevida Pandzic

Major: Biology, Human Physiology

Mentors: Chi-Lien Cheng (Biology)

- All land plants proceed through a life cycle in which a haploid gametophyte generation alternates with a diploid sporophyte generation. The sporophyte generation produces spores, which are the first cells of the gametophyte generations, by meiosis. The gametophyte generation produces gametes by mitosis. The fusion of male and female gametes (syngamy) produces the zygote, the first cell of the sporophyte generation, and completes the life cycle. In addition to this sexual reproduction pathway, some fern species can undergo apogamy, a process by which the gametophytes bypass fertilization to generate haploid sporophytes. The model fern *Ceratopteris richardii* does not reproduce asexually through apogamy in nature, but the pathway can be induced in a laboratory setting by altering glucose levels in the medium. It was discovered that the plant hormone cytokinin was able to induce apogamy as well. In gametophytes induced to undergo apogamy, callus formation and gametophyte regeneration were also observed. The rate of apogamous sporophyte generation relative to callus formation and gametophyte regeneration varied depending on the concentration of cytokinin in the media. In angiosperms cytokinin is known to activate the transcription of the *WOX9* gene whose activity is essential to maintain the meristem fate. Here, a new role of the cytokinin-signaling network is identified- induction of the asexual pathway of apogamy in the fern.

65 - The Effect of GFP on Ciliary Motor

Presenter: Tyler Pecora

Major: Biology

Mentor: Daniel Eberl (Biology)

- My project involves manipulating factors that control ciliary motility in auditory neurons. Specifically I am building a DNA construct that fuses the GFP protein with an axonemal dynein. The dynein we are investigating (CG17150) is responsible for the development of antenna in fruit flies, and ultimately the fruit flies hearing.

66 - Measuring listening effort: The paradoxical effect of noise on listening effort

Presenter: Joanna Perkins

Major: Speech and Hearing Sciences

Mentor: Yu-Hsiang Wu (Communication Sciences and Disorders)

- Listening effort is a substantial dimension of speech perception and when situations require increased listening effort, more brain-power is used to understand speech, leaving less brain-power for other tasks, or leaves the listener feeling "mentally exhausted." Although attempts to reduce listening efforts of hearing aid wearers with specific processors, such as digital noise reduction (DNR), have not been shown to improve speech recognition, there are benefits in freeing up cognitive resources that would otherwise be spent listening. A dual-task paradigm provides the opportunity to objectively quantify listening effort, measuring it as reaction time (RT) of a secondary task. The primary task was a speech-recognition task and the secondary was a visual-reaction task. The purpose of this study was to characterize the psychometric functions, which describe the performances of the speech recognition task and a secondary task as a function of signal-to-noise ratio (SNR). The results indicate that RT does not increase asymptotically at less favorable SNR although speech performance decreased. Instead, the

psychometric functions of the secondary task were peaked; as noise-level increased, the RT initially increased to a peak around 0 dB then decreased. At the most difficult SNR conditions, reaction times were faster than less difficult conditions.

67 - The Value of Resistance to Power Use

Presenter: Colin Peterson

Majors: Sociology and Philosophy

Mentor: Michael Lovaglia (Sociology)

- Does preventing someone from getting what they want make them want it more? Perhaps, but will the increased desire be stronger when another person stands in the way compared to when circumstances intervene? In social psychology, one person preventing another from getting what they want is known as power use. An important research finding is that power use creates resistance. Increasing the value—the amount a person is willing to pay for a resource—is one way to resist. We predict that when people have their access restricted through the use of power, they will bid more for the resources than when the restriction does not involve power use. A laboratory study will test the prediction. First, participants will exchange different colored chips of unknown value. Then chips of one color will be restricted in two different ways, either by a partner or by circumstance. Afterward, participants will bid for the different colored chips, and a questionnaire will check participants' feelings and attitudes toward them. If we find that resources restricted by power use are worth more than others, then that result will contribute to a growing body of research on power in work settings and the effectiveness of leaders.

