

Zyzzogeton Presenters and Abstracts

2015

Eric Alfuth
Benjamin L. Stottrup, Ph.D.
Physics
Creating Laboratory Equipment for Biophysics Research and Education Using a 3D Printer

Maker and DIY projects and resources have exploded in popularity and accessibility. We describe the development of a Langmuir trough system and accessories by undergraduates. LabVIEW provided the base user interface while Arduino micro-controllers were used as the interface electronics. We present a cost effective way to build a modular and disposable Teflon trough. We demonstrate that Arduino and LabVIEW interface effectively. Using a home built 3D computer-controlled router we are able to build barriers and other necessary elements.

Molly Allen
Nancy Steblay, Ph.D., Ben Denking, Ph.D.
Psychology
Eyewitness Memory Procedure with Older Adults

Older adults make more identification errors than younger adults when asked to identify a culprit from a police lineup. These errors increase the chance that an innocent person will be accused of a crime. Therefore, it is important to determine a lineup procedure that reduces identification errors when police are working with older adult eyewitnesses. The purpose of this laboratory study is to compare the accuracy of younger (18-30 years of age) versus older (60-80 years of age) eyewitnesses under conditions of best lineup practice. This study is a 2 x 2 x 2 factorial research design. The identification accuracy of older and younger eyewitnesses will be compared using the sequential (images viewed one at a time) versus simultaneous (images viewed all at once) lineup procedures, with either the culprit present or absent from the lineup. Participants view a short video of a simulated crime. They then try to identify the culprit from a six-person lineup. Data collection is currently ongoing. The data will be analyzed using chi-square tests.

Heath Anderson
Stuart Stoller, Ph.D.
Business
The Beer Ratio

Our research hypothesizes that a beer-friendly country in Europe should adopt the Euro as its national form of currency when the price per pint in that country is of equal value to the price per pint in Germany. If there is a discrepancy in these prices when a country converts to the Euro, the cost of living in that country will gradually increase over time.

Karla Guadalupe Arredondo-Payan
Lars Christiansen, Ph.D.
Sociology
Living Under The Shadows: A North Minneapolis Perspective

The purpose of this study is to examine the links that exist between the negative perceptions of North Minneapolis with the lifestyles of residents and how these perceptions are created, specifically through the media. Qualitative data such as interviews, random survey, content analysis, and field observations are used to profile whether or not the lifestyles of residents in North Minneapolis are affected by the

negative perceptions and to determine what causes these negative views. Qualitative analysis revealed that media perceptions play a key role in influencing people in creating and accepting the negative views of North Minneapolis. However, the interviews presented the concept of North Minneapolis being like any other community in the world and had no distinguishable characteristics that would make it stand out for the media to create negative stories and views of the community. Furthermore, family dynamics play a key role in the acceptance or rejection of the negative stereotypes that are argued by some to mold individuals in the neighborhood.

Nadine Ashby

Matthew Beckman, Ph.D.

Biology

Cloning and Characterization of the Expression of gooseberry from Daphnia magna

Daphnia magna are invertebrates that are primarily found in freshwater lakes and ponds. Historically, daphnids have been used to conduct toxicology studies as a biological indicator. The growth or decline of the *Daphnia* population can be used to indicate the quality of the water in which they live. Being that *Daphnia* are cyclopean organisms, we hope that, in studying the normal development of the cyclopean eye, we will be able to gain some insight into how abnormalities in eye development can lead to certain midline disorders. Based on the known *D. magna* gene models for Pax-family members, PCR primers were designed to clone fragments of the Pax2 and Pax6-like gene fragments in *D. magna*. This broad PCR screen yielded a strong candidate gene which was pursued further. Based on the multiple sequence alignment to known Pax genes, the gene I cloned in this work is gooseberry, which is similar to several genes in the Pax family. Using the gooseberry gene fragment as a template, RNA probes were created for in situ hybridization. I am currently in the process of performing in situ hybridization experiments to determine the spatial and temporal distribution of gooseberry. In summary, a partial clone of the gooseberry gene from *D. magna* was cloned and characterized. Future studies will focus on determining its pattern of expression.

Vision Bagonza, Eleni Beyene, Blair Stewig

Joan Kunz, Ph.D., Benjamin L. Stottrup, Ph.D.

Biophysics, Chemistry

Comparison of Isomeric Hydroxycholesterol systems of 20-, 25-, and 27-OH cholesterol systems using Langmuir Monolayer approach to observe phase changes

Biophysicists in the field of membrane biophysics play a vital role in providing preliminary information needed to further studies in protein sheets and monolayer assembly. This paper involves the initial analysis of 20-hydroxycholesterol, as a follow up study from 25- and 27-hydroxycholesterol. Data collection and analysis was by means of a Langmuir trough and fluorescent microscope, to assess the interaction of this lipid with DMPC at the air-water interface at varying pressures and areas. Initial findings show 20-OH exhibiting contrasting, as well as similar characteristics from both cholesterol and other hydroxysterols. Overall differences were observed in size distribution, transition pressures as well as nature and shape of domains at different pressures and mostly at the transition pressures. 20-OH is also more susceptible than other sterols to oxidation at the air-water interface, causing its transition pressure to change very quickly. The 20-OH system behaves like cholesterol in its arrangement into lipid domains at low pressures, but the domains appear similar to other hydroxysterol domains at higher pressures. These findings have led us to believe it could be an intermediary molecule between hydroxysterols and cholesterol. 20-OH cholesterol is not commonly found within mammalian cells, however, understanding of the implications of its differences with other isomeric hydroxysterols could be instrumental on understanding 25-OH, which is the most biologically relevant molecule of the hydroxysterols.

Hannah Bech
Mary Lanzerotti, Ph.D.
Physics, Sociology

Oral History Project: Oral Histories of Distinguished Leaders: Inspiring the Next Generation of Young People in Science, Technology, Engineering, and Mathematics (STEM)

My research is an extension of Dr. Mary Lanzerotti's previous research with other undergraduate students that involved the preparation, conduct, and transcription of oral history interviews of distinguished female leaders in Science, Technology, Engineering and Mathematics (STEM). Oral histories are an established form of historical record keeping, and these interviews are intended to archive the trajectories of women who have broken barriers in their field. This research is a collaboration with Dr. Lanzerotti's contacts at the IEEE History Center in New Jersey. The previous oral histories, when completed, transcribed, and approved, have been archived both at the IEEE History Center (New Jersey) and digitally on the online IEEE Global History Network. This research involves my interviewing a female leader in STEM, whose name cannot be disclosed until her approval of the interview transcript. I was trained by Dr. Sheldon Hochheiser from the IEEE History Center in oral history interview techniques. The interview is transcribed and submitted to the subject for approval. This research will result in a completed oral history to be archived through the IEEE History Center and the IEEE Global History Network.

Yasmin Abdulaya, Mathia Colwell, Amanda DeChaney, Jasmine Eltawely, Adrian Lowe, Juliabeth Ritchie, Hassan Sankoh, Raesean Sneed
Matthew Beckman, Ph.D.
Biology

Auggies Imaging in Action: Fluorescence Deconvolution Microscopy In Biology Courses

A new fluorescence imaging workstation acquired in May of 2014 by the college for the Biology Department has shed light on new opportunities for inquiry and learning in courses and faculty-student research. We present the results of research projects that were carried out using the Leica DMI6000B fluorescence deconvolution microscope in Genetics (BIO255) and Advanced Cellular and Molecular Biology (BIO471). Students learned how to use this sophisticated imaging tool and generated the images presented here. Some of these images are near-publication quality, if not publication quality. The faculty-student project that was embedded in the laboratory section of BIO471 yielded data that confirmed a previous finding. In summary, students confirmed that the basal bead of the chemosensory antennae of *Daphnia magna* is stained with a specific actin-binding fluorescent ligand—FITC-Phalloidin. Control experiments performed without the FITC-phalloidin showed no staining at comparable exposure times and demonstrated the specificity of this probe. A second student-driven project in BIO471 involved expressing tubulin-mCherry or actin-GFP, cytoskeletal proteins that are fused to a fluorescent reporter protein to determine their distribution within HeLa and HEK293 cells in culture. Finally, smaller student-driven projects in BIO255 utilized the microscope in genetic screens performed by students to better understand the mode of transmission of genes with fluorescent reporters. This new microscope offers ample opportunities for real-time or static imaging at the subcellular level using three fluorescent channels. The present data demonstrates the feasibility of utilizing this tool in laboratory courses with students at various stages in their major course studies.

Michelle Berry
Mzenga Wanyama, Ph.D.
English

Damning Zora: The Literary Muffling of Race in Hurston's Writing

Richard Wright's review of *Their Eyes Were Watching God* grants that Zora Neale Hurston has the ability to write but that the novel "carries no theme, no message, no thought." Many scholars in the past have disagreed with Wright's review by suggesting that Hurston's desire to write about themes other than race is valid. I aim to show that Wright and these other scholars fail to see race as the dominant, undergirding theme in this novel. Thus, my objective in this research is

to find the message Wright could not, and add my voice to efforts that seek to liberate Hurston from being seen as the race-traitor Wright deemed her to be. I assert that Wright wanted to find a message involving the question of race in Hurston's novel but could not because of the foregrounded love story, the meandering narrative, and the vernacular speech patterns used by the characters. To counter Wright's review, I conduct a close reading of *Their Eyes*. I then supplement my work with secondary sources to carve out a more comprehensive understanding of what Hurston achieves in this great novel. My findings suggest that the narrative is a story of love sabotaged by race, especially the impact of slavery. I maintain that Hurston's capacity to write, specifically [using and celebrating](#), the Black vernacular, emphasizes her message and entices her audience to read the narrative more [closely](#).

