Zyzzogeton Presenters and Abstracts
2018

Anisa Ahmed
Dr. Matthew Beckman
Biology
Quantitating the Expression of the Hedgehog Gene throughout Embryonic Development in D.magna Using qRT-PCR

Daphnia magna is a common model used in the fields of ecology, evolutionary biology and ecotoxicology (Thorp and Covich, 2011. Stollewerk, 2010). Daphnia magna belongs to the class of Branchiopoda. Daphnia is a cyclopean organism meaning that it has one distinct eye. Not many scientific literature is out there about the cyclopean eye. This project is focused on gene expression levels, and goal is to help us better understand the normal process that alters the amplitude of these organisms phenotypes. We chose the 18s reference gene since it is the most stable reference gene for normalising qRT-PCR data. (Taylor, Candy M. et al. 2016). The goal of this project is to quantitate the expression of the hedgehog gene during early development in Daphnia magna using quantitative reverse-transcription, polymerase chain reaction (qRT-PCR) with TaqMan probes. The main motive for my study is to gain a deeper understanding of the developmental genetic mechanism of cyclopia by first addressing the role of the hedgehog gene. First, we are interested in the fundamental mechanisms of animal development and the role of hedgehog in embryonic patterning in Daphnia. Second, we believe that by understanding the developmental genetics of cyclopia in a simple model organism it will lead to deeper insights into HPE.

Alexa Anderson
Dr. Christina Erickson
Social Work
Spanked!

The spanking of children is an enigma in American culture as well as the field of social work. Heavily shrouded in both familial shame and pride, it is a difficult conversation to begin. Spanking, for the purpose of this research, encompasses “whooping,” “paddling,” and the slapping of someone’s buttocks for the purpose of discipline. Spanking is often included under the blanket term of “corporal punishment”; however, this term implies a level of disapproval that isn’t agreed upon universally in American culture. Our research aims to discover the trends and evolution of spanking as either necessary discipline, or unnecessary cruelty.

Lukas Barbuscak
Dr. Stella Hofrenning
Economics
What Makes a Soccer Player Expensive? Analyzing the Transfer Activity of the Richest Soccer Teams

This study focuses on developing a model for transfer fees paid for the players sold to the fifteen most valuable and richest soccer clubs in the world. Using data collected from transfermarkt.com, a leading soccer database focusing on transfers and soccer community valuations, we ran a linear regression with variables measuring popularity, monetary valuation, and productivity. Results indicate that variables such as number of Google searches, number of years on contract left, community valuation of a player, number of goals and assists, and the race of a player significantly influence the transfer fee paid for a player. Moreover, additional analyses found that the transfer fee of $250 million for the most expensive soccer player, Neymar, is not random and can be explained by the model.

Samuel Bennyhoff
Dr. Benjamin Stottrup
Physics
Brewster Angle Microscopy and molecular orientation in two dimensions

Through the use of Brewster Angle Microscopy it was possible to demonstrate evidence of lipid tilt through the compression and packing of lipid monolayers at the air-water interface. Several experimental challenges were overcome to obtain usable images. However, our results confirm that Brewster Angle Microscopy is sensitive to the molecular orientation of a lipid monolayer. We report preliminary results.

Gabriel Benson
Dr. Sarah Groeneveld Kenney
English
Representation and Diversity in Minnesota Book Award-Winning Fiction

In this research paper, I set out to discover if adult and young adult fiction that has won the Minnesota Book Award is representative of the populations of Minnesota through a qualitative and quantitative literary analysis from 1988 (the first year that the Minnesota Book Award was awarded) to 2017 (the most recent year of when the Awards were given before this research was completed). By meticulously tallying the gender, race, and sexuality of the characters in 25 young adult novels and 25 adult novels, I sought to understand who was being represented in my state's literature and how often. Through this research, I found out that, for the most part, the Minnesota Book Awards give minority groups a larger platform to display an authentic and realistic view into the lives of these groups. Despite this, there are two groups that are underrepresented: women and Asian populations. I have found that authors from minority groups are able to accurately and appropriately represent their respective cultures and groups. Future study into different aspects of the identities of these characters would be possible for as long as the Minnesota Book Awards continue to given awards for fiction.

Chad Berryman
Dr. Maheen Zaman
History
The Afterlife of Greek Thought in the Christian and Islamic Traditions

In order to push back on both a superficial religious pluralism and the apocalyptical "clash of civilizations" narrative, this project interrogates the eschatological claims of Augustine of Hippo, an influential Christian saint, and Muhyiddin Ibn 'Arabi, the great Muslim sage. Taking Plato's Theory of Forms and the Greek Myth of Er as a shared conceptual foundation, effort was made both to appreciate the common philosophical heritage of the Christian and Islamic traditions and to explore the tensions among the ethical and metaphysical implications of Augustine and Ibn 'Arabi's eschatological thought. While the Myth of Er envisions a cycle of reincarnation following a limited "afterlife", both Augustine and Ibn 'Arabi follow a linear eschatological trend in which a finite life on earth precedes an eternity in the next world. Augustine shares Plato's low opinion of flesh and the material world, but, for Augustine, humanity needs grace rather than philosophy in order to overcome evil. Ibn 'Arabi, like Plato, foresees punishment for sin ending after an appropriate duration. However, Ibn 'Arabi contradicts Plato by viewing the outward nature of man as more stable than the inward.

Alexander Boukal
Dr. Mary Lanzerotti and Dr. Mark Engebretson
Physics
How do Topological Properties of Ripple-Carry Adders Affect Time Delay?

This poster presents topological properties of N-bit ripple-carry adders and the effects of their topology, specifically their genus, on the speed of current flow. An adder is a very simple computer that takes input numbers (0 and 1) from logic gates and then adds them together. To create a ripple-carry adder, we take N number of adder circuits and arrange them in parallel. We differentiate between two kinds of adder circuits: half adders and full adders. Half adders are non-planar (has loops) circuits with genus = 1 that let us perform elementary addition operations using logic gates. Full adder circuits are non-planar circuits with genus = 2 that comprise three inputs (A, B, and the Carry input) and two outputs (Sum and the

Carry output), sending the carry input from one adder to the next. We can think of the genus of a circuit as the number of loops a surface needs in order for a circuit to be drawn on it without any crossings.

Alex Bouvier
Dr. Anthony Clapp
Exercise Science
Effects of a 3-week Bruce Protocol Training Program on VO^2max and Heart Rate

INTRO: Maximal oxygen consumption (VO^2max) is the single most important factor for determining health and longevity as well as providing important athletic performance in athletes working at or near maximum capacity. There are many forms of cardiovascular exercise training programs one can do to work to improve VO^2max, however no one has yet examined if training a specific training program using the actual assessment tool, the Bruce protocol, would generate a viable increase in VO^2max performance. PURPOSE: To compare the use of Bruce protocol to standard cardio vascular training as a means of increasing VO^2max scores. METHODS: Eight moderately fit active college students (age 21±2.2 yrs, hgt 67.5±4.5 in, wgt 163±80 lbs) were recruited to participate. VO^2max scores were obtained with the Bruce protocol, using a Med-Graphics $VO^2$000 gas exchange analyzer, on a Sportstar treadmill. VO^2max scores were obtained before and after a vigorous three-week training period in which four of the subjects were assigned to a Bruce protocol-training program (BPT) 3x a week and 4 subjects were instructed to follow general guidelines training (GT) at 60-80% intensity for 30 min, 3x a week. RESULTS: Mean (x) VO^2max scores and mean (x) heart rate maximum (HRM) for both the BPT and GT improved following the three week training period. Pre to post GT VO^2max increased from 43 ml/kg/min ±6, to 44.4 ml/kg/min ±9.5. Pre to post BPT VO^2max increased from 41.6 ml/kg/min ±7, to 42 ml/kg/min ±4.8. Pre to post mean (x) HRM of GT decreased from 199.3 bpm ±14, to 198.5 bpm ±19.5. Pre to post mean (x) HRM of BPT decreased from 189 bpm ±15, to 184 bpm ±15. There were no significant differences ($p > .05$) between the groups for either VO^2max and HRM. CONCLUSION: This experiment showed that changes do occur in VO^2max and HRM when subjects implement either mode of cardiovascular training, comparable to expected improvements following a month of cardiovascular training. The unique training program whereby subjects solely performed repeated bouts of the Bruce protocol failed to provide any significant improvements apart from the standard cardiovascular training program.

