

## 2013 Zyzzogeton Poster Session Full Abstracts

Bachman, Ryan  
David Hanson, PhD and Michael Wentzel, PhD  
Chemistry  
*Synthesis and Analysis of 2-nitro-oxy 3-butanol*

We present a synthetic procedure and a proton transfer mass spectrometer (PTRMS) breakup fingerprint of 2-nitro-oxy 3-butanol that is helpful for evaluation of PTRMS work on  $\beta$ -hydroxy nitrates.  $\beta$ -hydroxy nitrates  $(RC(OH)C(ONO_2)R')$  are products in tropospheric photo-oxidation of volatile organic compounds, and are important for understanding tropospheric ozone formation and degradation of volatile organic compounds. This work shows that the (parent mass) $\cdot H^+$  ion for a hydroxynitrate molecule breaks apart at high temperatures, e.g. losing HONO, HNO<sub>3</sub>, but this ion is preserved at lower temperatures.

Barrick, Jonathan  
Bill Green, JD, PhD  
History  
*The Peace Project: A Medicine Wheel Community Garden*

The year 2012 marks the sesquicentennial of the U.S. - Dakota War of 1862. The war originated near present-day Litchfield, Minnesota. Even though 150 years have passed since the conflict ended, the residue of the U.S. - Dakota War remains. The Peace Project is a community garden based in Litchfield, Minnesota. Our primary goals in this project were to enhance garden members' consciousness of Litchfield's rich and varied history and expose participants to the virtues of indigenous horticultural practices. By incorporating the U.S. - Dakota War of 1862 as a backdrop we hoped to raise interest about Minnesota history. The Peace Project has incorporated many aspects of Dakota Culture within the garden as a means to spread awareness in a predominately white community. Essentially we planted seeds in the ground as well as the mind in the hopes of cultivating both a bountiful fall harvest of healthy produce and a better community.

Barrozo, Enrico  
Matt Beckman, PhD  
Biology  
*Neuropharmacology: Dopaminergic Drug Screening in Daphnia*

*Daphnia magna* are freshwater crustaceans commonly known as water fleas. For many decades this organism, which is central to freshwater aquatic food webs, has been utilized by ecotoxicologists measuring water quality and aquatic ecosystem dynamics. In our groups previous neuropharmacology experiments, 10 dopamine receptor agonists and antagonists were screened to determine if they could increase or decrease *Daphnia* movement. Three of the ten drugs showed effects which were statistically different from control treatments. Specifically, the results showed an increase in movement for the D2-like dopamine receptor antagonist L-745, 870 and a decrease in movement with the D1-like dopamine receptor agonist A68930 and the D2-like dopamine receptor agonist bromocriptine. These experiments cataloged the effects of drugs targeting the dopamine pathway in *Daphnia* and are critical for establishing *Daphnia* as a model for studying neurodegenerative disease.

Benser, Roseanna  
James Vela-McConnell, PhD  
Sociology  
*Tough Crowd: The Interactional Nature of Stand-up Comedy*

Is it appropriate to laugh at racial jokes? At what point do comedians transgress from humor to offense? With the framing of race and sexual orientation in mind, how is the performance of the comedian perceived and interpreted by the audience, and with what consequences for their reaction? Through the lens of Symbolic Interactionism, this study analyzed how audience members create

meaning through an interactive process during a stand-up comedian's performance in which race and sexual orientation are used as the basis for humor. A sample of thirty-two participants were interviewed in seven focus groups in which three comedy clips were shown and used as the basis for discussion. Conversations were recorded and transcribed for the purpose a qualitative analysis of participant responses to the uses of humor by the comedian. Results of this study outlined several reasons given for offended, ambivalent and entertained reactions to subject matter covered during comedy sketches, confirming past research on comedy involving race and sexual orientation.

Bergland, Ingrid  
Nancy Fischer, PhD  
Sociology  
*"Passing for What?": Expressing Nonconforming Gender*

In this paper, I seek to understand the ways in which gender nonconforming and trans-identified individuals express their gender identity as well as how these expressions are received by others. I am guided by three central questions: (1) how do gender boundaries dictate "normal" gender behavior? (2) What are the consequences and the benefits are for people who do not conform to gender norms? And finally, (3) in what ways both heterosexual society and LGBTQ (Lesbian, Gay, Bisexual, Transgender, Questioning) communities enforce gender non-conforming individuals' behaviors and expressions. By using both a content analysis of trans\* blogs and interviews with trans\* and gender non-conforming individuals, I show the complexity and vastness of experiences and identities of trans\* and gender non-conforming individuals.