68 - Modeling Iowa Water Quality based on Animal Feeding Operation Density and Land Cover

Presenter: Emily Pettit

Majors: History & Geography

Mentor: Heather Sander (Geographical and Sustainability Sciences)

- Iowa is an agricultural state that relies heavily on thousands of Animal Feeding Operations (AFOs) to produce and raise livestock. These operations, and other agricultural processes, produce waste products that can pollute waterways for hundreds of miles downstream. Iowa has lost 99% of its native prairie; this conversion, combined with continuing land cover changes, further reduces the ability of the landscape to restrain runoff and filter pollution. I modeled nineteen Iowa watersheds using monthly data for five pollutants connected with agricultural livestock production: E. coli, nitrate, ammonia, orthophosphate, and phosphorus. The model differentiated AFO livestock type and land cover categories to better examine the relationship among livestock species, vegetation, and the five water quality indicators. It is important for the future health of Iowa's residents and environment that the influence of AFO density and land cover change on water quality be understood, so that it can assist with better environmental policy development.

69 - The Role of Perceptual Ambiguity in Cognitive Flexibility

Presenter: Daniel Plebanek

Major: Psychology and Linguistics

Mentors: Larissa Sameulson and Sammy Perone

- Executive function is a term that describes a set of processes composed of working memory, inhibition,

and task switching. These processes are key in carrying out goal-directed actions. Between the age of 3 and 5 years, these processes undergo dramatic changes. The dimensional change card sort is often used to probe children's executive function skills. In this task, children sort bi-dimensional cards by one dimension (color or shape). Then, the sorting rules switch and children must switch to sort by the other dimension. Traditionally, three year olds are unable to pass the task while four and five year olds are able to flexibly switch rules. The current study investigates the effect of perceptual ambiguity on executive function in 4 and 5 year olds children. The results suggest that 5 year old children, but not 4 year old children are able to successfully complete they DCCS with stimuli that are perceptually ambiguous.

70 - Do exotic species have traits that are similar or distinct from resident common species?

Presenter: Tyler Pokoski

Major: Biology

Mentor: Tiffany Knight & Erynn Maynard (Washington University Biology Department)

- An exotic species is one which has moved outside of its native range. When exotic species increase and cause ecological damage they are termed invasive. Much research has focused on differentiating the traits of invasive and noninvasive exotics to predict invasions. However, comparing common exotic plant traits to the traits of the common ('weedy') resident plants has not been widely explored, which could be a vital component to understanding invasions. Hypothesis 1: Exotic species have traits similar to common residents. For a particular environment there may be ideal traits which allow species to persist. Hypothesis 2: Exotic species have traits distinct from common residents. Under this scenario the exotic species may be taking advantage of underexploited resources, avoiding costly competition, and allowing for increased success. These hypotheses were explored using two exotic species (both Fabaceae), one invasive (*Lespedeza cuneata*) and the other not (*Kummerowia striata*). Trait data was compared within each community using multivariate analysis (PCA). The invasive species supported the second hypothesis, and the more benign exotic supported the first. While having traits similar to common residents may allow for persistence of exotic species, having traits which are underexploited in the resident community may contribute to invasive species success.

71 - Narrative Performance of Children who are Deaf and Hard of Hearing

Presenter: Rachel Raupp

Major: Speech and Hearing Science

Mentors: Elizabeth Walker (Communication Sciences and Disorders)

- Objective: The current goals were to: 1) compare narrative performance of seven-year-old children who are hard of hearing and children with normal hearing; 2) determine predictors in spontaneous and retell narrative productions; and 3) assess the ability to accurately introduce characters. Methods: Participants were 142 seven-year-old children; 54 children with normal hearing and 88 children with mild-to-severe hearing loss. Children generated narratives while viewing a wordless picture sequence entitled *The Candy Stealing Story*. After children produced a spontaneous narrative, the examiner told the story to the children. Children then retold the story. Narratives were transcribed and coders who were blind to hearing status used a scoring rubric to judge the quality of narrative performance. Results: Interrater reliability using the narrative scoring rubric was above 90% for all categories. Children with normal hearing received higher scores on the scoring rubric for both spontaneous and retell narratives compared to children who were hard of hearing. Aided audibility, language ability,

and phonological working memory predicted performance on the task. Conclusions: Some children with hearing loss demonstrate delays in narrative skills compared to their same-age hearing peers. Narrative performance may be a clinically-relevant area to target in language intervention with this population.