Hannah Bowlby
Dr. Bahri Karacay (University of Iowa)
Human Toxicology
Analysis of Neuronal Nitric Oxide Synthase Transgene Expression in Purkinje Neurons of the Cerebellum

Maternal alcohol abuse during pregnancy can damage the fetal brain and lead to fetal alcohol spectrum disorder (FASD). Children born with this disorder often display various phenotypes including growth deficits, midface and central nervous system abnormalities, and behavioral problems. However, not all fetuses exposed to alcohol have FASD. While some fetuses are substantially damaged by alcohol, other fetuses exposed to similar or even greater alcohol quantities are not affected. The question of why some fetuses are more vulnerable than others is not clear, but genetic differences are likely play a role in the observed differences. Indeed, human twin studies have suggested that genetic factors may underlie the variable vulnerabilities to alcohol teratogenesis. Using genetic and pharmacological approaches, our laboratory has demonstrated that nitric oxide (NO) can protect developing neurons against alcohol-induced neuronal death in vitro. NO is a gaseous molecule and is produced by neuronal nitric oxide synthase (nNOS) in the brain. We have shown that mice genetically deficient for nNOS (nNOS−/− mice) suffer greater neuronal losses than their wild-type counterparts following alcohol exposure during development. This further confirms the protective effect of the nNOS in the protection of neurons against alcohol toxicity. Within the developing brain, certain neuronal populations are more vulnerable than others to alcohol-induced death. These cellular differences in vulnerability may reflect differences in the presence of neuroprotective mechanisms, including those mediated by NO. Among affected cell populations, Purkinje neurons of the cerebellum are particularly vulnerable to alcohol-induced neuronal death. Thus, we hypothesize that overexpression of the nNOS gene in a Purkinje cell specific manner can protect Purkinje neurons against alcohol toxicity. To test our hypothesis, we have generated a transgenic mouse strain that expresses a rat nNOS gene coding sequence under the control of a Purkinje cell specific promoter (pcp2-nNOS).

Ha Dong
Dr. Jayoung Koo
Business Administration
Conspicuous Consumption: A Study of Luxury Cars

This study collects and analyzes previous research of luxury car consumption to gain knowledge about brand prominence and conspicuous consumption through luxury cars. The study looks into the communication process (1) between the owners of luxury brand cars and the public and (2) between the luxury brand car companies and the potential or actual owners of luxury brand cars. The research focuses on BMW brand and its past and current business and marketing strategies to discuss how a luxury car brand can establish its brand image and build effective relationships with car owners. The findings of this research can be beneficial to relatively new luxury brands that were originated from mass car brands, such as Genesis by Hyundai and Acura by Honda.

Jennifer Ellenburg, Natalie Johnson, Michael Reid, and Gisel Suarez Bonilla
Dr. Nancy Steblay
Psychology
Co-witness Signature: Effects on Accuracy and Confidence

This study explored how the presence of a co-witness signature affects an eyewitness's decision accuracy and level of confidence when making an identification from a police lineup. Participants (N=72) viewed a short video of a crime and were asked to make an identification from a six-person culprit-present simultaneous lineup and report their level of confidence in the decision. The first question was whether decision accuracy could be influenced by the presence of a co-witness signature. It was hypothesized that when participants are shown a co-witness signature, they will become more accurate when the signature is underneath the culprit of the crime and less accurate when the signature is underneath a known filler. Participant decisions in the control condition will be the comparison. There was partial support for this hypothesis. The second question was whether the presence of a co-witness signature could alter witness confidence. It was hypothesized that the highest confidence would be demonstrated when a participant's signature is the same as the co-witness signature. This hypothesis was not supported.

Joel Enriquez Blas and James Kurtz III
Dr. Ben Denkinger
Psychology
The Influence of Confidence and Motivation on Flow

Much research suggests that when one is highly motivated to succeed, either for intrinsic, personal satisfaction, or for extrinsic, outside gain we may become absorbed in the task at hand and feel that time slips away. This experience of a "flow state" (Csikszentmihalyi, 1988) is often accompanied by superior performance on the task due to heightened attentional focus, accompanied by skewed estimates of the time spent on the task. Participants were provided sham feedback indicating that had performed either exceptionally well or exceptionally poorly on an initial task, and we predicted that those in the high confidence condition would experience a state of "flow" on subsequent tasks, while those in the low confidence condition would perceive time as passing more slowly on future tasks. We also predicted that participants who have higher scores on the Need for Cognition (NfC) scale would be more affected by negative feedback than those with lower NfC scale scores. After providing written informed consent, participants first completed a computerized sham intelligence task that required rapid and "intuitive" decision making. Regardless of their results, the participants were randomly assigned to receive a mock "results summary" sheet which either indicated that they performed well above (top 1%) or well below the average (bottom 1%) of other participants. They were then asked to complete a series of visual search tasks, with each trial lasting a variable duration. Using a modified temporal bisection design, following each trial participants indicated whether the trial seemed to have lasted for a relatively short (30 s) or relatively long (45s) duration. Participants also completed measures of state anxiety (STAI), NfC, and flow state experience. Participants in the high confidence condition experienced significantly shorter perceived time in the visual search task than the participants in the

low confidence condition. The effect of negative feedback was magnified in participants who scored high on the NfC scale, who perceived the trials as passing significantly more slowly than those with lower NfC scale scores.

Olivia Fitch
Dr. Matthew Beckman
Biology
A comparative genetic, microscopic and pharmacological study of larval eye development in Branchiopoda

Daphnia magna, an invertebrate model organism that is gaining attention in developmental biology is a cyclops, a feature rarely seen in nature. Studies of the developmental basis for cyclopia have largely focused on mutations in vertebrate models that result in a cyclopean phenotype. Here, we present a comparative study between the natural cyclops *Daphnia magna* and closely related two-eyed organisms including *Triops longicaudatus* and *Artemia franciscana*. In doing so, we hope to better understand the genetic basis for cyclopean eye development. We first focused on the *hedgehog* (hh) gene and performed a sequence alignment of the Hedgehog (Hh) protein from multiple species to identify sequence differences unique to *Daphnia*. We have begun cloning hh from multiple branchiopods to expand the sequence alignment and we are pursuing qPCR to measure expression levels during development. In addition, we have investigated morphological differences during development between *Daphnia*, *Artemia* and *Triops* by preparing staged photographs of their larval eye development. Future experiments will comprise staged photographs from other branchiopods such as clam shrimp, which have two adjoining eyes that are not fully fused. Another approach we have taken to understand the functional effect of Hh signaling in branchiopod eye development is to treat *Daphnia*, *Artemia* and *Triops* with Hh signaling pathway inhibitors. We hypothesized that eye development in *Daphnia*, a cyclops, would be refractory to hedgehog inhibitors while *Artemia* and *Triops* would exhibit perturbed eye development when treated with such inhibitors. Our initial experiments suggest cyclopamine causes subtle effects on eye morphology in *Artemia* and *Triops*. Future experiments will test other Hh pathway inhibitors since cyclopamine may not affect arthropod Hh signaling. Funding provided by Augsburg College URGO program and Dean Sundquist.

Genevieve Gleich and Nell Gehrke
Dr. Nishesh Chalise
Social Work
Addressing food insecurity in urban neighborhoods: A community based participatory research approach

In addition to many federal food and nutrition assistance programs, local food shelves serve millions of individuals and play a vital role in food security in our communities. The number of people served by food shelves has been increasing at a steady rate; food shelves in Minnesota served almost three million individuals in 2016. Amidst budget cuts and efforts to provide healthy options, organizations running food shelves are under tremendous financial pressure. This community based research project (CBPR) was motivated by the challenges of managing the dynamic of increasing demand and declining resources. This CBRP project consisting of staff from three community centers in urban Minneapolis, a local foundation, and a research center aimed to better understand the experiences of food shelf participants and identify strategies towards long term food security. The community based research team worked collaboratively at each phase of the project including designing interview questions, data collection, and analysis. The goal is to identify effective and sustainable approaches that will provide comprehensive, longer term food security. Various themes emerged both from the data and the reflection of the CBPR process. One of the key findings was the nuanced conceptualization of food by the participants. Counter to some narratives, people were very aware about healthy and organic food and access to such food for their family played a significant role in their definition of food security. Many of the participants talked about coming to the food shelf at the end of the month. They lived on fixed income and tried to stretch the budget as much as possible. The value of “community” at the food shelf and their desire to give back was perhaps one of the most surprising findings of the study. Additionally they were very knowledgeable about available resources in the community.

Lukas Gillett
Dr. Michael Wentzel
Chemistry
Photo-initiated Radical Polymerization of Polymers with Dental Applications

Polymers are involved in everyday dentistry. They are used when replacing chipped teeth, making dentures and pasting sealants or fillings. Fillings are photo-polymers that react when exposed UV-light (400-500nm). Bisphenol A-glycidyl methacrylate (Bis-GMA), Triethylene glycol dimethacrylate (TEGDMA), are two monomers used in the making of some dental fillings. With the help of Camphorquinone (CQ), 2-(dimethylamino)ethyl methacrylate (DMAEMA) as radical initiators, and different inorganic fillers, a photo-imitated radical polymerization of polymers involved in dentistry were synthesized and studied.

Chloe Gintner and Lidiya Ahmed (Ravi Tavakley)
Dr. Benjamin Stottrup
Physics
Measuring Line Tension in Lipid Domains

The existence of domains or rafts in cell membranes have a functional role in important cellular processes such as protein sorting or cell signaling. An important parameter in the theory of rafts is the line tension or free energy per unit length between immiscible phases in this two-dimensional system. We present preliminary results on the development of a line tension measurement technique in lipid monolayers. This approach uses the dynamic response of the membrane shape to perturbative forces. This technique complements existing tools in the Augsburg Biophysics Lab.