Fikre Beyene
David Murr, Ph.D.
Physics
Investigation of Magnetospheric Events

The magnetosphere is an active area of research because of its importance in keeping the earth safe from high speed solar radiation. Magnetospheric activity is capable of damaging satellite technology as well as electrical systems, and for these reasons, activity in this region is researched. The aim of this study was to search for a correlation between magnetic events in the bow shock region of the magnetosphere and magnetic events observed on the ground. It has been hypothesized by space physicists that there is a relationship between events identified in these two regions. To test this hypothesis, ground station data was downloaded from remote ground monitoring sites consisting of magnetic field strength, magnetic local time and magnetic latitude, and analyzed through programming written in python. First, the ground data were searched for events during time periods after a satellite identified event had been recorded. Secondly, ground events were identified first and then satellite data were searched for corresponding events. The hypothesis suggested satellite identified events and ground station events would have a strong correlation, however, our results do not agree with this expectation. A correlation ranging from only 9% to 30% was found and thus no significant relationship was found.

Priti Bhowmik
Shana Watters, Ph.D.
Computer Science
An Empirical Study to Determine the Cognitive Status of the Third Person Bengali Pronouns

Reference resolution is a subfield of computational linguistics, an intersection of computer science and linguistics, that is interested in determining what a noun phrase or a pronoun refers to. This empirical study's aim was to determine the cognitive status of the 3rd person Bengali pronouns using the Givenness Hierarchy framework. We coded the cognitive status of 130 referential instances of the 3rd person Bengali pronouns. The coding was performed using the Givenness Hierarchy coding protocol criteria. Our results show that the Bengali 3rd person pronouns' referents are "in focus." Modifications to the coding protocol criteria are proposed to account for instances where the coding protocol was not sufficient to properly classify the referent as "in focus." This is because the Givenness Hierarchy coding protocol is considered to be sufficient but not necessary. It was assumed that modifications would possibly be required in order to determine the correct cognitive status.

Shira Bilinkoff, Devan Bedenbender, Tanner McCarthy, Ann Renner
Nancy Steblay, Ph.D.
Psychology
Structural Lineup Bias in Real Police Lineups

This study assesses bias in police lineups that can put an innocent suspect at risk of false identification. The problem of structural lineup bias is that it allows the eyewitness to identify the suspect without

reliance on recognition memory. We have access to 50 real police lineups from a major U.S. city. The research question is whether these lineups are biased against the suspect. The mock-witness procedure is used to test for bias. Lab participants view each of a set of photo lineups. For each lineup, participants are asked to read the description of the culprit provided by the real eyewitness and then to rank the lineup members based on which is most likely the accused. Our primary measure of lineup bias is the proportion of mock-witnesses who identify the police suspect. If a lineup is fairly constructed, mock-witnesses (who did not see the crime) should identify the suspect at a rate no greater than chance. Chance is equal to a 20% selection rate from these five-person lineups. Data are available currently from 51 participants who rated nine lineups. The average proportion of suspect picks is 26%, significantly above chance, $Z = 2.14$, $p = .04$, $r = .07$, providing evidence of structural bias. The full set of lineups will be analyzed and presented at conference. The complete data set will allow us to assess the relationship between lineup bias and real eyewitness decisions.

Kathryn Block

Benjamin Denkinger, Ph.D.

Psychology

Homophily in Relationships: Do politics and race influence romantic attraction?

The current study builds on the psychological theory of relational homophily, or assortative mating, which had previously been studied mainly in marriage, not dating. Assortative mating is the idea that people are attracted to people who are similar to themselves, and it has been shown in terms of education level, IQ, personality, race, politics, and religion. Participants were recruited through Amazon Mechanical Turk to complete an online survey, which showed them a fictitious online dating profile. The racial identity and political ideology were manipulated between the profiles, so that some participants saw profiles that matches their own characteristics and some saw profiles that did not. Results showed that participants more positively rated profiles which were similar to themselves. Implications of this trend could spread to household makeup and increase racial and political divides in society.

Andrew Boyum, Jacob Kraft

Ben Denkinger, Ph.D.

Psychology

The influence of motivation on attention to temporal feedback

It is hypothesized that when offered a timer as a source of temporal feedback while attempting some task, participants will spend a detrimental amount of time looking at the timer instead of focusing on the task at hand; this effect will be enhanced under conditions of motivation. In this experiment, X participants were given a visual object search task, some with a timer counting down and some with a timer displaying random digits. Half of the participants were informed of the possibility of winning a gift card for their participation to motivate their performance, and half were not informed. Their progress and attention were monitored using the search task's software and an eye-tracking device. It was found that participants spent more time looking at the timer when it displayed actual descending time than when it displayed random digits, and even more time still when they were part of the "motivated" condition. Further, this increase in look time corresponded to a decrease in task performance in those conditions.

Lucinda Bukowski

William Capman, Ph.D.

Biology

*Effects of Host Plant Stress on Flowering in Dodder, *Cuscuta pentagona**

Cuscuta pentagona (fiveangled dodder) is a holoparasitic plant with no roots or leaves that gains all its nutrients from its host plant through the insertion of root-like appendages called haustoria. Past studies done at Augsburg College have shown that some velvetleaf plants (*Abutilon theophrasti*) are resistant to dodder attachment. It was also noticed during these studies that on some host plants the

dodder attaches but flowers much earlier than normal, with little if any vegetative growth. We have not known how to interpret these situations of premature flowering but have suspected they might be responses to limited resources due to poor haustorial connections on partially resistant host plants. We tested the hypothesis that flowering in dodder is a response to reduced resources from the host plant. We defoliated and damaged the vascular systems of velvetleaf host plants to reduce resources available to the dodder. We found that dodder bud clusters were initiated earlier on defoliated host plants, but intrinsic characteristics of the highly variable individual host plants seemed to have the greatest influence on dodder performance on a given host plant in the end.

Hector Camerena

Mark Engebretson, Ph.D.

Space Physics

TCV and ICW: Ultra low frequency waves and the effects on space weather

The Earth's upper atmosphere extends gradually for hundreds of miles into space. At these highest altitudes (the magnetosphere) it consists of an ionized gas, called plasma. Earth's plasma environment is confined and often perturbed by the solar wind, plasma moving out at high speed in all directions from the Sun. By better understanding the effects of large solar wind perturbations on our magnetosphere we could prevent satellite, spacecraft, and aircraft damage. Pressure increases in the solar wind generate waves that carry information along magnetic field lines to Earth's surface at high latitudes, where they can be detected by ground-based magnetometers. Such pressure increases often generate two kinds of waves simultaneously, with very different frequencies: Traveling Convection Vortices (TCVs) and Ion Cyclotron Waves (ICWs). In this study I am attempting to correlate the amplitudes of both kinds of waves to the characteristics of these perturbations. I selected 30 TCV/ICW events from nearly 4 years of high latitude magnetometer observations in Arctic Canada (Cape Dorset) and Antarctica (South Pole Station), and I used data from spacecraft both high in the magnetosphere and in the solar wind to characterize the initial perturbations. A data model using both satellite and ground data was created, tested, and is now running preliminary experiments to determine why these two different waves are occurring together. In particular, I will provide an observational test of a simplified theoretical model that suggests that ICW amplitude is proportional to the magnitude of the perturbation, while the TCV amplitude is proportional to its derivative (time rate of change).

Anika Clark

Kevin Potts, Ph.D., Miles Ott, Ph.D., Pavel Belik, Ph.D.

Biology, Mathematics

The Chimpanzee Social Network: Identifying the Potential Targets of Ebola Vaccination in Wild Chimpanzees

Chimpanzees (*Pan troglodytes*) are endangered, and among the factors most directly threatening future population persistence is the threat of emerging infectious diseases, particularly Ebola. Consequently, preventative action must be taken to ensure that future Ebola epidemics do not decimate chimpanzee populations, as has happened to Western lowland gorillas. In 2014, an Ebola vaccine was developed and shown to be effective in a captive chimpanzee population. The vaccination of large numbers of wild chimpanzees, however, is logistically difficult and would be prohibitively expensive. Because the disease spreads through social contact, targeted vaccination of the most socially central chimpanzees may effectively halt the spread of the disease through a population. Ebola outbreaks are endemic among human populations in Uganda, with the most recent in 2012. Chimpanzee mortality rates from Ebola far exceed those of humans, and have been as high as 98% in outbreaks in Central and West Africa. Uganda's Kibale National Park is home to the largest and most dense community of chimpanzees in the world, at the Ngogo site, in the center of the Park. By using social network analysis, this research aims to determine which chimpanzees from the Ngogo community would be potential "superspreaders" of Ebola—i.e., individuals with the highest numbers of social contacts in the community. Our long-term aim is to examine the feasibility of vaccinating these superspreaders, who, if infected with Ebola, would pose the greatest risk of spreading the disease.