Bier, Elianna  
Mark Engebretson, PhD  
Physics  
*Investigating the IMF Cone Angle Control of Pc3-4 Pulsations Observed on the Ground, 2: Confirmation of Anomalies and Further Analysis*

Narrowband Pc3-4 pulsations are ultra-low-frequency magnetic waves generated in Earth's space environment. They have been found by many previous studies to be observed on the ground during daytime hours at high latitudes when the cone angle, the angle between the interplanetary magnetic field (IMF) and the Earth-Sun line, is below  $45^\circ$ . To further investigate this IMF dependence, a year's worth of Fourier spectrograms (June 2010 – June 2011) from Svalbard, Norway and Halley Bay, Antarctica were examined for the presence of Pc3-4 pulsations. Values of the IMF cone angle, created from a combined spacecraft data set (OMNI), were then compared to the spectrograms containing the pulsations. It was discovered that the presence of Pc3-4 pulsations did not completely correlate with a low cone angle, even when the criteria was widened to include cone angles of up to  $60^\circ$ . To ensure that the discrepancy was not due to OMNI being compiled incorrectly, the cone angle from OMNI was compared to data from all available near-Earth spacecraft that measure the IMF. In both the days of agreement and the days of disagreement there were times that OMNI cone angles completely matched the values at all other available spacecraft, and times that OMNI showed cone angles that differed from those at other spacecraft, but the frequencies of the waves always matched the spectrograms even when the cone angles did not. To attempt to relate the observation of Pc3-4 waves to another parameter, the components of the magnetic field vector and the flow pressure were examined during periods of agreement and disagreement. Thus far no pattern has been found. However, it is evident that factors beyond a low cone angle affect if Pc3-4 pulsations are observed on the ground.

Blake, Brianna  
Su Doree, PhD  
Mathematics  
*Lollipops and Spider-flowers: Rank numbers of graphs that are combinations of paths and cycles*

A  $k$ -ranking of a graph  $G$  is a function  $f: V(G) \rightarrow \{1, 2, \dots, k\}$  such that if  $f(u) = f(v)$  then every  $u - v$  path contains a vertex  $w$  such that  $f(w) > f(u)$ . The rank number of  $G$ , denoted by  $\chi_r(G)$ , is the minimum  $k$  such that a  $k$ -ranking exists for  $G$ . It is shown that given a graph  $G$  and a positive integer  $t$  the question whether  $\chi_r(G) \leq t$  is NP-complete. However, the rank number of numerous families of graphs have been established. In this poster we will study and establish rank numbers of some more families of graphs that are combinations of paths and cycles.

Bonfiglio, Angela  
Diane Pike, PhD  
Sociology

*Perceptions of the Academic Achievement Gap: Minneapolis Community Leaders*

The purpose of this research is to explore perceptions of the academic achievement gap among a sample of Minneapolis community leaders. Twenty three community leaders were identified from six organizations that have programs for afterschool, college preparation, career preparation, tutors, mentors, family support, networks and empowerment. Participants' responses provide a qualitative understanding of their definition of the achievement gap, the role of race and class, the main issues and the ways their organizations are addressing the achievement gap. The findings illustrate the complexity of the definition of the achievement gap among community leaders. A number of those interviewed suggested that race and class both play a significant role in creating the achievement gap. These community leaders are involved organizations trying to change the odds for students, yet the different definitions of the achievement gap may affect the ability to have the consensus needed to address the issues seen as causing the gap. These organizations are developing community, building student social capital, providing adult support and creating access. Future research is needed to better understand the role of the community in responding to the systematic issues in the education system.

Bowman, Eric  
Ben Stottrup, PhD  
Physics

*Experiment and Instrumental Design to Study Self-Assembly of Simple Systems*

Experiments and equipment are being designed to investigate the self-assembly of fatty acid molecule likely to have been present on pre-biotic earth. This poster describes three small projects towards this goal. In one project we investigate the association of adenine with stearic acid. A second phase was to design an experimental system which allowed us to determine the behavior of soluble surfactants. Finally we describe the construction of a micro-controlled evaporative cyclor. All three projects are described.