Mitchell Goedken
Dr. Nancy Steblay
Psychology
Witness Description and Lineup Bias: Highly Detailed Witness Description Leads To Heightened Bias

A police lineup may be biased against the suspect, increasing the risk of false identification of an innocent person. Structural lineup bias occurs when lineup members are not homogenous in their appearance. This experimental laboratory study tested 20 real photo lineups from violent crime cases in four U.S. cities. The research question is whether the police failure to match six lineup members sufficiently to the witness's description of the culprit created structural lineup bias. We used a mock-witness procedure. The independent variable was the level of detail in the witness description—high or low. Dependent measures included five metrics of lineup fairness/bias. A statistically significant difference in bias values between the lineups of high versus low witness description was found for each of the five metrics of bias.

Marissa Guillou
Dr. Ana Ribeiro
Health, Physical Education, and Exercise Science
Knee Biomechanics in Division III Female Soccer Players with Reconstructed Anterior Cruciate Ligament (ACLR)

Non-contact anterior cruciate ligaments (ACL) injuries are frequent in women's soccer (Boguszewski et al., 2015). It is not known whether previously injured athletes alter their knee biomechanics while performing sport-specific drills. PURPOSE: To compare knee valgus angles (KVA) between healthy athletes and athletes with reconstructed ACLs in vertical drop jump and soccer specific drills. METHODS: Sixteen NCAA Division III (DIII) female soccer players, ages 20.94(±1.29), thirteen athletes with healthy ACL and three with an ACL reconstruction (ACLR). Knee Valgus Angles (KVA) were measured during vertical drop jump, ladder drill, dribbling drill and shooting drill using Dartfish. Paired t-tests compared the groups. RESULTS: There were no differences in KVA between groups in any of the drills. Drop Jump KVA mean was 12.9°(SD±11.8)(p=0.87). Mean right leg KVA on ladder drill was 19.1°(SD±9.6)(p=0.95) and 17.2°(SD±8.3)(p=0.3) for left leg. Mean right leg dribbling drill average KVA was 15.8°(SD±8.5)(p=0.11) and 12.7°(SD±7.5)(p=0.16) for left leg. Mean right leg shooting drill average KVA was 19.9°(SD±7.3)(p=0.08) and 15.2°(SD±7.2)(p=0.29) for left leg. CONCLUSION: Although there were no significant differences, between the injured and non-injured athletes for any drills, KVA in the

injured athletes tended to be larger in game-like drills, suggesting they could be more meaningful in injury prevention assessment.

Zackary Hajjali
Dr. Stacy Freiheit
Psychology
Gender Differences in Religious and Psychological Functioning

Gender differences in religious and psychological functioning were examined in the present study. A total of 302 college students completed self-report measures of religious coping, spiritual struggles, emotion-focused and problem-focused coping, and negative mood in Qualtrics, an online survey platform. Female college students scored higher than male college students on measures of positive religious coping and spiritual struggles. There were no gender differences in measures of psychological functioning. Understanding the differences in religious and psychological functioning is important in order to provide college students with the proper resources to better their mental health.

Owen Harrison
Dr. Stacy Freiheit
Psychology
Self-Efficacy and Meaning in Life: Proposed Mediators Between Gratitude and Affect

In the present study we examined the impact of engagement in gratitude activities on well-being. A total of 54 college students were randomly assigned to an active gratitude, passive gratitude, or control group. College students completed self-report measures of gratitude, life satisfaction, and mood after the intervention and again two days later. Actively writing about gratitude improved negative mood more than reading about it. Gratitude interventions that require engagement and effort may be more effective than passively thinking about gratitude.

Winston Heckt, Lukas Olson, and Meredith Carstens
Dr. Jenny Hanson
Communication Studies
Millennials, Movies & Marketing: Crafting an Authentic Millennial Romance Screenplay

Antiquated gender roles, inauthentic genre clichés, and a lack of diversity are among the issues of romantic representation of Millennial experiences in film. Three filmmaker/scholars examined Millennials' romantic experiences, viewing habits, conventions of the romance genre, and the film market. They used the research to script an authentic Millennial romance.

Nikki Hoang and Thomas Pho
Dr. Vivian Feng
Chemistry
Analysis of DNA damage in Bacillus subtilis induced by nanoscale complex metal oxide

Expanded demands for lithium ion batteries in transportation and consumer electronics give rise to the emergence of lithiated nickel manganese cobalt oxide, NMC ($Li_xNi_yMn_zCo_{1-y-z}O_2$), a nanoscale cathode material. Previous studies on the environmental impact of NMC have found that it inhibits bacterial oxygen uptake via heavy metal ion release. In this study, the genotoxic mechanisms of nanoscale NMC toward an ecological relevant bacterium, Bacillus subtilis, is investigated. B. subtilis is first exposed to various dosages of NMC, and a sub-lethal dosage of NMC is identified by monitoring bacterial growth and viability. Bacterial cells are then exposed to the sublethal dosage of NMC and examined using a single-cell gel electrophoresis method to identify any double-stranded DNA breakage under the fluorescence microscope. DNA from NMC-exposed bacteria is extracted and hydrolyzed for identification of DNA adducts, covalently modified bases, using a high resolution/accurate mass data dependent-constant neutral loss-MS^3 DNA adductomic approach. To test the hypothesis that bacterial cells uptake metal ions released from NMC, the ion uptake of nickel and cobalt is assessed with Newport Green™ DCF, a nickel- and cobalt- sensitive fluorescence probe. The

presence of intracellular reactive oxygen species (ROS) is also investigated using the dichloro-dihydro-fluorescein diacetate (DCFH-DA) fluorescence probe.

Kitana Holland
Dr. Tom Morgan and Elaine Eschenbacher
Leadership
BEWARE! Black Educated Women Receiving Access, Resources, and Emotional Intelligence

Despite having great success in higher education, most studies of Black female students only focus on exploring the success of Black women and generalize the experience of all Black women. These studies have failed to explore social class, environmental factors, sexual orientation, mental health, and other contributing factors that can play a role in successful completion of education. A review of relevant literature on emotional intelligence and its emphasis on the importance of self-efficacy, motivation, a supportive environment, a focus on identity and goal setting will enhance academic adjustment among Black women. This research argues that by developing emotional intelligence, Black female students will positively influence their educational completion.

Lewis Istok
Dr. Pavel Belik
Mathematics, Statistics and Computer Science
Modeling Velocity Fields around Vortex Breakdowns in Tornadic Flows

In 1986, a KARE 11 news chopper recorded remarkably clear footage of a tornado over the Twin Cities suburbs of Fridley and Brooklyn Park. Based on this video, Pauley & Snow (1989) conjectured the presence of a vortex breakdown in the tornado. Based on the structural similarity between this conjectured flow and a family of flows corresponding to an axisymmetric, incompressible blob of vorticity (Moffatt, 1968), we explore some possible models of the velocity and vorticity fields around a tornadic vortex breakdown. Although these current models are incomplete, the generated flows offer some promising possibilities for future models and a better understanding of tornadic behavior.

Anders Jader
Dr. Ben Denkinger
Psychology
The Adaptability of Offline Hand Representations in The Rubber Hand Illusion

In normal waking life, we perceive our locus of experience as being fixed within our bodily borders, encapsulated within a corporeal shell that seals us off from the external environment. This is referred to as the sense of embodiment, which is the feeling that one is located within one's physical body-- rather than being located within, for example, one's coffee mug. The rubber hand illusion is a way to manipulate our sense of embodiment, wherein one experiences a fake hand to be apart of one's own body. Literature suggests that this illusion occurs because the brain is continually synthesizing an unconscious "blueprint" of the body (offline representation) through visual and tactile information. When the visible fake hand matches the offline representation of one's hidden hand, the illusion is able to occur. This study investigated the adaptability of offline hand representations in a modified version of the rubber hand illusion. Participants' finger arrangement (five-fingers / three-fingers) and the visible rubber hand (realistic hand / alien hand) were manipulated, then proprioceptive drift, sense of embodiment questionnaire responses, and drawback to a threatening stimulus were collected. The results suggest that in the congruent conditions, the sense of embodiment and proprioceptive drift scores were significantly higher than in the incongruent conditions.

Anthony Jenks
Dr. Mikael Elias (University of Minnesota)
Biology
Quorum Sensing and Lactonase Engineering

Quorum sensing (QS) is a molecular communication system utilized by gram negative and gram positive bacteria to coordinate group behaviors. QS involves the release of autoinducer molecules by bacteria into the extracellular space.