Mathia Colwell, Najma Jama
Ralph Butkowski, Ph.D.
Biology

Blood Clotting Modulator Histidine Rich Glycoprotein Purification

Histidine Rich Glycoprotein (HRG) is a component of plasma where it plays a role in blood clotting, and has been associated with several other biological functions. The initial goal of this project was to evaluate several of the published purification schemes for HRG and to develop methods to improve the existing purification strategy. During these studies we learned about a reagent "HisDetector™" used by molecular biologists to detect recombinant proteins containing many copies of the amino acid histidine. Since HRG has multiple histidines in its amino acid sequence, we decided to test HisDetector binding to HRG. HisDetector proved to bind strongly to HRG and our goals shifted to include further studies of its interaction with HRG. Enzyme immobilized assay (EIA) demonstrated HisDetector reactivity in plasma, and Western blotting revealed that HisDetector reacts specifically with an HRG-size component of plasma. Purified HRG completely inhibits HisDetector reaction, further indicating that the reactivity of HisDetector is due to HRG in plasma. Since these studies demonstrated that HisDetector was ideal for identification of HRG, quantitative EIA and Western blotting were then used to measure the concentration of HRG in plasma and to track progress of its purification. Further research plans aim to study the role of HRG as a regulatory protein involved in blood clotting.

Mary Cornelius
Colin Irvine, Ph.D.
English

Why Do We Have to Read This? Creating a Continuum of Text Complexity for Use in Secondary English Language Arts Classrooms

When implemented in fall 2014, Minnesota will become the 44th state to accept the Common Core State Standards (CCSS), instituting an unprecedented change in English Language Arts classrooms and secondary education, in general: by senior year, the CCSS recommends student reading be split between nonfiction and fiction at a ratio of 70% to 30%, respectively. In this presentation, Mary Cornelius responds to this change and the implication that literary fiction has lost its standing in education and that there is no need or reason for districts, standardized tests, or curriculum to differentiate between literary and non-literary texts when selecting what to teach. Using current research from cognitive narrative theorists, Cornelius highlights fiction's unique complexity and explains what reading fiction does for the brain that reading nonfiction texts alone cannot. She then introduces a three-part system of evaluation developed to help students and teachers alike gauge the relative complexity of fictional and nonfictional texts in a more qualitative and specific way than previous methods. Finally, case study applications illuminate underexplored differences between fictional and nonfictional texts and demonstrate concisely the reaches of cognitive narratology's potential to prompt policy-related discussions about literature.

Amanda DeChaney
Nidanie Henderson-Stull, Ph.D.
Biology

The Sarcoma kinase SH3-SH2-catalytic domain construct is not regulated by Csk in fission yeast

The Sarcoma kinase (c-Src) is an important player in understanding malignancy and tumor development given its observed activity increase in roughly 50% of tumor causing cancers. Our research aims to understand the conformations of the intact Src protein: its inactive, transition, and active states, using *Schizosaccharomyces pombe* fission yeast as assay.

Src is an enzyme whose activity is toxic to fission yeast. When Src is expressed in yeast they die, but if negative regulators such as C-terminal Src kinase (Csk) or a phosphatase such as PTP-PEST is co-expressed with Src in yeast, the yeast live. This assay allows us to examine how changes in the Src protein affect activity and regulation in the cell.

To date most biochemical and structural studies of Src have considered only the SH3-SH2- catalytic

domain (Src Δ U) construct. In order to compare the activity of intact Src (SH4-unique-SH3-SH2-catalytic domain), we expressed the Src Δ U construct in *S. pombe*. As expected, Src Δ U expression caused growth arrest in the fission yeast. However, this inhibition could not be rescued by C-terminal Src kinase (Csk). Interestingly enough, this result is exclusive to the Src Δ U treatment and results with the full-length Src were as expected.

Are there different levels of phosphorylation happening, and if so, why? Could membrane association be necessary for Csk phosphorylation? If chemotherapy drugs are targeted to these protein fragments, shouldn't we understand their behavior better? To explore the mechanism for this phenomenon, we assess: the levels of protein expression, subcellular localization, and protein recognition and phosphorylation by Csk.

Abigail Dickinson

Michael Wentzel, Ph.D.

Chemistry

Activation of C-H Bonds through the Use of Iron Based Organometallic Reactions with Aryl Directing Groups

The activation of C-H bonds was experimented through an organometallic reaction involving green chemistry principles and aryl directing groups. C-H activation by this method utilizes an iron catalyst; with the intention to lead to good product yields with no harmful byproducts. A mixture of N-methylbenzamide, diphenylacetylene, NaOAc, 1,10-phenanthroline, and Fe(OAc)₂ in THF stirred overnight at 100°C will be used in the future to produce significant amount of product.

Nazrawit Dimore

Bernard Walley, Ph.D.

Economics

The Impact of the Recent European Union Crisis on the Franc Zone Countries

The global financial crisis of 2008-2009 started in the U.S and spread to the rest of the world in 2008. In Europe, the crisis started in the spring of 2010, when it became clear to financial market participants that Greece might not be able to honor its obligations to its creditors. As the Greek government negotiated the terms of a possible bailout, financial markets begun to worry about the fiscal health of the other smaller members of the EU such as Spain and Portugal. The expectation that the crisis may spread to other EU member countries triggered a slowdown in the real sector in several EU countries. This study examined the exposure and reaction of the franc zone countries to the recent financial crisis in the European countries. The empirical approach used had three key elements: first, we computed the unexpected real GDP growth for each franc zone country to assess the heterogeneity of the impact of the crisis on franc zone countries. This exercise showed that the franc zone countries responded differently to the crisis. Second, to understand why the responses differed, we examined the various ways in which the franc zone countries were exposed to the European crisis. In particular, we discussed both trade and financial channels. The evidence appear to show that factors such as balance of payments/GDP, current account/GDP and remittance/GDP were the most important channels through which the EU crisis affected the franc zone countries. Finally, we implemented a structural break test proposed by Bai and Perron to assess whether the shock had a temporary or permanent effect on the franc zone countries. The test results showed that there was no break in real GDP growth during the peak of the crisis. This means that the shock to franc zone countries is temporary.

Jasmine Eltawely

Matthew Beckman, Ph.D.

Biology

Studies of the Role of Hedgehog Signaling in Cyclopean Eye Development: Cloning and Characterization of the Daphnia magna Patched Gene

Holoprosencephaly (HPE) represents a spectrum of disorders in humans ranging from cleft palate to the extreme of a single cyclopic eye, which are a result of a malformation of the forebrain. Though there have been many advances in understanding HPE we still do not understand its variability in phenotypes, in relation to the mechanisms and genes involved in the developments of these disorders. *Daphnia magna* is a cyclopic organism that can be used to study the developmental mechanism of cyclopia and the genes involved in this process. My research includes cloning the patched gene and using the method of in situ hybridization to study the spatial and temporal expression of this gene. I have also conducted a pharmacology experiment using cyclopamine, a Hedgehog inhibitor to study the role of Smoothened in the *Daphnia magna* development. Patched and Smoothened together form the receptor for Sonic Hedgehog which has been found to be involved in invertebrate and vertebrate development. I have run experiments to pinpoint the expression of patched and have gotten some preliminary data, but through the pharmacology study using cyclopamine I have found that the inhibition of Hedgehog signaling has effected the consolidation of the cyclopic eye in *Daphnia magna*. I have successfully cloned a segment of the patched gene in *Daphnia magna* and will further the research by examining the expression of the gene at different stages of embryonic development as well as using the pharmacology experiments to understand the role of Hedgehog signaling in *Daphnia magna*.

Joseph Farley

Stuart M. Anderson, Ph.D.

Physics

Reflectance Apparatus for Local Characterization of Thin Films on Liquid Surfaces

The goal of this two-month project was to design and build an apparatus for optically probing thin films on a liquid surface to provide thickness and composition information. The final configuration used broadband light from an incandescent filament imaged onto the liquid surface. Light reflected from this image was re-imaged onto the entrance slit of a spectrometer to provide spectral analysis of the light reflected from a small area (about 200 x 50 microns) of the film in near real-time. Spectra indicative of film thickness variations associated with spreading and movement of oil films on water surface were obtained. Future work will focus on adapting the apparatus for study of controlled films in a Langmuir trough environment and adding the capability of extracting information on absorption within the film.

Briana Felton

Anthony Clapp, Ph.D.

Exercise Science

The Effect of a Self-myofascial Release Intervention on Functional Movement in Healthy Adult Males

Functional Movement Screening (FMS) is a common procedure for ranking movement patterns. Fascia is responsible for supporting the musculoskeletal system and is frequently interrelated with FMS performance. Overuse or trauma may cause adhesions within the fascia, creating inefficient movement patterns. Self-myofascial release (SMR), via foam-rolling, is a method of breaking up fascial adhesions. Optimal programs for improving FMS evaluations have yet to be established. The purpose of this study was to determine the effect of a six week SMR program on functional movement. This study included 18 healthy adult males who received a foam roller, participated in a 6-week self-directed foam rolling program, and completed a FMS pre-test and post-test evaluation. Changes in classification from the pre-test to the post-test for each of the FMS measures were compared using Wilcoxon signed-rank tests. The average composite score increased from 13.6 to 15.7 from pre to post-test out of 21. Significant improvements in classification were observed from the pre-test to post-test for several of the individual FMS tests. However, not all individual tests showed significant improvements. This study revealed that a 6-week SMR protocol is effective in increasing functional movement in middle-aged, active male subjects in some functional areas, but not others.