Bruemmer, Amanda  
Diane Pike, PhD  
Sociology

*The Effects of Standardized Testing: Student and Teacher Perceptions*

Since the passing of No Child Left Behind in 2011, there has been an increase in the use of standardized testing as a measurement of school quality. This recent increase in the use of standardized tests has necessitated the study of how students and teachers are affected by these tests. This study aims to describe student and teacher perspectives on the effects of standardized tests. Questionnaires were distributed to 25 teachers and 18 students; in addition to the questionnaires three teachers and three students were interviewed. Students were asked to describe their personal experiences with standardized tests and how these experiences affected their perceptions. Teachers were asked to describe their personal experiences along with how they perceive the effect of standardized tests on students and on schools. It was found that both students and teachers had negative perceptions of standardized tests and both samples had experienced negative consequences such as a decrease in student and teacher morale. However, when directly compared, it can be seen that teachers had a more positive outlook on standardized tests than did students.

Buchman, Joe  
Daniel Mueller, MD  
Rheumatology

*Developing a Characterization Method for Autoreactive B Cells in Systemic Lupus Erythematosus*

The symptoms caused by Systemic Lupus Erythematosus (SLE) are the result of autoimmune cells that bind and elicit an immune response against proteins that are necessary for maintaining healthy body function. A common target for the autoimmune cells of SLE patients is the Ro52 protein. Two peptides from the Ro52 protein, p107 and p277, were tested to determine their binding affinity to the immune cells in SLE patients. Then p107, which displayed better binding, was used to differentiate the surface markers on the different

immune cells. This technique can be applied to SLE patients to characterize their autoimmune cells as a method to assess the severity of their disease.

Butcher, Kevin  
Stacy Freiheit, PhD  
Psychology

*How emotion dysregulation relates to the motivation and scope of substance use*

Substance use disorders are persistent and widespread in the United States. College students are at particular risk for developing these disorders. In the present study, the relationship between emotion regulation and substance use motivations, and the potential mediating role of these motivations between emotion regulation and substance use, were examined among 62 college students. Emotion regulation was positively correlated with substance use and with motivations; motivations were also positively correlated with substance use. Substance use motivations mediated the relationship between emotion regulation and binge drinking, but they did not mediate the relationship with marijuana use. It is important to consider emotion regulation when attempting to treat individuals with patterns of maladaptive substance use.

Campbell, Steven  
Lars Christiansen, PhD  
Sociology

*The Disconnect Between Young People and Youth In Sobriety: Coincidental or Consequential?*

The purpose of this study is to explore the relationships between young adults and young adults in recovery from drugs and alcohol. Qualitative interviews are used to question members of each group about their experiences with the other, and their perceptions about the state of the relationship between them. Though stigma was thought to play a key role in the relationships between the two groups, it becomes clear that the most important factor contributing to the lack of strong bonds is that people new to sobriety need to surround themselves with like-minded individuals and therefore stray from non-sober young people. Though this is the one dominant finding, others include the importance of the length of sobriety an individual has, as well as their length of residency in Twin Cities area. Finally, these results signify the need for a quantitative study to focus on which factor is greater in determining the relationship between the sober and non-sober communities, length of residency or length of sobriety.

Cantrall, Samantha  
Robert Stacke, PhD  
Music

*The Influence of Rap in the Arab Spring*

Throughout history music has been influential in social, religious, and political disputes. In the early 21<sup>st</sup> century, change in the established order can be found in expressing the need for reform halfway around the world in the Middle East's Arab Spring. Rap artists such as El General (Tunisia), GAB (Libya), and Omar Offendum (Syria) used their talents to both spark and encourage protestors during the early days of the Middle Eastern protests that began in late 2010; these protests have since been coined "The Arab Spring." The energy that could have been used to wield guns and bombs was instead poured into protest music that these and other artists produced during this time period. The relatively Western genre of rap music became integral in peaceful citizens' protests happening all over the Middle East. Important to the fields of both communications and music, this research shows the relevance of rap music in dissenting communication of the 21<sup>st</sup> century, specifically in the Arab world. This research was conducted using news and scholarly articles, personal interviews, and musical examples from the countries of Egypt, Lebanon, Libya, Morocco, Tunisia, and Yemen. The research specifically examines the role of rap in the protests of the Arab Spring, why and how rap became a major medium for the protests, and the effect rap has had in peaceful conflict resolution throughout the world.