When the autoinducer reaches a particular threshold concentration they are able to induce gene expression simultaneously in the bacterial population. QS controls a dynamic range of cellular processes within bacteria, for example biofilm formation, virulence factors and bioluminescence. These processes are crucial to the survival and pathogenesis of many bacteria. Quorum quenching (QQ) is the action by which these QS systems may be disrupted. QQ may be employed via QQ enzymes that degrade autoinducer molecules. QQ is able to provide a degree of control over many biological processes in bacteria. QQ enzymes are naturally found within many microbes and are used as a defense mechanism against other QS microbes. Current research is focused on developing QQ enzymes for applications in medicine, water treatment, and agriculture as an antimicrobial agent. SsoPox is a QQ phosphotriesterase-like lactonase (PLL) from the hyperthermophilic archaea, Sulfolobus solfataricus. Acyl-homoserine lactones (AHLs) are a type of autoinducer molecule used by certain gram-negative bacteria. SsoPox is capable of hydrolyzing the lactone ring in acyl-homoserine lactones (AHLs) with aliphatic chain lengths of 8 to 10 carbons. SsoPox has been demonstrated to actively quorum quench AHLs preventing biofilm production and leading to an observed decrease in bacterial population in vitro in the bacterium Pseudomonas aeruginosa, a microbe prevalent in long infection pathogenesis. SsoPox enzyme variants have been engineered to have greater activity for a variety of AHLs by utilizing a rational design approach to introduce primary sequence variations. I was able to produce protein crystals from multiple variants, these crystals will allow for solving of these protein structures. Analysis of the solved structures will allow for greater understanding of how the variants lead to increased activity and changes in specificity.

Matthew Johnson
Dr. Erik Steinmetz
Computer Science
Geomagnetic Data and Neural Networks

The MACCS project, a geomagnetic survey conducted jointly by Augsburg University, Boston University, and the University of Alberta, collects a fairly large volume of information. This data is parsed by partners of the project to identify anomalous patterns in the data. The goal of this project was to automate the process of identification. The method to be used for the identification of these anomalies was prescribed by Augsburg faculty as neural networks. Given that neural networks require large amounts of labeled data and that there was an insufficient amount of current MACCS data for such a purpose, the research project instead relied on data from the British Antarctic Survey to train neural networks. The type of neural network that was utilized was a convolutional neural network, an architecture that uses filters on grid representations of the data in order to intelligently constrain connections between layers of the neural network. The neural network was modeled after LeNet, a convolutional neural network architecture that has been utilized to positive effect in the categorization of images of the digits 0-9. Of the neural networks that were produced as part of the research project, the highest accuracy achieved on British Antarctic Survey data was an accuracy of 97%.

Ferial Kamsheh
Dr. Matthew Beckman
Biology
Manganese Toxicity on Cultured HeLa Cells

Human exposure to manganese is known to be toxic and causes symptoms in humans that are similar to those displayed by individuals diagnosed with Parkinson's disease. Humans are exposed to manganese through the environment, like the air and water, but at a non-toxic amount. A common way individuals are exposed to dangerous amounts of manganese is occupationally through welding, mining, smelting, etc. HeLa cells, derived from cervical cancer, will be used to test the toxicity of manganese on human cells. To do this, a dose response was conducted to test for cell viability upon exposure to increasing amounts of manganese, as well as staining the cells with MitoRed to see how the mitochondria is affected by manganese through a fluorescence deconvolution microscope. The first dose response experiments performed did not show any significant change as the concentration of manganese increased from 0 μM to 1000 μM of $MnCl_2$. However, there were changes to the cells upon exposure to manganese at 1000 μM to 1500 μM of $MnCl_2$. After finding the concentration that makes the cells very unhealthy, they were then treated at that concentration, as well as two more concentrations, and stained with MitoRed, to observe what the manganese is doing specifically to the mitochondria through fluorescence microscopy. The manganese was demonstrated to have an effect on the mitochondria. This points

us in the direction of what exactly is happening to the mitochondria upon exposure to increasing amounts of manganese, and if there is anything that can be done to prevent mitochondrial dysfunction of the cells.

Derek King
Dr. Tina Loesekann (University of Minnesota)
Biology
Hydrogen Sulfide Remediation and Regulation by Sulfide-Oxidizing Bacteria using Environmental Control Mechanisms

Sulfate is present in high concentrations in mining waste waters in Northern Minnesota, which can cause devastating results with the introduction of naturally occurring sulfate reducing bacteria. Sulfate-reducing bacteria are a vital part of the ecosystem1, yet their metabolic activity can cause environmental concerns among local fauna, wildlife, and the ecosystem.2 Sulfate-reducing bacteria create hydrogen sulfide by a dissimilatory sulfate reduction. Hydrogen sulfide is both toxic in atmospheric form, and as a dissolved gas in liquids. This study aims to investigate a possible way to convert sulfide to elemental sulfur by sulfide-oxidizing bacteria, and filter out of the system.

Cleo Knickerbocker
Dr. Merilee Klemp
Dr. Robert Stacke
Music
The Somali Cultural Integration Through Music in Minneapolis

As a jazz pianist and music major, I had the unique opportunity to perform with and study Somali music. Through this experience, I not only learned about Somali music but also its significance to Somali culture and how music can act as a bridge, bringing together Somali and non-Somali communities in Minneapolis. As a result of my research, I've developed "The Somali Music Minnesota" website which displays information about the history of Somali music, events, and resources available for Somali music. Most importantly, the website includes a variety of Somali music excerpts. The site is accessible to English-speaking as well as Somali-speaking communities. Also included are issues and topics that were voiced by the Somali musicians I worked with and interviewed.

Samantha Kong
Dr. Ben Denkinger
Psychology
Clock Watcher: Does Checking the Time Decrease Task Performance?

The purpose of this study is to determine how motivation influences someone's tendency to check the time during a task, and whether checking the time affects their performance on that task. We conducted an eye tracking study where participants were asked to find hidden targets in complex images in under one minute. We manipulated the motivational states of half of the participants to induce extra pressure to complete the task within the time interval. We hypothesized that people in the motivated condition would spend more time looking at the time, leading them to finding fewer objects in the scene, but no significant effect was observed.

Joshua Kuether and Rodrigo Tapia Hernandez
Dr. Vivian Feng
Chemistry
The Identification of Bacterial Isolates from Cationic nanoparticle Solutions and their Interactions with Cationic Nanoparticles

Cationic-polymer wrapped nanoparticles have been shown to induce membrane damage to bacterial species. The mechanism of the toxicity is associated with electrostatic surface interactions between the nanoparticles and the cell walls. In this study, we isolated bacterial contaminants from cationic nanoparticle solutions. Bacterial strains were compared for colony morphology and gram-stains. Bacterial DNA samples were extracted for sequencing for identification purposes. To investigate the high resistance of these strains to cationic nanoparticles, the toxicity of b-PEI wrapped gold nanoparticles (b-PEI-AuNPs) was assessed using viability assays that quantify actively metabolizing cells. The surface

charge of the cells and cell-particle interactions of these strains were also compared to an existing gram-negative model bacterium, Shewanella oneidensis MR-1 in order to better understand the interactions and the source of resistance.

Holly Kundel and Isabelle Natrop
Dr. Emily Schilling
Biology/Environmental Studies
Phantom midge mandibles in lake sediments as bioindicators of historic fish absence in Minnesota's shallow lakes

Research Question: Is Chaoborus americanus a useful bioindicator of contemporary and historical fish absence in Minnesota's shallow lakes? The phantom midge Chaoborus americanus (Diptera: Chaoboridae) is restricted to fishless habitats due to their vulnerability to fish predation (Von Ende, 1979, Schilling et al. 2009). Their chitinous mandibles are preserved in pond sediments, making this species an excellent bioindicator of historical fish absence in water bodies with unknown fish colonization history (Lamontagne and Schindler, 1994; Schilling et al. 2008). Our research is part of a larger project using paleolimnological techniques to understand historical regime shifts (from clear to turbid states) in shallow lakes in the Prairie Pothole Region (PPR) of Minnesota (Hobbs et al. 2016). As part of the larger study, fish and macroinvertebrate communities were sampled and sediment cores were collected from a large set of study lakes in the PPR (Hobbs et al. 2016). We are interested in examining the role that fish colonization/extinction has played in triggering regime shifts in shallow lakes. Our current research objective is to test methods for detecting fish presence/absence developed in Maine (Schilling et al. 2008, 2009) to see if they are applicable to lakes in the PPR.

Kiah Larson
Dr. Michael Wentzel
Chemistry
Synthesis of Secondary Amides from Amine Derivatives and Propionitrile using a Continuous Flow Process

Amide bond formation is one of the most important reactions in chemistry. Nevertheless, developing reactions for the efficient synthesis of amides continues to be important, as the management of variables such as time, efficiency, temperature control, and pressure regulation remains challenging. Flow Chemistry can be a rapid and efficient method for the optimization of new reactions such as amide bond formation. Using the heterogeneous catalyst TiO_2, we synthesized the amide functional group through a continuous flow system using propionitrile and various amines.

Bob Laskowski
Dr. Pavel Belik
Mathematics/Statistics/Computer Science
Characteristics of Vortex Filaments Modeled on a Cubic Lattice at Zero Statistical Temperature

The purpose of this research is to better understand the behavior of small, violent vortices within larger tornadic flows called suction vortices. They are thought to exist in all tornadoes but are short-lived and difficult to observe. When they dissipate, they transfer their high kinetic energy to the surrounding flow, adding to the overall energy of the tornado. We modeled these vortices at zero statistical temperature using self-avoiding walks on a cubic lattice. We computed the minimum energy values for the largest filaments possible, using our results and patterns observed to extrapolate to larger filaments.