72 - Characterization of the Zebrafish FOXE1 Gene Function

Presenter: Christine Roenitz

Major: Evolutionary Biology

Mentor: Robert Cornell & Amanda Decker (Anatomy and Cell Biology)

- Cleft lip and palate is one of the most common birth defects. It is characterized by an incomplete fusion of the lip and, or palate. Other problems associated with cleft lip and palate are dental abnormalities, difficulty eating, speech difficulties, and hearing loss. Varying amounts of genetic and environmental factors cause cleft lip and palate. The Forkhead Box E1 gene (FOXE1) has been shown to be associated with cleft lip and palate. An example of this association is in Bamforth Lazarus Syndrome. FOXE1 is mutated in people with Bamforth Lazarus syndrome and their symptoms include cleft lip and palate, thyroid malfunction, and spiky hair. My goal is to characterize the function of FOXE1. I will do this by first using a CRISPR/Cas system to nullify the function of FOXE1. Guide RNA (gRNA) was injected with a nuclease into a fertilized egg allowing for a site-specific excision. A T7 endonuclease assay will be done to detect the induced mutation in zebrafish embryo tissue. Once the mutation has been confirmed, assays will need to be done to characterize the loss of function from the mutated FOXE1 gene. An Alcian blue staining procedure will then be done to characterize cartilage development.

73 - Smoking and Chronic Pain: Effects of persistent inflammatory injury on $\alpha 4\beta 2$ nicotinic acetylcholine receptor number and binding affinity in the periaqueductal gray

Presenter: Christopher Sande

Major: Biology

Mentor: Donna Hammond (Anesthesia, Pharmacology)

- Nicotine from tobacco smoke acts on acetylcholine receptors (nAChRs) throughout the body. The $\alpha 4\beta 2$ subtype is expressed in regions of the central nervous system (CNS) involved in pain modulation, such as the periaqueductal gray (PAG) and rostral ventromedial medulla (RVM). We have observed that epibatidine, an $\alpha 4\beta 2$ nAChR agonist, can produce antinociception when microinjected into these pain modulatory regions in rats. Interestingly, persistent inflammatory injury as modeled by intraplantar complete Freund's adjuvant (CFA) injection can lead to a time-dependent decrease in the antinociceptive effects of epibatidine. This phenomenon may be explained by changes in $\alpha 4\beta 2$ nAChR number or binding affinity in these regions. Radioligand binding is a highly quantitative pharmacological technique that allows us to directly assess receptor number and binding affinity. Presented here are preliminary results from the PAG of CFA- and saline-treated rats.

74 - Extinction of Conditioned Fear in Developing Rats

Presenter: Jonathan Schacherer

Major: Psychology

Mentors: John Freeman & Kevin Brown

- Extinction, the elimination of a conditioned response achieved by repeatedly presenting a conditioned stimulus alone following initial CS-US learning, is an experimental procedure that effectively suppresses a CS-US associative memory relating to an aversive event. An effective way of measuring one's memory of an aversive event is through fear conditioning, a behavioral paradigm in which an aversive stimulus (e.g., footshock) is paired with a neutral stimulus (e.g., tone). Using this method, we studied the effects of extinction on developing rats ages postnatal 17 (P17) and 24 (P24). Our results replicate those of Richardson and colleagues (2009; 2010) and demonstrate that the expression of learned fear (assessed through freezing behavior) is equivalent across developing rats. It was found that extinction effectively suppresses the expression of fear behavior in both age groups. Future experiments will observe the effects of reinstatement – re-presenting the US in the original context – on the recovery of the initial memory of the CS-US association. Additional experiments will aim to evaluate the neural mechanisms for fear conditioning and extinction through the use of electrophysiology techniques. Data obtained from this current, and future experiments, have great clinical implications, as they may provide potential avenues for the treatment of anxiety disorders.

75 - Myxococcus xanthus Secondary Metabolite Production Involved in Predation

Presenter: Sarah Strack

Major: Microbiology

Mentor: John Kirby (Microbiology)

- 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. We have determined that B. subtilis is capable of defending itself from predation by M. xanthus. To identify genes involved in this process, we performed transposon mutagenesis of M. xanthus and assayed the resulting mutants for their capacity to engage in predation. The EZ-Tn5 transposon mutagenesis screen allowed us to identify EPS production (dif pathway), c-di-GMP (hsf pathway), and BCAA (ABC transporter permease) as additional factors. To determine the secondary metabolites involved in predation by M. xanthus, we made lacZ-reporter constructs for the polyketide synthase (pks) / non-ribosomal peptide synthase clusters responsible for secondary metabolite production. These constructs allowed us to identify gene clusters transcribed in the presence of a prey source.