Kayla Fuechtmann
Michael Wentzel, Ph.D.
Chemistry

The Protection and Methylation Using a Bulky-Protecting Group for Amine Synthesis

Amines play a vital role in the drug industry and therefore its importance of synthesis can be used for greater implications. Tri-tert-butoxysilane chloride (TBOS-Cl) is an effective protecting group due to its ability to be easily purified through a silica plug and its steric bulky-size that influences chemoselectivity. Furthermore, by successfully finding the best conditions to attach the protective group to benzylamine, it allowed for further synthesis of amines.

David Gersten
Ann Impullitti, Ph.D.
Biology

*The effect of latent of *Cadophora gregata* on soybean physiology and productivity*

Brown stem rot (BSR) is caused by *Cadophora gregata*, and is known to negatively affect soybean by reducing profits. We investigated the physiological effects of types A and B of *C. gregata* during both latent and pathogenic infection to determine how gas exchange, fluorescence, and leaf area are potentially modified. Susceptible and resistant varieties of soybean were used in trials in the plant lab, the growth chamber, and the field. During the pathogenic phase, in the susceptible variety, the leaf area of the control and plants inoculate with type B were 40-41% greater than plants inoculated with the type A. The rate of photosynthesis was 84% higher in plants inoculated with type A than the non-inoculated plants. In the resistant variety, conductance was 11-22% higher when inoculated with type A, compared to the non-inoculated plants and type B, respectively. Gas exchange effects occurred during the transition from latent to pathogenic infection. Our results indicate that no physiological effects occur during latent infection of the plant. The death of leaves caused by type A of *C. gregata* may facilitate a higher gas exchange rate of leaves not yet affected by the pathogen. The susceptible variety may have resistance to type B of *C. gregata*.

Anil Geharu
Jennifer Bankers-Fulbright, Ph.D.
Biology

Initial characterization of an anti-bacterial protein found in human airway surface fluid

Human airway surface fluid (ASF) is a fluid that coats epithelial cells in the lungs. The major role of ASF is to prevent bacterial colonization in the lungs due to the presence of antibacterial molecules. Patients with the genetic disorder cystic fibrosis (CF) have very thick and viscous ASF, which causes their lungs to be prone to bacterial infections, most commonly infections due to the bacterium, *Pseudomonas aeruginosa*. In this study, the effect that wild-type ASF and boiled wild-type ASF has on the flagellar motility of the PAO1 and PA14 strains of *Pseudomonas aeruginosa* was determined by using video analysis. Wild-type ASF inhibited the speeds of both PAO1 and PA14 and boiled wild-type ASF failed to inhibit the speeds of both strains, leading us to predict that this inhibition of *Pseudomonas aeruginosa* is due to an inhibitory protein. The upper limit to the size of this inhibitory protein found in wild-type ASF was also identified as being less than 250 kDa by using fractioned wild-type ASF.

Malina Gore
Diane Pike, Ph.D.
Sociology

Restaurant Observation: Server Attitudes and Seating Patterns

Previous research has shown that certain groups have been found to give less appealing tips than others, but little research has been done to assess the effects of these beliefs in where guests are seated in the

restaurant. A systematic observational study was conducted among five casual dining restaurants. Over eight shifts, data was collected on 175 tables to describe seating patterns among restaurants. Complementary confidential surveys and interviews were conducted with servers and restaurant managers regarding the perception of seating patterns in the restaurant. The average party consisted of two to three white, middle aged males or females. There were no significant findings between the variables of perceived age, race, or gender and the area of the restaurant that the guests were placed.

Michelle Grafelman

Matthew Beckman, Ph.D.

Biology

Characterization and Staging of Daphnia magna Eye Development

At the earliest appearance of eye structures in *Daphnia magna* embryos, two distinct eye spots are present, which gradually grow and fuse together, leaving adult daphnids with a cyclopean eye. Though the growth of the individual ommatidia making up the compound eye has been studied and used to describe this apparent eye fusion, a visual timeline of eye development and a means for determining the progression of an embryo through its eye development have not been established (Flaster & Macagno, 1984). Therefore, in the current study, a timeline and staging system were developed in order to better characterize this eye maturation process. Five distinct stages of eye development were identified and described. To define the progression of embryos through these eye development stages, the determined stages of the embryos were compared to the overall developmental stages, as defined by Mittmann, et al. (2014), as well as to embryo body lengths and multiple eye separation measurements. These data suggest that the *D. magna* eye spots grow larger and closer together throughout development to produce the characteristic cyclopic eye.

Cory Haight-Nali

Pavel Belik, Ph.D.

Mathematics

The Effects of Rotational Symmetry on the Performance of Laguerre's Method

Laguerre's Method is an iterative method for finding roots of polynomials that is intriguing for exhibiting a high rate of convergence. Furthermore, in many cases, it appears to work with any (real or complex) initial approximation of a root. After investigating the complex set of initial approximations to a root that lead to convergence, we found that rotational symmetry negatively impacts the size of these sets, and that breaking this rotational symmetry allows for a far greater range of initial guesses that eventually converge to a root. We present computational results that demonstrate this phenomenon and theoretical results that provide good estimates of the size of the region in which convergence occurs.

Ellyn Holiday-Kaufmann

Anthony Clapp, Ph.D.

Exercise Science

Effects of a 6-week regiment weight training program on body composition in pre and post- menopausal women

Regiment weight training (RWT) consisting of low volume weight training 2-4x weekly, exhibits immense health benefits for women particularly as they approach the menopausal development stage where the risk of gaining body fat and experiencing altered body fat distribution increases. Moreover, RWT is correlated with chronic elevation in daily energy expenditure and fat oxidation; further implying that RWT is an optimal method in managing body composition. PURPOSE: The purpose of this study was to examine changes in body fat percentage upon implementing a 6-week RWT program for pre-menopausal and post-menopausal women. METHODS: Four pre-menopausal women (Age=24.75 \pm 2.25 yrs, Body Fat=21.63 \pm 8.77 %) and four post-menopausal women (Age=56.50 \pm 5.5 yrs, Body Fat=25.95 \pm 1.65 %) executed a RWT program consisting of four multi-joint lifts (bench, 3 sets of 8 reps; overhead press, 3x8;

squat 3x8; deadlift, 3x5) 2x a week for 6 weeks. All participants completed an initial strength assessment to establish an appropriate resistance level for each lift. The participants' body composition was obtained with BodPod air displacement plethysmography prior to and post the 6-week program. Additionally, all participants completed a qualitative questionnaire at the end of each week to provide feedback regarding: level of soreness, daily energy level, and overall satisfaction with life. RESULTS: Three of the four post-menopausal women withdrew from the study due to family emergencies. Of the five remaining participants, three participants showed a decrease in body fat averaging -1.7%. The mean body fat percentage for the five participants who completed the RWT program decreased from $22.8 \pm 7.6\%$ to $22.2 \pm 7.6\%$ ($p > 0.05$). Where as, the data collected from qualitative questionnaire concluded an increase in overall satisfaction with life for all participants. CONCLUSION: Despite that the RWT study resulted in an average loss of body fat percentage and an overall increase in sense of satisfaction, there were no statistically significant improvements to be reported.

Brent Horwart
Phillip Adamo, Ph.D.
History
Augsburg and the Environment

Augsburg College is one of the Twin Cities' many private colleges, but its history with the regard to the environment stands out among them as being one of the longest and most ideologically conflicted. Starting with a rural feel on the outskirts of a much smaller Minneapolis than we know today, Augsburg Seminary gathered its own water, cultivated the earth to feed its animals, and harvested wood to heat the campus. This labor intensive, yet sustainable lifestyle was abandoned as Minneapolis became the "gateway to the Midwest" and slowly enveloped the college in a grid of interlocking streets, utilities, pollution and cramped living conditions. Past historians have labeled Augsburg's journey to understand its environmental impact with works like "Fjord to Freeway" and more recently "Rural to Urban." Such labels capture the dynamic shifts that occurred at the college over its first century and a half. My study builds on these earlier works and seeks to understand Augsburg's evolving environmental consciousness.

Mandy Isaacson
Jill Dawe, DMA.
Music
The Viola Concerto in Middle to Late 18th-Century Germany

The violin and cello have a number of 18th-century concerti by well-known composers such as Mozart and Haydn, but for a number of interesting historical reasons, viola repertoire from this era is generally thought to lack musical depth and variety. This project gathered information about, and made archival recordings of, seven relatively unknown 18th-century German viola concerti by the lesser-known composers Joseph Schmitt, Josef Reicha, Anton Stamitz, Johann Gottfried Arnold, Johann Stamitz, and Ernst Wilhelm Wolf. Performing and recording the pieces, and comparing them to standards set by the American String Teacher's Association revealed that although these pieces are not standard repertoire, they contain musical and pedagogical qualities that may deserve wider recognition.