Jerry Lee
Dr. Matthew Beckman
Biology
A study of the effects of Ibuprofen on manganese toxicity in Daphnia magna

Manganese toxicity is a toxic condition when a organism has been exposed to excess amounts of Manganese. The symptoms of this toxic condition causes organisms to develop Parkinson's like symptoms and can be fatal once sufficient amount of Manganese has accumulated. Despite knowing the symptoms of Manganese toxicity, the toxic condition is still a enigma on how it affects cells directly. In order to further our understanding of this condition, a freshwater organism name Daphnia will be used as the model organism since it is a commonly used in ecotoxicology. This study will expose

Daphnia to two different concentrations of Manganese, 30 mg/L and 60 mg/L, and have their movement recorded to see the effects Manganese has on Daphnia. We discovered that Daphnia that was exposed to Manganese has a overall decrease in their movement speed. Once the characterization of Manganese has been recorded, Daphnia will then be exposed to an anti-oxidant agent, Ibuprofen, alongside with Manganese to see if this drug can help elevate the effects of Manganese toxicity. We observed that Ibuprofen has little effect on Daphnia alone while Ibuprofen + Manganese has a detrimental effect on Daphnia. We conducted further treatments by pre-treating and post-treating Daphnia with Ibuprofen after being exposed before and after to Manganese respectfully. We discovered that these final treatments did indeed cause a positive effect on the Daphnia exposed to Manganese. These experiments provided sufficient evidence that shows Manganese has a negative effect on Daphnia, but by pre-treating and post-treating Daphnia with a anti-oxidant will help elevate Manganese toxicity.

Houachee Lee
Dr. Nidanie Henderson-Stull
Biology
Towards Building a Locus-Specific Database (LSDB) of (Bcr-)Abl Variants to Study Drug-Resistance Mechanisms

Biological databases have become increasingly important in healthcare, especially for clinicians, diagnostic laboratories, and scientists. Locus-specific databases (LSDBs) are repositories of specific gene or protein sequence variants that produce a disease or cancer related phenotype. There is no known LSDB for (Bcr-Abl), a hybrid protein that when present in cells causes specific types of blood cancers. To build a comprehensive LSDB for (Bcr-)Abl, a Pubmed and MNCAT search of 'bcr-abl mutation' was performed. Through manual text mining of all 6,896 articles, 235 substitutions were identified at 119 positions. Of these 235 substitutions, 164 were unique to the literature and were represented at 111 unique positions. Known drug sensitivity and/or resistance, whether clinically or experimentally observed, and predicted and/or empirical mechanisms were recorded for each variant. Once published, integration of variant and pharmacological data in a single Bcr-Abl LSDB database will facilitate central access to data that is important residues for understanding drug binding and determining resistance mechanisms to develop new drugs to help combat cancer in patients that contain these variants.

Christopher Lemke
Dr. Michael Wentzel
Chemistry
A Continuous Catalytic Flow Reaction Forming Primary Amide from a Variety of Nitrile Derivatives

An amide is one specific functional group that is present in many commercial products. These influential products are found in a variety of settings. Bug spray's active ingredient, N,N-diethyl-meta-tulamide (DEET), contains a significant amide bond. An additional example is found in military grade Kevlar. Kevlar's robust tensile strength is generated by the interactive amide and carbonyl groups. Since amides are important for daily life, it is important to produce these materials in a greener fashion by decreasing pollution, time, and cost. Better economical and time-efficient processes have resulted from using a heterogeneous catalyst such as titanium dioxide. Titanium dioxide was used in a commercial catalytic flow reactor, along with water as a reactant and tetrahydrofuran as the solvent, to synthesize amides in a greener fashion.

Elise Linna (Sara BinAhmed and Santiago Romero-Vargas Castrillon)
Dr. Benjamin Stottrup
Physics
Effect of Graphene Oxide Packing on Bacterial Adhesion using Single Cell Force Spectroscopy

Many studies have investigated the biocidal properties of Graphene Oxide (GO) resulting in different possible explanations behind these effects. Possibly, the orientation of GO sheets can result in more exposed carboxyl groups or the edges of the sheets acting as sharp corners. In this study, we use Langmuir-Blodgett trough to deposit GO on Si wafers at varied packing densities to obtain different GO morphologies on solid silicon substrates. Roughness and morphology is characterized with AFM. Then, AFM is used to study the interaction of bacterial cells with these GO substrates at single cell level.

Simona Mackovichova
Dr. Bridget Robinson-Riegler
Psychology
Reversing the Misinformation Effect through Source Monitoring

The effect of misleading post-event information on human memory was studied using the misinformation paradigm in which participants were presented with a to-be-remembered (TBR) event, exposed to some misleading details and tested on their memory for the TBR event. According to the coexistence account, both the TBR and the misleading information should be available in memory, yet both may not be equally accessible at retrieval. We manipulated which information – TBR or misleading – participants retrieved by matching/mismatching the modality of the recognition test to the modality of the TBR information. Finally, we used source monitoring to help the misled participants recover the details of the TBR event. The modality manipulation was effective on 2 of the 3 critical items. Moreover, participants who initially reported seeing/reading about three toothbrushes (i.e., misleading information) on the recognition test, corrected their answers to two toothbrushes (i.e., the TBR information) on the source-monitoring test at a level significantly greater than chance.

Jon Maiers
Dr. Stacy Freiheit
Psychology
Sensation Seeking and Attitudes towards Substance Use in Athletes and Non-Athletes

We examined differences between athletes and non-athletes on sensation seeking and attitudes towards substance use. We found that there was no significant difference between athletes and non-athletes on sensation seeking nor on attitudes about alcohol, tobacco, cocaine, marijuana, or ecstasy. However, athletes trended toward more favorable views about alcohol use than non-athletes. Overall, college students higher in sensation seeking had more positive attitudes about substances. Though conclusions are limited by the small sample size, sensation seeking college students may be at increased risk for substance use.

Megan Mccrady and Aleksys Patterson
Dr. Ben Denkinger
Psychology
Facial Recognition and Own-Age Bias

This eye-tracking study investigates own-age bias and positivity bias in face recognition. We evaluated how visual scanning patterns among younger adults (18 -27) while encoding emotional faces predicted subsequent recognition accuracy, and whether own-age and positivity biases would be found in both the gaze patterns, and in later recognition performance. Although an own-age bias was observed in participants' facial recognition performance, our eye-tracking results did not follow our hypotheses.

Hannah McDowell
Dr. Bibiana Koh
Social Work
Inter-country adoption

The Heritage Travel Project was designed to understand the impact of heritage travel on transracial and transethnic adoptee's (TTA's) and their families. To do this adoptive families participate in audio recorded interviews and complete online surveys. The comparison families are families that have not yet planned, or do not plan, on taking part of a heritage tour. These families complete the surveys and one interview; they also complete a survey three months later. The intervention families are participating in a group heritage tour. These families complete the surveys and an interview pre-travel, but also complete the surveys post travel and 6-months later. The intervention families also complete a 6-month follow-up interview. The present URGO research study qualitatively analyzed pre and 6-month follow-up interviews from two families (n=2) who adopted from China and Korea.

Milkii Moya
Dr. Michael Wentzel
Chemistry
Activation of Nitrogen-Silicon Bond Using Palladium Catalyst

Amines are one of the most prominent starting materials used in the synthesis of pharmaceutical drugs. They play an important role in many biological systems, including in the formation of peptide bonds, neurotransmitters, and in many products of the pharmaceutical industry. Due to their large importance, the exploration of their synthesis is of great importance. To synthesize these amines in high yields, large bulky silane protecting group can be added to control its reactivity and activation conditions. Tri-tert-butoxychlorosilane (TBOS-Cl) is an effective protecting group for primary amines and its derivatives due to its high molecular weight and steric bulkiness. This study focuses on protecting several different benzylamine derivatives with bulky silane protecting groups and further activating the newly formed N-Si bond using palladium as a catalyst.

Samuel Mungure
Dr. Stella Hofrenning
Economics
The Role of the Transfer Window in Success for a Soccer Club

In recent years there has been public outcry against soccer clubs that have been spending large amounts of money in the transfer window. For example, RB Leipzig in the Bundesliga, Manchester City in the Premier League and Paris Saint Germain in Ligue 1 spent a world record €222 million on Brazilian soccer star Neymar. The transfer window occurs twice-a-year, from July 1st to August 31st and from January 1st to January 31st. During these time periods, teams can buy and sell players to other teams within either league or internationally. The reason for the outcry is the belief that these clubs are buying their success as most of these clubs do not have a long and successful history in their competitions. This desire to win, coupled with inflating player prices in the transfer markets has led to large amounts of money being spent and world transfer records being broken repeatedly. This research examines transfer window spending compared with other factors such as manager reputation, goal scored and conceded, and amounts invested in facilities such as training grounds and team academies in ensuring success for a club. Data from the official league websites for the top five leagues in Europe: the English Premier League, the Ligue 1, the Serie A, the La Liga and the Bundesliga is used to run several regression models of transfer window pricing.