76 - The effect of discourse elicitation protocol on reported speech use in healthy participants

Presenter: Madeline Strange

Major: Speech and Hearing Science

Mentor: Melissa Duff (Communication Sciences and Disorders)

- Reported speech (RS) is a pervasive discourse phenomenon whereby speakers represent, or re-enact, words, thoughts, or feeling from other times and/or places and is thought to reflect and create emotional connections among interlocutors. The current study examined the effect of discourse elicitation protocol on the use of RS in 13 healthy participants, each interacting with a clinician across two protocols: Mediated Discourse Elicitation Protocol (MDEP) and TalkBank. Both protocols sample similar discourse genres (e.g., narrative, picture, procedure), but differ in the type and amount of interaction provided by clinician (e.g., MDEP clinician takes role of conversational partner; TalkBank

clinician takes role of task administrator). We predicted an increase in the frequency of RS use in the MDEP protocol because the clinician is allowed to interact with participants more freely. Sessions were videotaped, transcribed, and coded for RS following established methods in the literature. Results suggest no difference in the frequency of RS across the two protocols. Future analyses will look for differences in the use of RS across discourse genres and in the interactional nature of RS across protocols. This study contributes to the development and evaluation of protocols that support the sampling and evaluation of interactional aspects of communication.

77 - Infant feeding decisions by first-time mothers: Great expectations, mixed experiences

Presenter: Katherine Strickland

Majors: Psychology & Anthropology

Mentor: Erica Prussing (Anthropology)

- Recent research highlights how women in the U.S. currently encounter numerous messages about the importance of breastfeeding, but also face significant barriers to nursing their infants beyond a few weeks as they navigate the post-partum return to employment. This qualitative study of first-time mothers in the Midwest focuses on the ways that women's narratives of decision-making around breastfeeding and paid work reflect and/or resist professional (e.g., biomedical, public health) and popular messages about infant feeding. Preliminary data analysis of transcribed interviews conducted with women both prenatally and postnatally, using MAXQDA software, affirms many of the barriers noted in existing research but also suggests that women who have high expectations of breastfeeding while also experiencing challenges to balancing work and home life during their pregnancies may be especially likely to stop nursing once they encounter barriers to doing so. These findings suggest that public health strategies to promote breastfeeding would benefit from focusing not only on communicating the benefits of breastfeeding but also on problem-solving strategies, ideally grounded in detailed understanding of key challenges that all working women commonly face in as they balance paid employment with domestic responsibilities.

78 - A Fire Cracked Puzzle: using experimental methods to determine the integrity of an archaeological site

Presenter: Luke Stroth

Major: Anthropology

Mentor: James Enloe (Anthropology)

- The subject of my research project is examining the fire-cracked rocks found in the 2012 and 2013 University of Iowa field schools to see if fragments can be refitted. Their vertical and horizontal distributions should provide information about the integrity of the excavation, indicating whether we can discern an occupational surface. As part of my refitting methodology I will be testing the efficacy of XR-F scanning as a way to sort potential refits. The rocks were analyzed with X-ray fluorescence to determine chemical composition, grouped into like-mineralogical sets, and closely physically inspected. This study means to some insights into how to maximize the efficiency of the often limited time one has to do refits.

79 - Characterization of the fibroblast growth factor 10 alleles in *Xenopus laevis*

Presenter: Kyle Strouse

Majors: Biochemistry & Microbiology

Mentor: Dan Weeks (Biochemistry)

- The mitogenic factor Fibroblast Growth Factor 10 is a critical signaling peptide involved in sensory development in the cranial region. *Xenopus tropicalis* In-situ hybridization assays probing for *fgf10* mRNA shows high levels of expression in the cranial sensory placodes. My research during the Fall semester of 2013 was focused on identifying two potential alleles for *fgf10* in the related tetraploid frog *Xenopus laevis*. Identifying the two *fgf10* alleles and their regiospecific expression during development will help us design knockdown experiments specific for each allele to help us understand the function of *fgf10* in inner-ear development. During the spring semester of 2014, I identified one of the alleles and probed for its regiospecific mRNA expression.