Andrew Jewell
David Crowe, Ph.D.
Biology
Modeling NMDAR-dependent action potential coincidences using a spiking neural network

Background: Spiking neural networks can be modeled using a set of differential equations. Using the model put forth by Xiao-Jing Wang and Jacinto Pereira in their 2014 paper, I assembled a Leaky-Integrate and Fire model, approximating the function of a fully connected network of 1000 neurons in Matlab programming language. This model will be used to test hypotheses related to schizophrenia. Our laboratory has recently obtained data that systemic injection of the NMDA receptor antagonist

phencyclidine decreases the number of action potential coincidences in the prefrontal cortex. The goal of the current research is to test this behavior in the model and to quantify the parameters that give rise to this effect. Results: Assembling the model was a challenge due to the limited scope of the initial parameters that the model is functional for. I tested the model for varying amounts of randomized external input to find what amounts would cause the network to replicate biologically plausible neural activity. In addition to these tests, I performed voltage clamp-style experiments on the network to determine the value of various other parameters such as the external magnesium ion concentration or the differential equation's modeling time step (the accuracy to which each millisecond is modelled). The model is currently close to the point where I will be able to mimic NMDA receptor blockade by decreasing the NMDA conductivity variable in the model neurons.

Demond Johnson, Sean Adams, Austin Conery
Nancy Steblay, Ph.D.
Psychology
Assessment of Structural Lineup Bias in Real Police Lineups

A police lineup may be biased against the suspect, thereby putting an innocent suspect at risk of false identification. The problem of structural lineup bias is that it allows the eyewitness to identify the suspect without reliance on recognition memory. This on-going laboratory study tests 120 real photo lineups from violent crime cases in four U.S. cities. The research question is whether the lineups are biased against the suspect. The mock-witness procedure is used to test the lineups. 50 lab participants view each of 20 six-person lineups. For each lineup, participants are asked to read the description of the culprit provided by the real eyewitness and then to decide which lineup member is most likely the accused. Our measure of lineup bias is the proportion of mock-witnesses who identify the police suspect. If a lineup is fairly constructed, the mock-witnesses (who did not see the crime) should identify the suspect at a rate no greater than chance. Chance is equal to a 17% selection rate from a six-person lineup. Data are available for the first 19 of the 120 lineups. The lineups produced a suspect identification rate of 16%, not significantly different from chance, $X^2(1) = .09$, $p = .76$, $h = .03$. Therefore, this first set of 20 lineups shows no structural bias. We are currently testing the second set of 20 lineups. The complete data set will allow us to assess the relationship between lineup bias and real eyewitness decisions.

Sean Jordan, Haeley Hendrickson, Jacob Kraft
Nancy Steblay, Ph.D.
Psychology
Eye-Tracking the Effect of the Appearance Change Instruction on Attention and Lineup Identification Accuracy

The Appearance Change Instruction (ACI) is used by police departments nationally as a part of standard lineup procedure recommended by the U.S. Department of Justice. The ACI cautions eyewitnesses that "individuals depicted in lineup photos may not appear exactly as they did on the date of the incident because features such as head and facial hair are subject to change." The intended effect of the ACI is to increase the accuracy of eyewitness identification decisions. We tested this assumption in a laboratory study. Participants watched a short video of a crime and then attempted to identify the guilty perpetrator from a six-person photo lineup. The research used a 2 X 3 between-subjects factorial design, with participants randomly assigned to six conditions. Half of the participants received the ACI prior to viewing the lineup and half did not. Participants viewed one of three versions of a lineup: the culprit was present with no appearance change, the culprit was present with an altered appearance, or an innocent suspect replaced the culprit. The participants' eye movements and fixations were monitored during the lineup presentation. It is hypothesized that the ACI will increase correct identification decisions. It is also expected that the ACI will produce more eye fixations on stable facial features, linking witness visual attention with identification decision. The study is currently ongoing. Full results will be presented at the conference.

Andrew Julkowski
Michael Wentzel, Ph.D.
Chemistry

Synthesis of Amides from Anilines and Nitriles Using a Catalyzed Continuous Flow Reactor

Amides were synthesized from anilines and nitriles using a TiO₂ catalyzed continuous flow reactor. Using a flow reactor, temperature, flow rate, and stoichiometry were varied to try to produce higher isolated percent yields of amides. By varying optimal reaction conditions and generating a successful isolation method of the amide, the highest isolated yield of amide was produced at 200°C, with a 0.25 ml/min flow rate, using THF and water at a 1:8:1:4 (amine: nitrile: water: THF) molar ratio.

Roman Khadka
Jennifer Bankers-Fulbright, Ph.D.
Biology

Calu-3 secretions failed to inhibit PAO1 biofilm formation

Patients with the genetic disorder cystic fibrosis (CF) have very thick and viscous airway surface fluid (ASF), which causes their lungs to be prone to bacterial infections. *P. aeruginosa* is an opportunistic pathogen that colonizes CF lungs and adapts within the unique CF environment, which eventually contributes to mortality in CF patients. *P. aeruginosa* efficiently capitalizes on the altered ASF conditions in CF lung to form impenetrable biofilms which enhances their virulence and antibiotic resistance. Because *P. aeruginosa* biofilms don't form in non-CF lungs, we predict that ASF from healthy individuals may contain one or more functional agents that directly inhibit *P. aeruginosa* biofilm formation that are missing from ASF in CF patients. In order to test this hypothesis, we examined the effects of ASF from a non-CF human lung epithelium cell line (Calu-3) and test on its ability to inhibit *P. aeruginosa* PAO1 biofilm formation. According to our findings, the human Calu-3 WT secretions did not inhibit PAO1 biofilm formation.

Tatiana Kindy
Lois Eliason, Ph.D.
Art History

The Illusion of Naturalism: Animating the Reliquary of St. Theobald

This research focuses on the bust-reliquary of St. Theobald, which was repatriated in 2012 to Alba Cathedral in Piedmont, Italy. The reliquary was created in Alba to hold the cranial remains of Theobald Roggeri roughly between 1429 and 1450. It is made of gilded, chiseled, and embossed silver with a simple paste jewel. A close aesthetic and historic analysis of the St. Theobald reliquary will be the vehicle in discussing the bust-reliquary type and how it stimulates devotion through animated facial expressions. Through comparisons with other bust-reliquaries, the possible narrative importance of the St. Theobald reliquary will become clear. By determining the narrative importance of reliquaries to their respective communities, especially in regard to St. Theobald, the similarities and differences between medieval and modern Furta Sacra, "holy theft," will be explored and recommendations for protecting these artifacts will be given.

Douglas Kotchen
Stella Hofrenning, Ph.D.
Economics

Analysis of the Determinants of Income Inequality and the Impact on Income Inequality

In December 2014, President Barak Obama gave a speech on what he considered to be the defining challenge of our time, making sure the economy works for every American. Within the developed world, the United States possesses one of the highest Gini Coefficient. The Gini coefficient is a measure of statistical dispersion intended to represent the income distribution of a nation's residents, and is the most

commonly used measure of inequality. In addition, wages in the U.S. have remained relatively stagnant for a vast majority of the U.S. population. According to the Census Bureau, the bottom 3 quintiles of income earners have seen no real wage increase over the last several decades. This research will analyze the Gini coefficient of the U.S. against multiple variables to better understand what factors influence income inequality and what their impact is on income distributions.

Taylor Kuramoto

Suzane Lenhart, Ph.D., Christina Lanzas, Ph.D., Shi Chen, Ph.D.

Mathematics

An epidemiological model of bovine respiratory syncytial virus infection dynamics

Bovine Respiratory Syncytial Virus (BRSV) is one etiological agent in the larger Bovine Respiratory Disease (BRD) Complex that causes damage to the respiratory tract, facilitates bacterial growth and compromises the immune system. Negative effects of BRSV include costs stemming from death, reduced performance, poor growth and the administration of vaccines and treatments. Understanding the effect of cattle contact networks on the transmission of the pathogens causing BRD will help reduce unnecessary treatments, costs and public health concerns of growing drug-resistance. A stochastic agent-based epidemiological model has been developed to predict the outcome of infection under different circumstances. The model simulates the spread of BRSV using a spatially implicit contact network generated by a real time location system and visualized in NetLogo. It takes a top down approach to understanding the complex relations between the key transmission components. The underlying theory relies on basic Susceptible-Infected-Recovered (SIR) compartmental principles. Simulations were completed under varying initial conditions and compared susceptibility, incidence proportion, maximum prevalence and cumulative centrality to see how disease dynamics and emergence differ under given initial conditions. Qualitative observations from the model interface and preliminary quantitative analysis indicate that cows' social behavior and interactions affect how the virus spreads through a population. The interaction between the network structure and the disease status drives the disease dynamics. These findings indicate that decreasing the number of cows in a herd will not decrease the transmission rate but if the network density and sociality of the cows can be controlled so can the transmission.

Benjamin Kurtenbach

Sarah Combellick-Bidney, Ph.D., Dallas Liddle, Ph.D.