Daniel Murray
Dr. David Lapakko
Communication Studies
The Persuasiveness of Pharmaceutical Advertising

The purpose of this research is to identify similarities and differences among Direct-To-Consumer Pharmaceutical Advertising (DTCPA) television commercials. DTCPA can be described as an effort (usually via popular media) made by a pharmaceutical company to promote its prescription products directly to patients. The first phase of the study involved collecting a sample of televised commercials that involved 26 different drugs. Once the sample was drawn, content categories were created to identify similarities and differences within commercials, in order to better understand their key characteristics.

Alexis Nagle
Dr. Stacy Freiheit
Psychology
College Students' Reactions to Sexual Assault Disclosure

A total of 60 Augsburg University undergraduate students took part in a survey to examine reactions to sexual assault disclosure among college students. College students were asked to either respond based on personal experience (i.e., reflective) or, when they lacked personal experience with sexual assault disclosure, to respond hypothetically. The hypothetical group indicated significantly higher unsupportive acknowledgement than the reflective group. Preliminary

analyses also revealed that gender did not significantly impact the reactions to disclosure, though male college students reported higher rape myth acceptance than female college students. Given that more than half of the college students experienced a sexual assault disclosure from a friend, it is important to better understand factors associated with positive responses to a sexual assault disclosure.

Nastaran Nassiri and Aisha Barre
Dr. David Crowe
Biology
Action Potential Synchrony in a Genetic Model of Schizophrenia

Worldwide, about one percent of people are affected with schizophrenia, with symptoms of the disease typically first arising in the late teens or early twenties. There are positive symptoms in this disorder such as hallucinations, paranoia and disordered thought, as well as negative symptoms such as depression. Additionally, schizophrenics suffer impairment in various cognitive tasks. Though we do not know the exact cause of this disorder, past studies have shown a pattern of disconnection in schizophrenic brains. For instance, there is impaired functional specialization, abnormal functional integration, less cell potentiation, and fewer dendritic spines – all indicators of disrupted neural connections. One potential mechanism that may underlie the disconnections seen in schizophrenia is a disruption in the timing of the firing of action potentials. Synchronous neural activity, in the form of simultaneous action potentials across neurons, has the ability to strengthen neural connections. It is possible that schizophrenic brains show a decrease in the prevalence of such neural activity. Recently, our laboratory has tested this hypothesis using a drug model of the disease. We have found a reduction in coincident action potentials in animals given an NMDA channel antagonist. Here, we studied the same question in a genetic model of schizophrenia. In accordance with the previous data, we found that mice with a Dgcr8 mutation had fewer coincident action potentials than wild type mice.

Mariah Newell
Dr. Bibiana Koh
Social Work
Heritage Travel Project

This project focuses on how heritage travel can contribute to our understanding of transracial and transethnic (TTAs) adoptees' adjustment. Transracial and transethnic adoptees are those who belong to one ethnic group and their adoptive parents belong to another. The study examines the impact of heritage travel for TTA adoptees (from China, Korea, Vietnam, and India). The study also looks at other factors (for example, family socialization, personality and ethnic identity) that can contribute to TTAs adjustment. A quasi-experimental (comparison and intervention groups) research design was used; the intervention in this study was the heritage travel tour. Data was collected three times: (pre-travel, post travel, and six-months). For my research, I studied two families who were adopted from Vietnam: one family who went on a heritage travel tour, and another family that did not. I then compared the similarities and pointed out differences in the family's interviews through transcription.

Adam Pancoast (Evan Beaumier)
Dr. Ian Tonks (University of Minnesota)
Chemistry
Utilizing TiII/IV Redox Catalysis for the Synthesis of Unsymmetrical Carbodiimides

Traditionally, important reactions in homogeneous catalysis use noble metals such as Pd, Pt, and Ir, among others. However, these metals tend to be very expensive, and often have extremely depleted reserves. Thus, the need for an inexpensive and abundant transition metal catalyst has increased in recent years. Previous work by the Tonks group synthesized poly-substituted pyrroles via a $Ti^{II/IV}$ redox catalytic cycle, and there are several other examples in literature of the use of Ti catalysts for C-X bond formation, where X = O or N. However, the early transition metal catalyzed formation of unsymmetrical carbodiimides is extremely limited to a few examples currently present in literature, which generally utilize very restricted conditions. In this work, we propose to synthesize unsymmetrical carbodiimides via a $Ti^{II/IV}$ catalytic coupling of *p*-substituted diazenes and *t*-butylisocyanide, as well as the catalytic coupling of sterically hindered azides to a

variety of isocyanides. We aim to further prove the utility of $Ti^{II/IV}$ redox catalysis and to expand the early transition metal catalyzed formation of unsymmetrical carbodiimides.

Maria Camila Payan Rodriguez
Dr. Matthew Beckman
Biology
The effects of P7C3 on manganese toxicity in Daphnia magna*.*

This research aimed to test P7C3, a neuroprotective agent, on *Daphnia magna* against manganese toxicity. To test the effects of manganese on *Daphnia's* swimming we performed a dose response experiment with concentrations ranging from 0.1-200.0mg/L of MnCl2. We recorded one minute videos and tracked the animal's movement. We found significant findings at time point 72 hours post-manganese treatment. To test the effects of P7C3 on manganese toxicity we performed a pre-treatment, co-treatment, and post-treatment on the *Daphnia* using the same tracking and analyzing methods as above. The same P7C3 and manganese concentration was used for each experiment, what differed was the order of exposure of each treatment. In pre-treatment all the animals died. In the co-treatment, results showed that in the presence of P7C3 the effect of manganese on reducing total displacement was lessened between days 0 and 3 compared to animals treated with manganese alone. The post-treatment data showed that P7C3 did not reverse the effects of manganese on *Daphnia's* total displacement, post-manganese treatment.

Donovan Paz
Dr. Ben Denkinger
Psychology
Time Distortions for Emotional Imagery in a Dual-Task Design

In a temporal bisection task using emotional imagery, we sought to determine if participants overestimated the duration of images that evoked positive or negative emotions, relative to neutrally-valenced imagery. Moreover, we investigated whether these effects would be more pronounced in a dual-task design, when participants' ability to effortfully track the passage of time would be diminished by the requirement to manage multiple task demands

Eric Perez, Ariel Koch, and Courtney Olson
Dr. Nancy Steblay
Psychology
Eyewitness Identification Accuracy: "I know that guy!"

Most eyewitness research focuses on cases in which the witness does not know the perpetrator. We examined real eyewitness lineup decisions for familiar offenders. Preliminary data indicate that eyewitness identifications of previously-known persons can be unreliable.

Ellyn Peters
Dr. Michael Wentzel
Chemistry
Flow and Microwave Reactors in the Synthesis of Esters and Amides

A new method for amide synthesis from benzylamine and acetonitrile has been developed using a TiO_2 catalyst and microwaves. Temperature, reaction time, TiO_2 catalyst form, wattage, and work-up were varied. The optimal conditions were found to be 200 degrees Celsius, 5 minutes, pellet-form titanium dioxide catalyst, and 200 watts. The reaction is shown to work for ortho-, meta-, and para- derivatives and in the presence of electron-donating and electron-withdrawing groups.

Jubilee Prosser
Dr. Mark Travers and Zachary Dunbar (Roswell Park Cancer Institute)
Health Behavior
Stoking the coals: an analysis of indoor air quality and lead presence in waterpipe charcoal brands and an electronic alternative

Background: Waterpipe tobacco (hookah) smoking is becoming popular in the USA, and increased hookah smoking has led to indoor charcoal combustion. This study aims to analyze particulate matter ($PM_{2.5}$), carbon monoxide (CO), and lead (Pb) content in second hand smoke (SHS) emissions across charcoal brands to determine whether they are a health risk and if electronic charcoals (EC) are a harm reduction alternative. Methods: 18 smoking sessions with four different types of charcoal were conducted. The waterpipe was smoked with a specialized machine in an enclosed room ($40m^3$). SidePak and Qtrak monitors recorded corrected $PM_{2.5}$ and CO levels during smoking sessions. Pb was analyzed in charcoal prior to and after the smoking session using graphic furnace atomic absorption spectrometry. Results: Each session yielded significantly higher $PM_{2.5}$ and CO SHS emissions than ambient levels ($p<0.05$). Across brands, mean $PM_{2.5}$ emissions were not related to the mass of charcoal consumed (p=0.936); CO and mass of charcoal consumed were directly related. CocoNara and 3-Kings brands had mean $PM_{2.5}$ emissions significantly greater than Fantasia and EC. Fantasia, CocoNara, and 3-Kings had higher average CO emissions than EC. Charcoal analyses found that smokers or bystanders could inhale 102 ppb of lead on average per session for Fantasia. Conclusion: All waterpipe use, regardless of heat source, caused a significant increase of harmful toxins in the air, however EC emitted less than carbon charcoal into SHS. Differences in CO, $PM_{2.5}$, and lead emission between brands demonstrate a need for FDA regulation in charcoal marketing, and action among lawmakers to prohibit indoor charcoal burning.