80 - Energy Harvesting in the Wake of a Bluff Body

Presenter: Karlin Stutzman

Majors: Mechanical Engineering

Mentor: James Buchholz (Mechanical and Industrial Engineering)

- It is well-known that vertical (two-dimensional) cylinders placed in a stream can shelter fish from fast-moving currents, but not simply because of the slower flow velocities in their wakes. The nominally two-dimensional cylinders shed vortices, periodically alternating from each side, known as a Karman vortex street, from which the fish extracts energy to propel itself by meandering between the vortices. Natural obstacles tend to be more irregular and of low aspect ratio; however, low-aspect-ratio obstacles are known to not shed with such regularity. However, we discovered that placing an appropriately-tuned flexible membrane in the wake of a low-aspect-ratio semi-ellipsoidal obstacle can excite a vortex shedding mode like the two-dimensional case, which causes the membrane to be vigorously deflected side to side. We are conducting qualitative and quantitative visualizations of the flow to better understand the nature of this interaction. We expect that it will be possible to use this phenomenon to design more effective fish habitat structures in altered fluvial environments (e.g. downstream of dams), to enhance the efficiency of underwater vehicles, and to harvest energy from the flow for other applications.

81 - Effects of maternal responsiveness on infants' attention and play behavior

Presenter: Fanya Sun

Major: Psychology

Mentor: Zhen Yu & Julie Gros-Louis (Psychology)

- Previous studies have shown that infants' non-distress vocalizations occur more frequently when caregivers respond sensitively, such as commenting or acting on the object that the infant attends to. In addition, sensitive responses are shown to be related to language development; however, few studies have examined effects of sensitive responses in the moment. Therefore, the purpose of the study is to explore how different parental responses (i.e. sensitive response, no response, and redirective response), affect infants' attention to the target object to which they vocalized. We observed 12-month-old infants' communicative behaviors and caregiver responses in 30 minute free play sessions. Results demonstrated that infants were more likely to focus on the target object after sensitive parental responses. By contrast, after parents' redirective responses, infants' attention shifted to a non-target object or they became disengaged. This study calls attention to how infants' attention changes depending on different parental responses. We are currently exploring the potential association among parental responses, infants' attention differences and their language development.

82 - Pseudo-Arithmetic Super Sets in the Hamilton Quaternions

Presenter: Keshav Sutrave

Majors: Mathematics and Physics

Mentor: Peter Blanchard

- A set is a pseudo-arithmetic super set if every subset contains a difference that divides the other distances in that subset. We look into how these super sets appear in quaternions, a four dimensional number system. We look at unit clusters, which are sets in which each element is one unit distance away from another element in the set. A simple grow function can be written to build all the unit clusters that are pseudo-arithmetic super sets. However, quaternions are not commutative, and this leads to a distinction to be made in the definition of pseudo-arithmetic super sets: quaternion distances can be left or right divisible, which means that sets can be left or right pseudo-arithmetic, or both.

83 - Lower soluble RAGE and higher aortic stiffness in African American adolescents: possible protective effect of higher sRAGE in white youth

Presenter: Ericka Tank

Major: Health and Human Physiology

Mentor: Gary Pierce (Health and Human Physiology)

- The cleaved soluble isoform of the receptor for advanced glycation end products (sRAGE) is lower in African American (AA) compared with white adults and is hypothesized to partially contribute to higher CVD risk in AAs. sRAGE serves as a 'sink' for circulating AGEs, so that low sRAGE is associated with increased CVD risk. It is unknown if sRAGE is lower in AA youth and associated with increased aortic stiffness. sRAGE was significantly lower in AA (n=20, age 16.8±1.4 yrs; BMI 24±3 kg/m²) compared with white (n=24; age 16.5±1.5 yrs; BMI 23±4 kg/m²) healthy adolescents (930 ± 432 vs. 1567 ±338 pg/ml, P<0.001). Aortic stiffness (carotid-femoral artery pulse wave velocity, CFPWV) was higher in AA vs. whites (5.9±0.9 vs. 5.3±0.8 m/sec, P<0.05). sRAGE was negatively correlated with CFPWV in females (r=-0.60, P<0.01) but not males (r=0.28, P>0.05). The relation between sRAGE and CFPWV in females was mostly from the relation among white (r=-0.86, P<0.01), but not AA (r=-0.51, P=0.16), females. Young AAs demonstrate lower circulating sRAGE and higher aortic stiffness compared with their white age- and BMI-matched peers. Whether lower sRAGE contributes to aortic stiffness in AAs or higher sRAGE has a vascular protective effect in white youth deserves further investigation.