Political Science

The Fallout of 30-S: Ecuador's Police Revolt

The police uprising that occurred in Ecuador on September 30, 2010, known to Ecuadorians as simply 30-S, was a significant event in the history of the country and particularly Rafael Correa's presidency. The good-left-bad-left framework of dividing the left leaning governments in Latin America has always seen President Correa placed on the "bad" left or radical side. An in-depth look at Correa's government in particular, rather than all "bad" left governments, is warranted, especially following the events of 30-S. The Correa administration confronts complex and unique challenges from an opposition that continues to be alienated. Among this opposition are: traditional political opponents, U.S. interests, social movements, and the media. The events of 30-S are called by some a coup attempt, while others have accused it of being a false flag operation by the government. Correa's relationship with these opponents from 30-S onwards shows the increased polarization between the government and its opponents, as well as providing insight regarding the situation of the Correa administration in Ecuador without attempting to adhere to a binary categorization model.

Jessica Linck

Stella Hofrenning, Ph.D.

Economics

The Achievement Gap

The achievement gap that exists in education is an important topic in today's world. The achievement gap refers to the disparity in academic performance that occurs between groups of students. There are many factors that can account for this disparity such as race, income and gender. Many researchers use data from National Educational Longitudinal Study (1988) to study variables that have a positive or negative impact on the achievement gap. Several important factors in improving achievement have been found to be parental involvement, socioeconomic status, and experienced teachers. Ford (1998), found a positive relationship between parental involvement and test scores in a sample of Virginia schools. Bowen and Jung-Sook (2014), found that students living in poverty had a lower test score compared to their counterparts. Jeynes (2014) found that children living in married households have a strong correlation with academic achievement while race did not. Also, Martin and Dowson (2014) found that students perform better on standardized tests when teachers are actively involved and have high expectations for students. The main purpose of my research is to determine the factors that influence test scores in Minnesota using regression analysis. The dependent variable for my analysis is standardized test scores for high school students. Explanatory variables used in the analysis include race, free and reduced price lunch, school location, gender, and teacher involvement. This research is important because understanding the factors that influence the achievement gap can lead to decisive solutions to closing the gap. In the long run education is of maximum importance for economic growth. So, narrowing the achievement gap is an important public policy goal.

Oscar Martinez-Armenta

Katrin Karbstein, Ph.D.

Biology

Assessing the effect of bypassing two quality control checkpoints during ribosome maturation on translation fidelity.

Quality control mechanisms minimize errors during the assembly of functional ribosomes. However, it is unclear if defects during ribosome assembly result in errors during translation. Here we have used a dual luciferase assay to test for fidelity in two bypassed quality controls involving assembly factors Fap7 and Ltv1.

Robert McDonnell

Matthew Beckman, Ph.D.

Biology

The Role of a D2-Like Agonist in Force Production of Daphnia magna

The animal *Daphnia magna*, commonly referred to as the water flea, and *D. pulex* have been utilized in studying toxicology and has been studied with respect to its locomotor activity under unconstrained conditions, but limited research has been done on *D. magna* with a focus on the effect dopaminergic drugs have on force production. Animals were filmed with two orthogonal cameras one focused on the displacement of a plastic broom fiber on which the specimen was mounted, and the other focused on the animal itself. The animal was filmed for 15 second at two minute intervals over a period of 6 minutes. The animal was immersed for an hour at several concentrations of the dopaminergic drug A68930. The distribution of forces produced by the animal was affected by A68930. The use of a force transducer has been extremely effective way of measuring the force applied to the fiber, and studying the effects of the drug in regards to force production of a tethered *Daphnia magna* specimen.

Aisha Mohamed

David Crowe, Ph.D.

Biology

The Role of NMDA Receptors in Neural Communication

Schizophrenia is a mental illness characterized by disordered thought; however the causes of this disorder are largely unknown. It is thought that the underlying cause of schizophrenia is a disruption in

normal neural connectivity. There are two main hypotheses that try to explain this disruption: the dopamine hypothesis and the glutamate receptor or N-methyl-D-aspartate (NMDA) hypothesis. We explore the second hypothesis. In an animal model of schizophrenia, we were able to replicate specific cognitive deficits seen in schizophrenics by administering the NMDA receptor antagonist phencyclidine (PCP). We then recorded neural activity in the presence and absence of PCP. If schizophrenia is characterized by a disconnection between neurons due to deficits in NMDA receptor activity, we predicted that we would observe less synchronous neural activity between pairs of neurons. We compared the timing of action potentials between neural pairs, and found that, in general, PCP significantly disrupts the connection between cells.

Cameron Olson

Mark Engebretson, Ph.D. Jennifer Posch, Ph.D.

Physics

Low-harmonic magnetosonic waves observed by the Van Allen Probes

Purely compressional electromagnetic wave events were identified from electric and magnetic field data from instruments on the Van Allen Probes spacecraft orbiting Earth inside its radiation belt during the spacecraft's first full procession through all local times (October 1, 2012 through July 13, 2014). Consistent with other studies, wave occurrence peaked sharply around the magnetic equator and occurred both inside and outside of the plasmapause. Waves occurred at all local times but were more common from noon to dusk, and often occurred within three hours after substorm injections. Most recent studies of harmonic waves have used instruments restricted to higher frequencies, while harmonics identified in this study were found at lower frequencies. Comparisons with higher frequency data indicated these low-harmonic waves sometimes occurred independently of higher-harmonic waves, demonstrating the importance of including this population of waves in further studies of radiation belt dynamics.

Awale Osman

Adriane Brown, Ph.D.

Communication Studies

The institutionalization of Women's Studies

Women's studies is an integral department in the American higher education community. The aim of this study is to understand the institutionalization of women's studies in the academic community, track its growth in the last several decades, trace the emergence of gender and masculinity studies and engage with discourses about the future of this discipline. My research examines existing literature, mostly secondary sources, to glean answers to the above mentioned questions. The results show that the establishment of women's studies as a discipline continues to evolve and face myriad challenges at diverse higher education institutions (two-year, four-year and graduate school). Some programs have transitioned into gender and/or masculinity studies; others were downsized to certificates and smaller programs rather than full departments. Despite these challenges, there are still over 700 women's studies programs in colleges and universities around the world. Additionally, practitioners of women's studies continue to conduct research and publish prolifically.

Melissa Pascoe

Melissa Hensley, Ph.D.

Social Work

Rule 25 Assessment and Adult Men

When looking at the epidemiology of substance abuse, adult men experience higher rates of substance abuse than adult women (Shead M.SC. & Hodgins, PhD, 2006). Proper screening for substance abuse can help determine a diagnoses and course of treatment from those suffering from a substance abuse disorder. Overall, men present very different behaviors and symptoms of substance abuse than women. Substance abuse assessment tools vary from state-to-state. In Minnesota, the Rule 25 Substance Abuse

Assessment tool is used. The purpose of the Rule 25 is to give a preliminary diagnosis as per the DSM IV-TR and help an individual secure funding for their treatment (Substance Abuse Counselor interview). But does the Rule 25 do an accurate job of screening adult men? Through in-depth interviews and reviewing current literature, I analyzed interview notes with the current literature on effective substance abuse assessments. It was revealed that the Rule 25 does not account for some of the common ways substance abuse manifests in adult men, thus potentially compromising the quality of diagnoses and treatment the client may need.

Weixin Peng
Stella Hofrenning, Ph.D.
Economics

An Analysis of Community College Transfer Students Completion of a 4-Year Degree

From the mid-60s to early 2000s, enrollment in community colleges had been increasing at a rate of 5% annually compared to 2.1% for four year institutions. Recent reports from the National Center for Education Statistics and the National Student Clearinghouse Research Center for 2011 and 2012 finds decline in enrollments for community colleges. The lower enrollment figures could be attributed to a decreased number of high school graduates and fewer adults who can afford additional job training. Also, recent tuition increases may have contributed to fewer students seeing community colleges as a good option (Community College Review). The role of community colleges is to prepare students for “transfer” study at four-year colleges. Over one-third of students who ever enroll in community colleges later attend a four-year college (Adelman 2004). Much research has examined transfer graduation rates relative to “native” students, in other words, students who began their education at a four year college. Hillmer (1997) and Lee, Mackie-Lewis and Marks (1993) found that the graduate rates for transfer students and native students are similar. However, Nutting (2004) and Sandy, Gonzalez and Hilmer (2005) find that transfer students are significantly less like to complete a 4-year college degree than native students. My research will compare whether a student completed a bachelor’s degree or not, for students who transferred to Augsburg College with students who began their degrees at Augsburg College. A logit regression is used to calculate probabilities. Several explanatory variables such as race, gender, student scores on ACT exams, grades and parent education are included. This research is important because it has implications for policies directed to increase the role of two-year colleges as a way to increase the number of students graduating from four year colleges.