Nina Robinson
Dr. Ana Ribeiro
Exercise Science
Knee alignment and muscle strength ratios in female division III soccer athletes with anterior cruciate ligament reconstruction

Introduction: Anterior cruciate ligament tears are very common in sports that require contact, hard landing from jumps, or cutting, like soccer. Analyzing an athlete's knee valgus and muscle strength ratios may help reduce their risk for injury. Objective: To compare knee valgus angles and the hamstring to quadriceps femoris strength ratio between healthy female Division III soccer athletes and athletes with ACL reconstruction, as surrogates for knee re-injury risk. Methods: Thirteen non-injured and three injured athletes completed a vertical drop jump (VDJ) from a 31 cm box and 1 Repetition Maximum tests (1RM) using seated knee curl and seated knee extension machines. Baseline and landing knee valgus angles (KVA) were measured using Dartfish software. Results: There was a significant difference in quadriceps to hamstring ratio between injured and non-injured athletes (p=0.03), with injured individuals having an average ratio of 0.89 and non-injured 0.71. No significant difference was found in KVA from VDJ between injured and non-injured subjects (p=0.87). No significant relationship was found between KVA and quadriceps to hamstring ratios. Conclusion: There are significant differences in hamstring to quadriceps strength ratios in injured female DIII soccer players compared to non-injured, suggesting it is a better screening than VDJ. KVA cannot be predicted by quadriceps to hamstring ratio and injury history.

Breanne Sande-Martin
Dr. Ben Denkinger
Psychology
The Impact of Cellphone Salience and its Effect on Visual Search Tasks

Cell phones have become a part of our everyday life and an extension of ourselves. Our reliance on smartphones for navigation, reminders, and interpersonal communication has changed the way we communicate and function. As the demand and reliance on smartphones increases, we must ask ourselves how dependence and attachment to these devices affect our ability to think and function with or without them. The main goal of this research is to evaluate how cell phone salience effects clock watching behavior during a visual search task and how this may affect performance.

Adam Sawyer
Dr. Michael Wentzel
Chemistry
Palladium-Catalyzed Cross Coupling of Organosilicon-Protected Benzylamine Derivatives

Amines are a highly diverse group of compounds with a large presence in a variety of industries. Due to the reactive nature of primary amines, a protecting group is necessary in order to limit their reactivity in order to facilitate selective reactivity. Tri-tert-butoxychlorosilane (TBOS-Cl) and tris(trimethylsiloxy)chlorosilane (TTMSS-Cl) are effective protecting groups due to their high molecular weight and steric bulk. The purpose of this study was to protect a number of benzylamine derivatives with bulky silane groups and determine their effects on palladium-catalyzed cross coupling reactions. A number of benzylamine derivatives were successfully protected using TBOS-Cl and TTMSS-Cl. A method of cross coupling through the use of the nitrogen-silicon bond and aryl-halides is still in developmental stages. All products were characterized through the use of GC-MS and 400 MHz 1 H NMR.

Jason Scheeler
Dr. Amanda Case
Chemistry
Photoinitiated Kinetics in a Flow-tube: Characterization and First Steps

Current models of atmospheric chemistry fail to reproduce the unexpectedly high OH concentrations observed in regions of the atmosphere with large biogenic emissions. Recent studies suggest that the oxidation of volatile organic compounds (VOCs) in pristine environments results in recycling of the OH radical via isomerization and decomposition of hydroxyperoxy radicals. We are interested in the kinetics of the unimolecular reaction pathways of hydroxyperoxy radicals and would like to gain a fundamental understanding of how molecular structure affects the unimolecular isomerization reactions of hydroxyperoxy radicals in the atmospheric oxidation of VOCs. To achieve this goal, we constructed a flow tube capable of measuring photolytically initiated unimolecular reactions at near atmospheric pressures. The flow tube has four stages: (1) the entrance tube allows for development of the flow, (2) the photolysis region consists of a series of window ports to allow for the photolytic generation of hydroxy radicals (which become hydroxyperoxy radicals in the presence of O_2), (3) the reaction tube provides additional transport time to allow for reaction, and (4) the detection region is where we perform laser-induced fluorescence (LIF) detection of OH. This presentation focuses on the characterization of the apparatus. We measure flow velocities and construct radial velocity profiles, demonstrating the capability of the instrument to produce well-defined laminar and turbulent flows. From this data, we calculate transport times from the photolysis region to the detection region at 298 K and pressures ranging from 10 to 300 Torr. We use the UV photolysis of $HONO_2$ to achieve in-flow detection of OH radicals, and we detect the OH radical using LIF near 282 nm by exciting the A $^2\sum^+$ (v = 1) $\leftarrow$ X $^2\prod$ (v = 0) transition. We show OH LIF difference signals for various transports in a “short-flow” configuration.

Ryan Staffaroni (Abigale Enrici)
Dr. Matthew Beckman
Biology
Modeling the structure and function of the basal bead of Daphnia magna

Daphnia magna is a small freshwater crustacean used as a model organism for ecotoxicology studies within wetland environments. Nine chemosensory setae are found on each daphniid’s first antennule in a circular 8+1 arrangement. Each of these nine chemosensory setae – also known as aesthetascs – are mounted onto the antennule by a basal bead, a structure of the daphnid’s body that may be composed of a couple large actin rings. This actin ring structure is rare amongst animal organisms and its function is largely unknown. This novel actin ring structure stains with an FITC-Phalloidin stain and fluoresces when imaged under a deconvolution fluorescence microscope amongst daphniid subjects. A preliminary experiment with calcium-ionophore (A23187) induction presents a decreased size in the diameter of the actin ring, suggesting a contractile function in these actin rings.

Savannah Stevens and Simona Mackovichova
Dr. Dave Matz
Psychology
Gaze Patterns toward Females and Males

We examined the influence of participant gender, sex of target and task orientation (judging appearance vs. personality) on participants' tendency to exhibit an objectifying gaze. Preliminary results indicate no significant effects for any of the independent variables and no significant interactions.

Naomi Swanson
Dr. Annie Heiderscheit
Music Therapy
Qualitative Analysis of Themes & Images of Pivotal Moments in GIM Sessions for Adults with Chemical Dependency

The purpose of this study was to identify types of imagery, imagery themes and pivotal moments in Bonny Method of Guided Imagery and Music (GIM) sessions of adults in chemical dependency treatment. The data included 66 session transcripts of the 10 subjects randomized to the experimental group from the parent study. Qualitative session data was analyzed by coding transcripts by identify the type of imagery, imagery themes that emerged from the content of the imagery and pivotal moments. The qualitative analysis demonstrated visual imagery was the most common type, and that the number of types of imagery and the frequency of these types of imagery experiences remain consistent throughout a client's course of treatment. Results indicate that individuals having a higher variability in the types of imagery they experience correlates to a higher number of pivotal moments. There were nine main themes of pivotal moment imagery: fear, anger, stuckness, and loss, letting go/power of choice, moving on, discovering inner strengths, physical healing /transformation and hope. This study is the first of its kind and therefore further studies will be required to confirm its findings.

Rodrigo Tapia Hernandez
Dr. Vivian Feng
Chemistry
Molecular interaction between b-PEI-functionalized gold nanoparticles and Bacillus subtilis strains varying in wall teichoic acid composition

The optoelectronic properties of gold nanoparticles make them ideal for use in technological and biomedical applications. The expansion of gold nanoparticle applications motivates improvement in designing functionalized nanoparticles. The impact of such engineered nanoparticles on organisms in the environment, such as bacteria, is not well understood at the molecular level. To investigate the interactions between gold nanoparticles and Gram-positive bacteria, three Bacillus subtilis strains differing in wall teichoic acid composition (SB491 being the wild type, tagE lacking glucose and dltA lacking d-alanine moieties) were exposed to cationic b-PEI-functionalized gold nanoparticles (bPEI-AuNPs). Characterization of bacterial whole cell surface charges of the three strains show that the tagE mutant has the most negative overall surface charge. Upon exposure to the gold nanoparticles, the extent of interaction with the three strains differed as demonstrated by fluorescence-assisted cell sorting (FACS), while toxicity assessments showed no significant difference among them. The extent of gold nanoparticle attachment was largest to the tagE mutant, suggesting electrostatic interaction between cell wall material and gold nanoparticles dictates extent of association. The results of this work will help the engineering of gold nanoparticles in a way that makes them less impactful when exposed to organisms in the environment.

Mai Xee Vang
Dr. Nancy Rodenborg and Dr. Rebekah Dupont
Social Work/STEM Programs
Easing Into a 4-year Institution as a STEM Transfer Student: "What Year Are You?"

The demand for science, technology, engineering, and mathematics (STEM) professionals is growing. However, STEM students face barriers to degree completion, including financial need, lack of STEM momentum, and more. Transfer

students face unique barriers including poor fit between their varied educational and life experiences and traditional institutional supports – exemplified by the varied responses to the question, “What year are you?” This qualitative research study utilizes interviews and coded transcript analyses to explore fit between transfer students’ life circumstances and their experiences in a private liberal arts college. Findings suggest that finances, age, family, social identity, student goals, and college attributes may affect transfer students’ transition into traditional college environments. Students’ love of learning and excitement about their specific STEM area seemed motivational to their persistence and appeared to help them overcome lack of fit with traditional college structures. We conclude with recommendations for improved STEM transfer student support. This study was supported by National Science Foundation Grant No. 1565060.