Caron, Justin  
Sarah Myers, PhD  
Theater

*Shoots and Ladders: "Queering" Queer (Solo) Performance*

*Shoots and Ladders* is a solo performance piece that uses queer performance methods to interrogate class structures. In both process and product, the piece blends genres and puts theory into practice. The play is set in the year 2050 on a spaceship headed to Planet Utopia. The audience plays the role of the passengers on the ship. They are joined by Marcy, a volunteer flight attendant, Dorothy, another passenger on the ship who poses as Dorothy from *The Wizard of Oz*, and a Cyborg, a genderless, extraterrestrial being. Unlike typical queer performance, *Shoots and Ladders* steps outside of a queer narrative, broadening the style of performance and the definition of “queer” itself. It takes “queer” to a new level, not only queering normative perceptions of gender and sexuality, but also queering notions of what it means to be queer. *Shoots and Ladders* also uses drag and camp, staples of queer performance, in atypical ways. The performance not only plays with various characters in terms of their gendered performances, but also with their performance of class and their position in various power structures. As Marcy half-comically and half-seriously explains to the passengers on the ship, the performance takes the audience “on a journey through space, and through [their] *minds*”.

Christensen, Becky  
Ben Denkinger, PhD  
Psychology

*Time Warp: Perceived Time and Emotional Experience*

Previous research suggests that viewing emotional images can affect individuals' perception of time. This study seeks to further investigate how emotion-provoking images affect the individual's estimation of time. Augsburg college students performed a temporal bisection task in which they had to categorize the amount of time an emotional picture (positive, negative, or neutral) was displayed as either long or short, as compared to initial training images that were displayed for long (1600 milliseconds) or short (400 milliseconds) durations. The images they viewed were presented for one of seven variable periods of time, ranging from 400 milliseconds to 1600 milliseconds. Previous experiments in this area have yielded mixed results, but generally suggest that negative images are more likely to be perceived as having appeared for a 'long' time span (i.e., closer to 1600 ms than 400 ms), regardless of their actual presentation time. Our hope is that our experiment will help clarify the effect that emotional experiences have on the perception of passing time.

Darden, Jazmine  
Rebekah Dupont, PhD  
Physics  
*Bridgin' the Gap*

Through the Jay and Rose Phillips Foundation, six students from the Minnesota Private Colleges are chosen annually to propose and implement a funded community service project of their choice. There are a low percentage of minority students, especially females succeeding in and pursuing STEM (science, technology, engineering, math) fields in higher education. I partnered with GISE/GEMS (Guys in Science and Engineering/Girls in engineering, math, and science) youth engineering camp that takes place at Augsburg College every summer. The program reaches out to students in the Minneapolis Public School District emphasizing the importance of science and technology in today's society. I developed and implemented a curriculum to take a hands-on approach of classroom math and science to teach structural engineering through the use of bridges. These 300 urban students were broken into gender and age groups (kindergarten through grade eight) each in which different bridge curricula were prepared. The students participated in various bridge-building activities while being introduced to new engineering vocabulary words daily. Through “Bridgin' the Gap” students were able to learn about skills used in building bridges with the overall initiative to “bridge the achievement gap” occurring within the under-represented population.

Fairbanks Dickinson, Rebecca  
James Vela-McConnell, PhD  
Sociology  
*Honorary Males: The Social Construction of Gender Through Labor*

In theorizing the social construction of gender in relation to assigned labor roles, much of the sociological research has been focused on Western, dominant cultures. Drawing from the work of Judith Lorber (2004), who has devoted attention to pondering nondichotomous gender categories and social constructionism, this comparative case study seeks to analyze the patterns in gender

construction within groups whose gendered labor tasks or cultural norms seem to diverge from what has been previously studied, with a purposeful selection of global examples from China, Mexico, Sahleian Africa, Egypt, Native North America, and the U.S. today which have been treated in a culturally relativistic manner. The alignment between gender performance and the gender-specific assigned work has been sacrosanct even in cases in which individuals seemingly defied or crossed the boundary which made up each gendered division of labor. Regardless of the society, those sacrosanct gender categories and their respective tasks signifies the significance of the socially constructed meanings produced through the interaction that sustains, creates, and categorizes people: their work.