84- Global vs. local control of contextual cueing in pigeons

Presenter: Yuejia (Mandy) Teng

Major: Psychology

Mentor: Edward Wasserman (Psychology)

- Repeated pairings of a particular visual context with a specific location of a target stimulus facilitate target detection in pigeons – the contextual cueing effect. However, whether global properties of the scenes or local features surrounding the target are responsible for this contextual cueing effect has not been investigated. Our study involved both vertical and horizontal scene reversals to see whether global or local cues contribute to contextual cueing. Specifically, in the Training Phase, we required pigeons to peck a target that could appear in one of four possible locations on eight possible photographic scenes. On half of the trials, we consistently paired each of four Predictive scenes with one of the four target locations; on the other half of the trials, each of four Random scenes was

randomly paired with all four possible locations. In the Testing Phase, we vertically and horizontally reversed the Predictive scenes. Additionally, we presented the target in both reversed locations and in its original location. The results suggested that global contexts more effectively directed the pigeons' attention than did local features, although local cues did contribute to target detection.

85 - Pigeons use Connectivity to Solve Patterned-String Problems

Presenter: Keara Turkington

Major: Psychology

Mentors: Edward Wasserman & Leyre Castro Ruiz (Psychology)

- For quite some time, scientists have been using patterned-string tasks to assess both cognitive and perceptual capabilities of non-human animals as well as humans. Patterned-string tasks involve two or more strings in which one string is attached to a reward. In order to successfully retrieve the reward, the subject must choose the correct string to draw the reward closer. Typically, these paradigms are carried out with physical stimuli; more recently however, these patterned-string tasks have been carried out in a virtual environment. This virtual setting allows for further manipulation of variables such as string length, string alignment and spatial orientation. Pigeons, surprisingly enough, have been able to learn these virtual string patterns just as they would learn them in a physical setting (Wasserman et al., 2013). In regards to these patterned-string tasks, it has been commonly hypothesized that string-patterns are most difficult when the strings are crossed; when this is the case, the subject would be forced to use connectivity to solve the problem. Here, we propose that crossed patterned-string problems can be learned just as easily as non-crossed problems when both types of problems are presented outright.

86 – Dancing to Destabilize Discrimination: Charles H. Williams and the Hampton Creative Dance Group

Presenter: Lauren Vanchina

Majors: Dance and Psychology

Mentor: Rebekah Kowal (Dance)

- In 1943, African-born dancer Asadata Dafora performed African dances at New York's Carnegie Hall. There, Mrs. Mary McLeod Bethune addressed the audience, admiring "the Africans themselves" for "endeavoring to pull themselves up and to join more firmly...with America." Even at a performance dedicated to exploring African culture, her comments distanced African-Americans from "the millions of Africans across the waters." During the same time period, however, Charles H. Williams and the Hampton Institute's Creative Dance Group (CDG) were changing that attitude. Examining archival materials related to CDG's extensive tours, my research suggests how Williams wanted to show African dance as equal to American and European movement forms, thus presenting African-based dance as a source of cultural pride for the black community. Williams and CDG performed African dance on the same program that they performed African American folk forms, modern dance, and European folk forms. Cataloging numerous CDG performances and their reception by audiences in historically black, white, and integrated venues, I argue that by including "white" modern dance and European folk forms, CDG broke down expectations of what and where the black body was capable of performing, and in doing so, destabilized racial segregation in both subtle and overt ways. /

87 – The role of N-linked glycans on Ebola virus GP2

Presenter: Madeline Walkner

Major: Health and Human Physiology

Mentor: Wendy Maury & Nicholas Lennemann (Microbiology)

- Filoviruses, such as Ebola virus, cause fatal hemorrhagic fever. Virus entry into host cells is mediated by the viral glycoprotein (GP) on the surface of the virion. GP is composed of two subunits, GP1 and GP2, which contain N-linked glycans. Glycans on glycoproteins from other viruses are known to mediate protein stability, affect virus entry, mask conserved regions from antibodies and bind to C-type lectins on cells, leading to virus entry. Here, we seek to understand the role of the two conserved N-linked glycosylation sites, N563 and N618 that are present on GP2. Site directed mutagenesis was performed on N563 and N618 to disrupt the incorporation of glycans at these sites and we are currently determining the effect of loss of these glycans individually and in combination. To date, we have found that elimination of the glycans individually somewhat diminishes GP stability on virions. Surprisingly, loss of the glycan at N563 enhanced infection by two fold. These findings suggest that the conserved sugar chains located at N563 of GP2 decrease entry efficiency. We also propose that by exposing GP amino acids, removal of these glycans may lead to the development of an attenuated Ebola virus strain useful for vaccinations.