Panyia Vue
Dr. David Crowe
Biology
Neural activity in a mouse model of schizophrenia: A Comparison of neural activity in wild-type and Dgcr8+/- mice

Millions of people suffer from schizophrenia -- a chronic, complex and severe mental disorder that disrupts every aspect of a person’s mind. About 1% of the world population is thought to have schizophrenia – in the US alone, that amounts to over 3 million adults. Schizophrenia is characterized by a number of symptoms, including delusions, hallucinations, disordered thought, unusual and/or excessive body movements, a stoic or “flat-affect”, social withdrawal, inability to make rational decisions, poor short-term memory and deficits in attention. Both genetic predisposition and environmental factors (alcohol, drugs, stress) can contribute to the development of this disorder, but the exact etiology of schizophrenia is unknown. Human anatomical and brain imaging studies have suggested that schizophrenia is characterized by a disruption in communication between brain areas. However, little is known about how this disconnection is manifested at the level of individual neurons, the fundamental unit of brain activity. In our study, we are looking at neural activity in a mouse model of schizophrenia, comparing the neural activity in wild-type and genetically engineered Dgcr8+/- mice. The Dgcr8 gene is part of the 22q11.2 chromosomal microdeletion in humans, one of the highest known genetic risk factors for schizophrenia. Dgcr8 itself is thought to play an important role in neuronal function. We hypothesized that neural activity in the mutant mice would show lower levels of synchronization than that of the wild-type mice. We found this to be the case: mutant mice had lower local field potential power in the delta (1-3 Hz), theta (3-8 Hz) and gamma (30-100 Hz) bands. The two strains of mice did not differ in the size and frequency of observed power bursts at low (delta) or high (gamma) frequency.

Yee Vue
Dr. Penny Kianian, Dr. Shahryar Kianian, Dr. Jitendra Kumar (University of Minnesota)
Horticultural Science
Virus Induced Gene Silencing in Maize

Virus-induced gene silencing (VIGS) uses a recombinant virus to specifically target gene activity through post-transcriptional gene-silencing (PTGS). This technique is transient and does not depends on labor intensive steps of transformation and tissue culture. We are using Barley Stripe Mosaic Virus (BSMV) derived to VIGS vector to silence phytoene desaturase (PDS) gene in maize. This research focuses on the uses of BSMV to infect maize, a distant relative to barley. During the experiment, the maize inbred Missouri 17 (Mo17) was inoculated with the BSMV vector carrying a segment of wheat PDS gene, and phenotyped for 40 days. There were observable in phenotypes between the control plants, those infected with BSMV only, and plants infected with BSMV with PDS.

Aliya Watson
Dr. Robert Cowgill
English
The Genre of Justice: An Inquiry into Voice and Style in Supreme Court Opinions

Few think of Supreme Court decisions as being written works of literary value, but the truth is that the Judicial Opinions have more influence over everyday life than any other document. This is especially true of cases that revolve around civil rights. The Supreme Court, when they deliberate over constitutional rights, either decide to limit or expand the rights that

are guaranteed by the Constitution. Extremely import to all individuals, and yet few outside of the legal community actually read these decisions due to their daunting, technical nature. This study argues that by approaching judicial opinions as a literary genre, we can grasp the restraints that justices are both limited and supported by when crafting their decisions. Rhetoric of change commonly relies on emotional appeal, colorful allegories, pathos-laden language and amplification. And yet, when rulings are made that will change the lives of all Americans, justices are restrained by a technical genre that is antithetical to these common strategies. For the purposes of this inquiry, we investigate six Supreme Court Cases that deliberate expanding civil rights: *Plessy v. Ferguson*, 163 US 537 (1896), *Roe v. Wade*, 410 U.S. 113 (1973), *Planned Parenthood v. Casey*, 505 U.S. 833 (1992), *Lawrence v. Texas*, 539 U.S. 558 (2003), *Obergefell v. Hodges*, 576 U.S. (2015) and *King v. Burwell*, 576 U.S.(2015). Therefore, we analyze voice, style, manipulation of voice and distance, in both decisions that hold rulings and those that dissent and find that the rhetoric of inevitability is fraught with the friction that exists between language and action.

Elizabeth Whalen
Lindsay Markworth, MMT, MT-BC and Emma Moonier, MS, LPCC, MT-BC
Music Therapy
Understanding the Needs of Transgender Young Adults Dually Diagnosed with Autism Spectrum Disorder and Depression

This study investigates the mental health treatment experiences of one transgender young adult and one genderqueer young adult who are dually diagnosed with autism spectrum disorder and depression. Data were collected through semi-structured interviews with these young adults and two of their parents. Interview questions centered around participants' mental health treatment needs and experiences. The researcher conducted a phenomenological analysis of the data that yielded individual meaning units and global meaning units. The analysis found that individuals in this population experience low self-esteem, social difficulties, and a lack of appropriate mental health services.

Tiffany Widseth
Dr. Ana Ribeiro
Health, Physical Education, and Exercise Science
Validation of Modified Functional Movement Screen (MFMS) in NCAA DIII Female Soccer Players

Background: The Functional Movement Screen (FMS) is comprised of seven tests to identify compensatory movement patterns that may increase injury risk and reduce performance. A modified FMS (MFMS) was created by Augsburg Athletic Trainers to improve screening efficiency and includes three original FMS tests: shoulder mobility, active straight leg raise, trunk stability pushup, and a newly added test; the vertical drop jump (VDJ), all scored on a simplified 0-2 scale. Objective: This study aimed to validate the MFMS for DIII female soccer players. Methods: Sixteen NCAA DIII soccer players and twenty non-athlete controls were recruited and completed two trials of FMS and MFMS. Reliability was calculated as Pearson Product Moment. Concurrent validity was calculated between FMS and MFMS scores, using R Statistical Software. Results: Mean age of soccer group was 21 (SD=1.37) and control 21.05 (SD=1.61). Mean FMS score for soccer group was 14.38 (SD=1.54) and control 13.35 (SD=2.39). Mean MFMS score for soccer was 5.62 (SD=0.96) and control 4.95 (SD=0.69). Soccer scores for the first MFMS trial were significantly larger than controls' ($p=0.02$). FMS reliability coefficient was 0.99 and MFMS' was 0.88. Discussion: There were moderate positive correlations between FMS and MFMS for the soccer group ($r=0.51$) and for controls ($r=0.46$), but they were not large enough to validate the MFMS. When the MFMS was rescored on the original 0-3 scale (excluding VDJ) it was valid for both groups (soccer $r = 0.79$, controls $r= 0.83$). Conclusion: The MFMS is not valid, suggesting potential issues with the new scoring system.

Khadijah Wilson
Dr. Audrey Lensmire
Education
Black Girl Identity Development: A Theory of White Interruption

Patricia Hill Collins (1991) asserted that black women, when together in safe spaces, find positive self-definitions and affirmation to counteract the effects of living under a White supremacist and patriarchal society. This research confirms

her theories. In my study, I engaged in discussions with five young black women about their experiences as black girls in white schools and communities. This presentation will explore my theory of "white interruption", which is what occurs when white ideologies are imposed as a healthy Black girl identity is attempting to be developed.

Bryce Zdanovec
Dr. Anthony Clapp
Exercise Science
Effects of a 6-Week Preseason Training Program on Body Composition and Anaerobic Performance in Division III College Wrestlers

Wrestling is a physiologically demanding sport which requires many different traits and characteristics to set a wrestler apart his competition. With so many different training modalities it is difficult to determine the optimal process for collegiate wrestlers to prepare for their upcoming grueling season. Purpose: To investigate changes that occur in body composition and anaerobic performance in division III college wrestlers following a 6-week preseason sport-specific training program as they prepare for the upcoming wrestling season. Methods: Thirty-two (N=32) intercollegiate athletes from a NCAA Division III Men's Wrestling team (Ages=18-23) were measured with two physiological assessments. 1) Body composition was tested using a skinfold caliper and pinching three different anatomical locations: triceps, subscapular region, and abdomen, 2) anaerobic performance was assessed with the Missouri Shuttle Run. All wrestlers then completed a 6-week preseason training program consisting of practice five days a week and lifting weights four days a week. Following the six weeks of training, the participants' body composition and anaerobic performance were measured again. Data were also categorized into three different groups according to competition weight: light (125, 133, 141), middle (149, 157, 165, 174), and heavy (184, 194, 285). Data were analyzed using a paired t-test. Results: Mean (x) wrestler body fat decreased 3.59% following the six weeks of training ($p < 0.05$). The light weight wrestlers lost 2.9% body fat, the middle lost 3.79% body fat, and the heavy lost 4.07% body fat. Mean (x) anaerobic performance for the wrestlers improved by 8.01 seconds compared to the initial test ($p < 0.05$). The middle weights saw the greatest change with anaerobic performance by running 10 seconds faster than the initial test. Conclusion: This investigation revealed that a 6-week preseason training program consisting of wrestling practice 5x week along with an every-other day weight training regimen can significantly improve the physiological variables of a collegiate wrestler by lowering body fat percentage and improving anaerobic performance.