DuSchane, Patrick  
Stella Hofrenning, PhD and Tracy Bibelnicks, PhD  
Economics & Mathematics  
*Equity versus Efficiency: A New Look at Empirical Evidence in Minnesota*

Over the past several decades, many economists have examined the relationship between income inequality, income redistribution, and the growth of economies. While some researchers have concluded a negative correlation between income inequality and growth (Weller, Rao, 2010), others have found a positive correlation (Forbes, 2000). Additionally, the conversation is increasingly complicated given the regressive nature of most state tax systems in the United States because of their direct relationship to decreased social mobility for the lowest income brackets. The objective of this study is to empirically examine the redistribution policies in the state of Minnesota accounting for Federal, State, and Local tax systems and their effects on growth using Ordinary Least Squares (OLS) analysis. Additionally, this analysis uses linear programming to optimize the state tax system by maximizing taxable income. The data used in this study is from the Minnesota Department of Revenue. This analysis is pertinent because of the growing regressive trend in Minnesota's state tax system and the potential for tax reforms in light of the recent (2012) elections. In 1990, Minnesota's regressive tax system favored the highest income bracket at 1.5% based on gross income. In 2008, the system favored the highest income bracket at 16.6% based on gross income. Accordingly, Governor Mark Dayton is proposing tax reform to correct this trend. Previous studies examining tax systems in developed regions have found a negative relationship between income inequality and growth, and we anticipate a negative relationship between income inequality and growth in the state of Minnesota.

Ehrman-Solberg, Kevin  
Bill Green, JD, PhD  
History  
*"Little Untaught Brats": Ethnic and Religious Discrepancies in the Minnesota Reform School: 1880-1900*

Unlike modern penal institutions that are primarily seen as a place for punishment, the Minnesota State Reform School, founded in 1866, was ostensibly to be a place where delinquent children could be "fixed" and shaped into model citizens. However, the type of child who should be sent to such an institution was a point of some confusion. Indeed, a crime was not even a necessary prerequisite for incarceration. "Incorrigibility" and "Viciousness", both vaguely defined, were considered grounds for commitment. The intake records of the Reform School also show that certain ethnic and religious groups were far more likely to be considered "incorrigible" than others. I found that the explanation for the relative disproportion of different ethnic groups within the school can best be explained by their religious affiliation. Of the six most common ethnicities found in the school, the three that were consistently overrepresented were the Irish, French and Poles, all Catholic groups. Conversely, the Swedes and Norwegians, the two largest underrepresented groups, were predominately protestant. The difference between the percentage of Catholics in the Reform School and the percentage of Catholics in the state is the key in understanding the ethnic disparities found in the School.

Elkington, Beau  
Barbara Lehmann, PhD  
Social Work  
*An Examination of the Impact of Zen Meditation and Psychotherapy on Perceptions of Self*

This research project studied the practitioners of Shikantaza Zen meditation and psychotherapy. The study utilized a phenomenological design to clarify the subjects' perceptions of self from both Zen and psychotherapeutic viewpoints. Upon examination, practitioners of both Zen and psychotherapy were able to utilize the concept of non-self while practicing Zen and differentially utilize the concept of self

in their psychotherapeutic practices. Findings also indicate that it was sometimes challenging for practitioners of both disciplines to describe how they deal with the cognitive dissonance surrounding these two forms of mental conceptions.

Ellena, Devon; Rutten, Emily; Nguyen, Hien; Stewart, Mary

Henry Yoon, PhD

Psychology

*Substance Use and the Antisaccade Task*

Excessive substance use (or misuse) putatively reflect frontally-mediated neurobehavioral deviations marked by low inhibitory control. In the current study, we investigated the association between substance misuse (e.g., excessive alcohol consumption) with performance on the Antisaccade task (AST) in Augsburg College students with no lifetime diagnostic history of substance addiction. Using an infrared eye tracker, the AST determines the degree to which participants can willfully override reflexive eye movements, and performance on the AST is thought to involve the prefrontal cortical areas. We hypothesize that participants who engage in substance misuse will make significantly more errors on this task.