88 – The Effects of Exercise on Cognitive Function in Prodromal Huntington Disease

Presenter: McKenzie Wallace

Majors: Nursing & International Studies

Mentor: Nancy Downing (Nursing)

- Huntington Disease (HD) is a genetic neurodegenerative disease manifesting in motor, cognitive, and behavioral decline. It affects between 1/10,000 and 1/20,000 of the population. While disease diagnosis tends to be between age 30 and 50, cognitive issues start to appear up to 15 years beforehand. This period is a useful time to look at lifestyle decisions that could impact disease progression, as approximately 67% of the disease progression is attributed to the length of the genetic mutation. Previous research about the effects of exercise on cognitive function yielded mixed results about the impact of exercise on disease progression. We measured activity levels in 48 gene positive participants to see if the quantity of exercise is associated with progression of cognitive decline. Participants wore activity monitors for three typical days at home and also completed the International Physical Activity Questionnaire. We used analysis of covariance to test the relationships between activity and cognitive function using Single Digit Modalities Test, Stroop Word, Color, and activity and white matter brain volume using MRI scans. The results showed that increased activity levels are associated with increased cognitive function. This may mean we can implement exercise programs that will delay the onset of the disease.

89 – Damage to the ventromedial prefrontal cortex increases leniency of prison sentencing towards individuals who commit violent crimes

Presenter: Kelsey Warner

Majors: Psychology, Speech and Hearing Sciences

Mentor: Daniel Tranel (Psychology, Neurology)

- Attitude measures reveal that patients with damage to the ventromedial prefrontal cortex (vmPFCs) present a “doubt deficit” that manifests as higher authoritarianism. Individuals high in

authoritarianism submit easily to authorities and are often aggressive towards others in the name of authority. The Criminal Judgment Task was used as a behavioral measure of authoritarianism in vmPFCs. VmPFCs (n = 9), brain-damaged comparisons (BDC, n = 12), and normal healthy comparisons (NC, n = 32) were presented vignettes of criminals and their crimes. Participants sentenced each criminal with a prison term. It was hypothesized that vmPFCs would give harsher sentences towards criminals than BDCs and NCs. Interestingly, results revealed that vmPFCs were more lenient in their criminal judgments. This leniency was mediated by whether or not the crime had a victim. The False Tagging Theory (FTT), a neuroanatomical model of belief and doubt, asserts that the prefrontal cortex is critical for doubting initially believed cognitive representations. According to the FTT, vmPFCs fail to take the perspective of victims of violent crimes due to an inability to falsify their own perspective. These findings implicate the critical nature of the prefrontal cortex in the assignment of culpability to criminal actions.

90 – CaMKII is Essential for the Development of Lung Fibrosis after Injury

Presenter: Christopher Winters

Major: Biomedical Engineering

Mentor: Isabella Grumbach & Mark Anderson (Internal Medicine)

- Pulmonary fibrosis is a disease in which an excessive accumulation of connective tissue in the lung occurs. A key first step in the fibrotic process is apoptosis of type II pneumocytes in the alveolar epithelium. The type II pneumocytes serve a lung niche “stem-cell”, regenerate injured alveolar epithelium and prevent unrestrained fibroblast proliferation. Consequently, their apoptosis enhances fibroblast proliferation and deposition of connective tissue. Our lab studies the role of the calcium/calmodulin dependent protein kinase II (CaMKII) in disease states. CaMKII activated by cellular stresses, has been shown to enhance apoptosis. We hypothesize that after lung injury, CaMKII is activated in type II pneumocytes and promotes apoptosis and the development of pulmonary fibrosis. For our studies, we developed a transgenic mouse model that expresses a peptide inhibitor of CaMKII (AC3i) exclusively in type II pneumocytes. We induced pulmonary fibrosis via intratracheal injection of bleomycin in wild type mice and AC3i mice. 21 days after bleomycin treatment, the mice were sacrificed. Harvested lungs were used to measure the degree of pulmonary fibrosis by hydroxyproline assays and by scoring of fibrosis in with Masson’s trichrome -stained lung sections. We found that CaMKII inhibition reduced the amount of pulmonary fibrosis.

91 – Individual Difference and Self-framing in the Sunk Cost Bias

Presenter: Haoyang Yan

Majors: Economics, Psychology

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

- While past research has focused on manipulating factors that influence the sunk cost effect, little work has been done to understand the role of individual differences in decision-making involving sunk costs. We found that variables such as optimism, regret, thinking style and numeracy had no systematic effect. However, when we asked participants to highlight the portion of the sunk cost scenario that best described their thoughts, those who highlighted new opportunities were more likely to resist the sunk cost bias than those who highlighted the forgone costs. “Self-framing” seems to be the key factor in the sunk cost effect.