Susanna Petaisto
Henry Yoon, Ph.D.
Biopsychology

Longitudinal Association between Reduced P3 Brain Amplitude and ADHD Comorbidity

Previous cross-sectional research from the Minnesota Twin Family Study (MTFS) indicates that significant reduction in the amplitude component of the P300 (or P3) event-related potential waveform can effectively index youth at risk for externalizing disorders. Specifically, reduced P3 amplitude identified 11-year-old subjects with Attention-Deficit Hyperactivity Disorder (ADHD) combined with Oppositional Defiant Disorder (ODD) and/or Conduct Disorder (CD), i.e., “ADHD-comorbid”, but not in those diagnosed with ADHD alone (i.e., “ADHD-pure”). This suggests that the ADHD-comorbid group reflects a particularly severe variant of ADHD associated with a spectrum of disorders characterized by disinhibition. In the current study, we propose to investigate these associations longitudinally using a community-based sample of uniformed-age participants who were previously assessed as part of the MTFS. Diagnostic and EEG data will be analyzed from assessments made at ages 11, 14, 17, 20, and 24. P3 data were captured using the visual rotated heads oddball task, and this data will be modeled using growth curves to reflect P3 amplitude trajectories associated with three groups based on diagnostic status at age 11: 1) ADHD-pure, 2) ADHD-comorbid, or 3) Controls (no ADHD, ODD, and CD). Based on previous work, we hypothesize that the trajectories associated with the ADHD-comorbid group will continue to be significantly reduced compared to Controls over the approximate 13-year assessment span. Overall, it is anticipated that this investigation will further support the notion that P3 amplitude reduction is a

developmentally-stable index that taps into a neurobiological substrate associated with disinhibitory disorders.

Jens Pinther
Robert Cowgill, Ph.D.
English/Theatre

LGBT Stand-Up Comics: The Contact Zone of Comedic Performance

This project analyzes autoethnographic texts—engagements with the dominant culture’s representations of a marginalized culture—performed by LGBT stand-up comedians and other comics. The article argues that “autoethnography” is a term that has been stretched out and expanded too far, and proposes an alternative word to consider instead of “autoethnography” for cases that do not deal specifically with ethnic marginalization. Through humor, LGBT comics have an opportunity to criticize societal claims and stereotypes using the unique power dynamics of stand-up comedy in a way that would not normally be possible in other contexts. Additionally, this article draws distinctions among lesbian, gay, bisexual, and transgender autoethnographies, underscoring the idea that not every part of the LGBT acronym should be considered identical when considering techniques of performance.

Boo Segersin
Darcey Engen
Theatre

Professional Theater in Rural Minnesota

This summer I was able to work with a unique theater company, Sod House Theater. Each summer, Sod House takes a group of highly trained and professional actors to multiple communities in rural Minnesota where they work with local talent to create a site-specific production. In addition to performing, Sod House also holds theater classes for children, performance-based memory workshops for people in senior living, as well as providing workshops in acting and directing for people of all ages. Last summer we had the opportunity to visit Crookston, Blue Earth, and Lake Benton where we put on a revised version of Henrik Ibsen's *Peer Gynt*. As a student of performing arts, I was able to see the intricacy of running one's own theater company, get a glimpse into the life of many professional working actors, and learn more about how to create and teach art with people of any age group.

Raesean Sneed
Shahryar Kianian, Ph.D.
Biology

Testing Wheat Alloplasmic Lines For Genetic Resistance Against a Variety of Wheat Leaf Rusts

A key feature of eukaryotic evolution is the endosymbiotic relationship between certain cytoplasmic organelles (i.e. mitochondria and chloroplasts) and the nucleus. These subcellular structures possess a tightly coordinated communication system that regulate gene expression. This system can be disrupted by substituting the cytoplasmic organelles of a domesticated wheat line with identical structures from wild type relative, forming an alloplasmic line. This formation can yield negative phenotypes (male sterility, lower seed yield) and positive phenotypes (improved seed yield, improved stress tolerance). Pilot studies suggest that some alloplasmic lines display improved resistance against a variety of leaf and stem rusts. This study aims to identify particular alloplasmic lines with improved resistance against a group of domestic leaf rusts via screening. The purity of the hybrid lines were verified using high-density 90,000 single nucleotide polymorphism genotyping array. Our results suggest that certain alloplasmic lines exhibit improved genetic resistance against the selected leaf rust races.

Samantha Swanson, Caroline Wochnick
Mary Lanzerotti, Ph.D.
Physics

Topological Properties of Ripple Carry Adders for Chip Designs

This poster presents topological properties and connectivity of three ripple-carry adders. The three adders are a full adder cell (1-bit), a 2-bit ripple-carry adder, and a 3-bit ripple-carry adder. The topological properties are extracted from these adders, where the genus is the key interest of this study. This poster also presents the method by which the properties are extracted, any patterns or other interesting information that has been noticed, and conclusions that can be drawn from the data.

Zachary Swingen
Michael Wentzel, Ph.D.
Chemistry

Modification and Green Synthesis of Sustainable Tri-block Copolymers

The importance of green polymer synthesis and sustainable polymers is the focus in a new experiment developed as a guided inquiry polymer lab for undergraduate organic chemistry courses at all types of institutions. The lab highlights the fact that various monomeric incorporation of L-lactide and δ -dodecalactone are related to the physical and mechanical properties a polymer displays. This experiment not only introduces students to the fundamentals of polymer chemistry, but also instills quantitative data analysis techniques through analysis of ^1H NMR spectrums of the synthesized polymer to calculate the composition and molecular weight of the product.

Alicia Tate
Nidanie Henderson-Stull, Ph.D.
Biology

The Expression and Purification of Cellular Sarcoma Kinase from Fission Yeast

The cellular Sarcoma (c-Src) protein kinase has important roles in the life cycle of many cells in the human body, including cell growth and movement. If the proper feedback, either negative or positive, is not received to keep the enzyme regulated, oncogenic behavior is observed. Understanding the structure of Src protein could lead to better treatment options for patients with many different cancers because Src has a critical role in metastasis. Understanding the intact protein could lead to a better understanding of how improperly regulated Src causes cancer and improve medicines. I will discuss our efforts to purify amounts of Src from *Schizosaccharomyces pombe* (S. Pombe).

Tommy Teigen
Anthony Clapp, Ph.D.
Exercise Science

Grip, Pinch, and Grab Strength Measure in DIII Wrestlers Following Six Weeks of Hand and Wrestling Training

Grappling oriented sports such as Wrestling, Judo, and Jiu-Jitsu rely heavily on grabbing, holding and applying submissions to an opponent. Due to the nature of these sports and their reliance on holds, attaining powerful grip strength has often been seen as a necessity for successful participation. PURPOSE: Because wrestling is so dependent on hand strength, it is important to determine viable options to strengthen this aspect among these athletes. The purpose of this experiment was to determine the effects of a sport specific hand-wrist training program combined with wrestling training on grip, pinch, and grab strength. METHODS: Eleven elite (aged 20 + 2 yr) NCAA DIII collegiate wrestlers were assessed on their grip (whole hand), pinch (thumb and pointer finger), and grab (thumb and first knuckle of pointer finger) strength using grip and pinch dynamometers. After the initial testing, the participants completed six weeks of pre-wrestling competition training. Training consisted of wrestling technique practice 5x a week, live wrestling 5x a week, endurance lifting 3x a week, and various cardio workouts 5x

a week. Additionally, each subject completed a supplemental grip-specific workout consisting of farmer walks, fat grip pull ups, ball squeezes, plate pinches, and band extenders, 2x a week. Following six weeks of training, hand strength was reassessed. Each strength measure was obtained three times on each hand before and after training and average score derived. A repeated measures ANOVA was utilized to determine significance in hand strength before and after competition. RESULTS: Analysis revealed no significant changes in grip, pinch, or grab strength from pre to post training ($p > .05$). The hand grip dynamometer pre measures were 124.82 lbs (± 26.58) and grip post scores were 124.38 lbs (± 24.0). The pinch pre measures were 18.23 lbs (± 2.55) pinch post scores were 18.69 lbs (± 2.4). The grab test pre measures were 26.45 lbs (± 3.33) and post grab scores were 26.5 lbs (± 4.35). CONCLUSION: This study revealed that participation in a six week grip-specific training program along with a standard wrestling specific training has no significant impact on grip, pinch, or grab strength. Future investigations could focus on off-season assessments and the inclusion of non-participating control subjects, to better evaluate the potential for enhanced grip, pinch, and grab performance.

Courtney Terry, Ashley Johnson
James Vela-McConnell, Ph.D.
Sociology
Crisis in the Catholic Church: Stigmatized by Scandal

The Catholic Church has been stigmatized from the time the news of the sex abuse scandal broke in 2002 and the Church's status was discredited. The purpose of this study is to analyze the ways in which the media and the public have responded to the scandal. Who is blamed? How is the issue framed? Press coverage of the scandal by two U.S. news sources is being analyzed: The Washington Post and America Magazine, a highly respected secular news source and a nationwide Catholic publication. The time frame for the articles ranges from 2000-2013. In addition to the articles, the online comments are also being examined, which provide valuable immediate public feedback to the scandal and its press coverage. Analysis includes the level of the institution that is being stigmatized, the ways in which the scandal is framed, and the impact religious identity has on reactions to the scandal.