Genis, Arianna

Sarah Combellick-Bidney, PhD

Political Science & Women's Studies

*Reproductive Justice: Coalition-Building in Marginalized Communities*

The reproductive justice movement has created a coalition between women of color, people in the queer community, and individuals with disabilities and their allies, to transform the outlook on reproductive rights. How did reproductive justice activists form a broad alliance that many previous feminist movements were not able to achieve? More specifically, (a) How do people in communities historically not highly involved in feminist activism begin to identify with issues of reproductive justice? (b) How are activists identifying with the movement? (c) What factors lead activists to see their bodily experience of reproduction through a political lens? Through extensive, in-depth interviews with activists across the country involved in this movement, we present new perspectives on theories of intersectional coalition-building. Specifically, we find that common demands in a movement require both universal, human rights claims and more nuanced, intersectional claims.

Gilmer, Chad

Michael Wentzel, PhD

Chemistry

*A Green Synthesis of a Renewable Polymer*

Polymers can be found just about anywhere in today's world with their applications to just about anything. The natural products delta-decalactone and L-lactide are natural monomers. These monomers can be used to synthesize a renewable and biodegradable tri-block copolymer. The synthesis is quite green with the use of natural monomers, and a solvent free synthesis. Both steps require the use of a ring-opening esterification polymerization. The polymer is characterized through <sup>1</sup>H NMR, which easily distinguishes the monomers from the polymers. The experiment was worked with so that it could be integrated into a sophomore level organic chemistry class at the University of Minnesota. The use of a solvent free reaction and natural monomers make an exciting polymer that is different from typical petroleum based polymers.

Grant, Ben

Ben Stottrup, PhD

Physics

*Development of an Optical Tweezers for Undergraduate Research*

The optical tweezers was invented by Arthur Askin 25 years ago at Bell Labs and it has been used in several different areas of science. The optical tweezers I constructed was developed by Mathew Lang et al. at the Department of Biological Engineering at MIT while collaborating with ThorLabs. The optical tweezers is very useful because it can trap small dielectric particles and move them nanometer distances without damaging the particle, which can be used to study biological systems, such as cells. Optical tweezers can

also measure piconewton forces, which has been vital in studying molecular motors, such as the flagella of bacteria. In addition, optical tweezers can trap a wide range of particles from 500 nm to upwards of 30  $\mu\text{m}$  in diameter.

Haubrich, Arlo  
Shana Watters, PhD  
Computer Science  
*Solar Flare Data Analysis through Decision Trees*

Much research has focused on using machine learning algorithms such as decision trees. A decision tree is a machine-generated tree structure used to explore independent variable relationships to determine their effect on dependent variable values. Ross Quinlin's Iterative Dichotomiser 3 (ID3) algorithm was implemented to analyze large amounts of solar flare data collected through Augsburg's physics department. The ID3 algorithm uses the concept of information gain to determine patterns in the data which could be used to, for example, determine whether a solar flare had been detected, given meteorological conditions. Due to the complexity of the given data, this research focused on identifying issues and proposing solutions on how to best present the data to the decision tree as training sets. This data, unlike Boolean valued decision based data (i.e. true or false), had ranges of values that required much more analysis to find the best groupings to produce meaningful and useful results. Our research explored how different scenarios with regard to range values used by the independent variables could produce significantly different results, even if the changes were slight in terms of ranges.

Hernandez, Luis  
Ben Stottrup, PhD, Joan Kunz, PhD and Ravi Tavakley  
Physics  
*Comparison of Cholesterol and 25-Hydroxy-cholesterol*

Experimental studies of the phase separation of coexisting liquid phases in mixed phospholipid/sterol monolayer systems have contributed significantly to our understanding of the unique role that cholesterol plays within lipid membranes. Cholesterol is not unique in its ability to promote phase separation in these model systems. Several cholesterol analogs display similar liquid-liquid phase coexistence in monolayer and bilayer systems. One particularly interesting example of this is 25-hydroxycholesterol (25OH), which has been previously noted to have a kink in its monolayer pressure-area isotherm corresponding to the miscibility phase transition as well as for its pathological effect on the plasma cell membrane. We present the results of experiments using traditional Langmuir film-balance techniques (pressure-area isotherms) and surface potential measurements to identify changes in molecular orientation during monolayer compression. Fluorescence microscopy experiments complement these studies with comparisons of domain size distributions, area fraction, and line tension measurements. From our preliminary work it is clear that there are many similarities between the phase behavior of these two systems as well as many significant differences.