92 – Good things come in small packages: Fruit fly models of muscle and heart disease

Presenter: Grant Young

Major: Biochemistry

Mentor: Lori Wallrath (Biochemistry)

- Mutations in the human LMNA gene give rise to a collection of diseases that cause muscular dystrophy, heart disease, diabetes and early onset aging. The LMNA gene encodes lamins, proteins that form a filamentous network inside the nucleus of a cell. It is not known how mutant lamins cause disease. To determine the function of mutant lamins in specific tissues, we generated fruit flies (*Drosophila*) that possess the same mutations found in patients with muscular dystrophy and dilated cardiomyopathy. The flies with muscular dystrophy mutations develop muscle weakness; larvae have deteriorated muscles and crawl very slowly. Similarly, flies with cardiomyopathy mutations have age-dependent heart problems; the adult hearts collapse and show irregular beating. We are currently using these flies to identify gene products and compounds (drugs) to correct the muscle and heart problems. Our studies will identify potential treatments and lead to personalized medicine.

93 – Automated Axon Counting in the Optic Nerve of Mice for Glaucoma Research

Presenter: Kasra Zarei

Major: Biomedical Engineering

Mentor: Michael Abramoff (Ophthalmology)

- Glaucoma is the second highest cause of blindness in the world today. Recent work has demonstrated the role of the TBK1 gene in glaucoma. In mice, there is no published information on how axons compare in mutants for the TBK1 gene and wild-type mice. There is believed to be a decrease in the number of axons in mutant mice compared to wild-type mice, and there is also greater loss in smaller axons compared to larger axons. We developed an image-processing methodology to obtain accurate axon counts of the optic nerves in mutant and wild-type mice. Our method yields accurate cell counts compared to truth counts by humans ($r = 0.94$) and a 9% difference in axon counts in wild-type and mutant (P -value = 0.0004). Additionally, there is a significantly greater loss in smaller-sized axons. Our axon counting process can generate automated axon counts with considerable accuracy. Additionally, our method has provided new findings related to glaucoma research that have not been conducted by other scientists.

94 – Muscle Fiber Directionality Within the Ventricular Folds

Presenter: Melissa Zemke

Major: Speech and Hearing Sciences

Mentor: Jerald Moon (Communication Sciences and Disorders)

- Although multiple studies have been conducted examining the role and function of the true vocal folds, a detailed description of the role of the ventricular folds during phonatory and non-phonatory tasks has yet to be established. The purpose of this study was to explore the muscular anatomy of the ventricular folds and determine the directionality of specific muscle fibers present in the ventricular folds. A previous study done by Moon and Alipour (2013) solidified the fact that there are indeed muscles present in the ventricular folds. Identifying the direction in which these muscle fibers course will aid in the creation of a biomechanical model of ventricular fold function that will be used to

understand the role of these specific muscles in both phonatory and non-phonatory tasks.

95 – Acid-Sensing Ion Channels (ASICs) are required for Maximal Exercise Capacity in Mice

Presenter: Mara Zuckerman

Major: Spanish

Mentor: Christopher Benson (Internal Medicine)

- We have shown that ASICs are highly expressed in skeletal muscle and cardiac afferents, where they are believed to sense metabolic changes associated with exercise. Activation of these afferents during exercise leads to reflex increases in heart rate, blood pressure, and cardiac output, which increases oxygen delivery to the exercising muscles (exercise pressor reflex). In this regard, we hypothesized that ASICs contribute to exercise capacity. To test this we measured maximal exercise workload in wildtype, ASIC null, and ASIC double null mice (age 10-12 weeks) using a progressive treadmill exercise protocol. We found that mice with targeted deletion of ASIC1a, ASIC2, ASIC3, or both ASIC 1a and 3 each had diminished exercise capacity compared to wildtype. Interestingly, mice that lacked ASIC3, which is only expressed in sensory neurons, had the lowest exercise capacity of any single knockout genotype. ASIC 1/3 double null mice had an even lower exercise capacity than the ASIC3 single null mice. For unclear reasons, these exercise capacity differences were most pronounced in female compared to male mice. Our data demonstrate that ASICs play a role in maximal exercise capacity, and suggest they are required for normal exercise-mediated reflexes.