Sadie Tetrick
Mark Engebretson, Ph.D.
Space Physics
Observations of Electron Precipitation Correlated with Drift Echoes

I worked as a Space Physics research student at Dartmouth College under the supervision of post doc Alexa Halford and BARREL (Balloon Array for Radiation Belt Relativistic Electron Losses) campaign researcher Robyn Millian. BARREL is a research project that is carried out by the Dartmouth Balloon Group. It studies the Earth's Radiation Belts. I worked on Alexa's project that dealt with looking at microbursts which are very quick precipitation events. I worked with IDL programming as well as Python to fit the microburst event times as well as full time period of other events that were observed on January 26th of 2013. I was able to use my programming and mathematical skills to fit the events with both an exponential model, which I found the e-folding to be around 27. I also fit the events with a mono-energetic value of 160-170 KeV. I tested other various models such as a Gaussian curve. This relates to the general public because telecommunications and satellites out in space can be greatly affected by changes in the earth's space atmosphere. Understanding how particles interact in space with our atmosphere will improve telecommunications and protect us from damaging effects from the sun and other space elements.

Keng Thao
Benjamin L. Stottrup, Ph.D.
Physics
The Langmuir Monolayer of Microscopic Particles

The Langmuir monolayer system has been used to produce transferrable thin-films at the air-liquid interface for over 100 years. Graphene oxide is a nano-sheet that has exciting applications to thin-films because of its applications in the field of electronics and as a coating material. In our work, we use lycopodium as a model at the air-water interface. The aim of this study is to test cost-effective micron-scale particles such as lycopodium and determine how the physical geometry of such macroscopic films is tunable in Langmuir-Blodgett deposition systems. Lycopodium was characterized with traditional Langmuir film balance technique and was further observed with a microscope after transferring the thin-film onto a glass slide with the Langmuir-Blodgett deposition method. Lycopodium was found to disperse more evenly across the water surface when mixed with methanol. Langmuir-Blodgett dipping was modified to perform vertical dipping at adjustable angles in order to transfer the lycopodium thin-film onto a glass slide. The results indicated that the packing of micron-scale particles allow us to understand how the physical geometry of macroscopic films is changeable in Langmuir-Blodgett deposition systems.

Hannah Thiry

Matthew Beckman, Ph.D.

Biology

Developmental Expression of the Daphnia magna Hedgehog Gene

Daphnia magna are freshwater cyclopic crustaceans that have been studied by ecologists, toxicologists, and geneticists for decades. However, to our knowledge, no molecular genetics research has been done involving the development of the single cyclopic eye. To better understand embryonic eye development in Daphnia magna, the spatial localization and temporal expression profile of the hedgehog gene was studied using In Situ Hybridization (ISH). In order to perform in situ hybridizations, riboprobes specific to the hedgehog mRNA were generated using in vitro transcription. This riboprobe binds to the complementary strand of mRNA within the D. magna embryo and can be visualized. My preliminary data indicates that the hedgehog gene is expressed in the anterior midline in developing embryos up to approximately 10 hours. Future experiments will be conducted to confirm these preliminary findings and improve our understanding of the spatial localization and temporal expression of the hedgehog gene.

Juan Tigre-Lazo

Benjamin Stottrup, Ph.D.

Physics

Comparison of Line Tension Measurement Techniques in Phase Separated Multi-Component Lipid Monolayers

Langmuir monolayers of multi-component lipid compositions have been used to study the mixing behavior of sterol-phospholipid systems. Using traditional Langmuir pressure-area isotherms and fluorescence microscopy techniques we compare line tension measurements using two methods of image analysis. Line tension between coexisting phases of sterol-rich and sterol-poor domains can be extracted from a Fourier analysis of domain boundary fluctuations (J. Phys. Chem. B, 111:11091-11094). These measurements will be compared to a recently developed non-perturbative technique based on domain size distribution (Proc. Natl. Acad. Sci. 110:13272-1327). Until now these two measurement techniques have not been compared on the same data set. The compositions studied include 30:70 mixtures of cholesterol and DMPC, DLPC, and DCPC. As well as 25:75 mixtures of 25-hydroxycholesterol DMPC systems.

Michael Torreson

Kathryn Swanson, Ph.D.

English

Improving and Expanding the Available Resources at the Augsburg College Writing Lab

For my research project, I have been evaluating the resources and materials available to students and tutors in the writing lab in order to understand what resources can be improved upon and to figure out

what else needs to be added. The writing lab is one of the most heavily utilized services on campus, and the tutors have to aid many students in resolving issues with their writing on a daily basis. Our goal is not only to show students how to improve their papers, but it is also to help students improve their writing skills. My goal, then, has been to ensure that the current resources we have in the writing lab are helpful and informative and to produce new materials for information important to writing. I will also be putting materials online in order to make important information accessible for students.

Emily Uecker

Christina Erickson, Ph.D.

Social Work

Diffusing Individually Mandated Stress: Using A Community Peace Model to Increase Participation in Healthcare Coverage Under the Individual Mandate of the Affordable Care Act

The Patient Protection and Affordable Care Act is quickly changing the landscape of the healthcare and health insurance industry for providers and consumers alike. Unfortunately, executing the individual mandate of this act proved more difficult than expected due to difficult to reach populations and technological malfunctions. In Minnesota, many people faced difficulties enrolling in the state's insurance marketplace, MNsure, which only further complicated an already confusing healthcare and healthcare coverage system. Social workers and other human service professionals worked as certified navigators individually and through community organizations to aid persons in enrolling in affordable health insurance plans. Portico Healthnet, a community organization in St. Paul, Minnesota that has spent the last fifteen working to help people find affordable health care partnered with The Wakanheza Project, a community peacemaking initiative that began out of an antiviolence initiative through St. Paul-Ramsey County Public Health aiming to reduce stress in organizations and communities, shortly before MNsure rollout began. Based off a qualitative study conducted in June of 2014 by Dr. Christina Erickson and Emily Uecker, this presentation will explain through the metaphor of the video game Block Dude created by Brandon Sterner that in the context of healthcare organizations, use of additional training on the emotional and environmental situations people face such as The Wakanheza Project ensures smoother practices admits inherently stressful situations and a more successful enrollment overall.

Mari Uema

Andrew Aoki, Ph.D.

Political Science

Political Mobilization of Young Adults of Color in the Twin Cities Area

In an earlier era, political parties seem to have played an important role in incorporating the so-called "new immigrants". In recent decades, however, a number of studies have concluded that parties are no longer playing such a central role in drawing new Americans into the political process, and that community-based organizations have stepped in to fill that void. Our research investigates whether this is the case in the Twin Cities area.

Cain Valtierrez

Benjamin L. Stottrup, Ph.D.

Physics

Assembly of Graphene-Oxide Langmuir Films

Graphene-Oxide (GO) monolayers are an unconventional form of soft material. It is of great importance to investigate GO's colloidal assembly on the air/water interface through the Langmuir-Blodgett technique for applications such as electronics, polymer composites and energy storage. Characterization of GO's surface activity, monolayer stability against compression and reversibility, and sheet morphology provide an insight to the way that these sheets are assembled. GO's amphiphilicity can be varied with the degree of surface ionization because of GO's carboxylic edge groups and hydrophobic basal plane, which dictate the macroscopic edge-to-edge and face-to-face interactions. These interactions are observed when GO

monolayers are compressed leading to sheet folding and wrinkling that can be visualized through various microscopy techniques. Furthermore, a quantitative isothermal line fitting comparison between poly-disperse and homogenous GO is discussed.

Yer Yang

David Murr, Ph.D.

Physics

Designing an Air Sampling Instrument for Vertical Profiling of Motor Vehicle Pollution

Air quality in densely populated urban areas surrounded by interstate highway system is an issue that spans social, political and environmental barriers. Therefore, gauging and addressing issues related to airborne pollutants is a growing area of research for scientist. Air sampling has helped researchers understand air quality that is affected by anthropogenic emissions. Volatile organic compounds like benzene are a form of pollution generated by motor vehicles and are heavily emitted into the air during traffic hours. The design of a low-cost sampling instrument prototype was developed for vertical profiling over the Interstate 94 in Minneapolis, Minnesota. The physical design included using a 3D printer for components and Arduino microcontroller programs were written to actuate servo-motors for mechanical purposes. Tedlar bags and a canister were tested at ground level sampling and analyzed by a proton-transfer mass spectrometer (PT-MS) to determine which approach is most applicable for sampling VOCs. The canister was chosen due to the contamination found in Tedlar bags that would affect the PT-MS analysis. We anticipate completing our prototype air sampling instrument in fall of 2014, after which we can begin collecting samples.

Ruifa Yang

Keith Gilsdorf, Ph.D.

Economics

Testing and Comparing Men and Women's Tournament Incentives in Alpine Skiing

Our research tries to test Lazear and Rosen's (1981) tournament theory, which states that an athlete's performance in a tournament depends on the tournament's prize purse and distribution. We examine the prize structure's effect on individual performance in the Giant Slalom event for both men and women's professional skiing. This study estimates an empirical model using data containing information on tournament characteristics, player characteristics, tournament outcomes, and prize money distribution for all tournaments played during 2013 to 2014 FIS World Cup season. As an extension to Che and Humphreys' (2013) study of women's Alpine skiing, our research adds the men's events to investigate possible gender differences in performance. Our results tend to support tournament theory predictions in two specifications of the women's empirical model, but find no evidence to support the theory for men. In fact, our results indicate that male performance worsens as the prize distribution increases. In addition, we find that women respond differently to the vertical drop characteristic of the race venue. Women's race times fall as the vertical drops rises while the opposite occurs for men. This may suggest that men take a more cautious approach compared to women skiers, but more research is needed.