Hoy, Charlie  
Michael Wentzel, PhD and Tom Hoye, PhD  
Chemistry  
*Characterization of a Novel Synthetic Protecting Group: Tri-*t*-butoxysilane*

Tri-*tert*-butoxysilane (TBOS) serves synthetic chemists as a means to increase the chemoselectivity of chemical reactions involving multifunctional amine substituted reagents. TBOS acts by means of  $\text{S}_{\text{N}}2$  reaction, effectively hindering the amine group's reactivity due to the extreme steric and electronic hindrance characteristic to this protecting group. Once TBOS has bonded to the amine group its characteristic steric and electronic substrate shielding allows for a quick and easy purification by silica column. The final utility of TBOS is its excellent deprotection character; it's stable under aqueous conditions and can be cleaved by raising the pH.

Johnson, Kayla  
John Zobitz, PhD  
Biology & Mathematics  
*The Analysis of Daphnia magna Swimming Behavior using Video Recordings and Mathematical Modeling*



There has been much research done in mathematics and biology using random walk theory to describe the movement of *Daphnia magna*, a small freshwater crustacean. However, little research has been published on the movement of daphnids treated with neurotoxins. *Daphnia magna* has been used as a descriptive drug model for the classification of various environmental toxins. I wanted to observe how the neurotoxin MPP+ would alter the healthy movement of *Daphnia magna*. Over the past academic year, I have worked to model daphnid movement using two methods: a random walk model and a simplified set of differential equations. In order to learn whether a random walk model would accurately describe daphnid movement, I developed a biased random walk. This model accounts for light and food in the animal's environment. A set of differential equations were developed while keeping similar factors in mind. Position coordinates were extracted from each video and transformed into descriptive velocity distribution graphs. These graphs were analyzed to establish the influence of food and light on daphnid movement. Preliminary results suggest that light plays a more significant role in determining a daphnid's direction of movement.

Kang, HeeChan

Pavel Belik, PhD

Mathematics

*Exploration of fractals and their role in mesocyclones*

It has been suggested that the velocity and vorticity fields of tornadoes exhibit self-similar behavior in multiple different scales. Therefore, the connection between the mathematical characteristics and the severity of the storm, if there is any, will be analyzed. We will use the box-counting method and numerical computation to determine the Hausdorff/fractal dimension of a fractal. We are expecting tornadoes and mesocyclones to have fractal behavior, then calculate the dimension of this mathematical characteristics; and analyze the strength of the tornadic storms. There are fractal images such as the dragon curve that display similar characteristics to the tornadic storms.

Koecher, Christina

Grace Dyrud, PhD

Psychology

*Priming for Population: Perceiving Overpopulation in Context*

Some argue that most of noted world problems such as global warming and climate change, hunger, conflict, pollution and diminished resources are a result of overpopulation (World Population Balance, 2011). Others suggest that Bangladesh or India should be concerned, but that the U.S. has no overpopulation problem. Can students be primed to discover overpopulation in a scenario preceded by statistics? A Minnesota and a California sample were divided into a control group (46) who read general statistics unrelated to population and an experimental group (43) who read statistics on world population and resources. Both groups were given 6 questions on 5 point scales to rank the importance of factors in a scenario about people who once prospered but later declined. A 7th question on overpopulation in the U.S. followed. Statistically, California and Minnesota samples did not differ. On the combined samples the control group was significantly less likely to see overpopulation as a problem in the scenario ( $M = 3.5$ ,  $s = 1.16$ ) than the experimental group ( $M = 4.16$ ,  $s = .94$ ).  $t(87) = 2.924$ ,  $p = .004$ . The control group was significantly less likely to see overpopulation as a problem in the U. S. ( $M = 2/76$ ,  $s = 1.03$ ) than the experimental group ( $M = 2.14$ ,  $s = 1.16$ ).  $t(87) = 2.660$ ,  $p = .009$ . The world statistics used for priming appeared to be successful in getting people to notice overpopulation as a variable in the scenario and that they generalized to the U. S. as well.

Kolb, Lori

Bridget Robinson-Riegler, PhD

Psychology

*The effect of doodling on mind wandering in ADHD*

Mind wandering involves shifting one's attention from a primary task to internal thoughts. This affects one's ability to sustain attention on that task. According to Andrade (2009), doodling may aid concentration and prevent mind wandering during a boring task. The doodling gives people a task to which their mind can wander that does not demand many cognitive resources, leaving more resources to devote to the primary task. Research has shown that people with ADHD struggle more from mind wandering than "normal" people and this may contribute to problems in attention (Meaux, Green & Broussard, 2009), particularly sustained attention (Berwid, Curko

Kera, Marks, Santra, Bender & Halperin, 2005). As a result, those who have ADHD may benefit more from doodling than those who do not have ADHD. To test this idea, we will replicate the Andrade (2009) study and include a condition of ADHD participants. We are predicting a main effect of doodling. Participants who doodle while listening to the recording will remember more information than those who do not doodle. More importantly, we predict an interaction between ADHD and doodling. The effect of doodling will be greater for ADHD participants than non-ADHD participants.

Krugerud, Cameron

Tony Clapp, PhD

Health, Physical Education, and Exercise Science

*Effects of Weighted Vest and Resistant Band Plyometric Training on Vertical Jump and 20-yard Sprint Times in DIII Basketball Players*

Many sports require the ability to generate high amounts of force in relatively short periods of time. More specifically, basketball is a demanding sport which requires speed and quickness. Additionally, an enhanced vertical jump is unquestionably advantageous in basketball and athletes frequently focus on leg exercises to improve their jumping. Weighted vests and elastic bands are common ways to introduce the plyometric training ballistic contraction aspect frequently purported as modalities to improve speed and vertical jumping. Purpose: To determine the effects of a specific 6 week plyometric resistant training program with one of two different resistance methods (weight vests or resistance bands) on NCAA Division III male basketball players as measured by maximum vertical jump and 20-yard dash sprint times. Methods: Twenty male division III collegiate basketball players ( $n=20$ ) Age= $20.1 \pm 2.1$  in the midst of a pre-season cardiovascular and skills routine volunteered. Ten subjects served as controls (no plyometric training) and ten plyometric training subjects. Five training subjects used a 30 lbs weighted vest with each training session and five used plyometric resistance jump bands with each routine. Each training group followed the same plyometric routine of twice a week which involved 3 sets of 10 of 4 exercises: vertical jumping, step off platform to high jump, 24 in rapid box jumps, and lunges. All 20 subjects were tested in both vertical jump and 20-yard sprint before and after the six-week training protocol using a Vertec vertical jump tester and Brower laser timing system. Results: Mean (x) pre-to post vertical jump for the weighted vest group was 27.3 and 29.4 ( $p > 0.05$ ), pre-to post vertical jump for the resistance band group was 27.4 and 29.9 ( $p < 0.05$ ) and pre-to post vertical jump for the control group was 25.4 and 25.8 ( $p > 0.05$ ). Mean (x) pre-to post 20-yard sprint for the weighted vest group was 3.0 and 2.85 ( $p < 0.05$ ), pre-to post 20-yard sprint the resistance band group was 2.98 and 2.90 ( $p > 0.05$ ) and pre-to post 20-yard sprint for the control group was 3.02 and 2.97 ( $p > 0.05$ ). Conclusion: Both plyometric training modalities produced significant improvements. The resistance bands produced significant improvements in vertical jump and the weighted vest produced significant improvements in 20-yard sprint speed.

Kujawa, Meghan

Robert Stacke, PhD

Music

*Considerations for the practice of music therapy with clients of Jamaica*

This research looks at the practice of music therapy and the importance of cultural considerations when working with multicultural clients, specifically those of Jamaica. Cultural awareness is vital in the practice of music therapy with Jamaican clients. Notable considerations were discovered by the researcher through firsthand experience conducting music therapy sessions in Jamaica, as well as supplementary readings concerning Jamaican music and society. Through this research, multiple important considerations were established, particularly concerning societal norms, regional musical styles, instrumentation, and song choice. By creating a knowledge base of different facets of Jamaican culture, the music therapist is able to develop a more effective therapeutic relationship with his or her clients. However, it is also important to note that each individual from a particular culture will have different experiences, making the information of this research a broad understanding of Jamaican culture that may not be specifically applied to all clients.

Larkin, Jessica

Tony Clapp, PhD

Health, Physical Education, and Exercise Science

*Effects of a 6-week High-Speed Sprint Program on Ice Hockey Skating Speed and Skate Speed Predictors*

Training programs utilizing high-speed treadmill sprinting have become common practice in the hockey community to improve skate speed. However, different muscles are recruited in skating as compared to running. It may be beneficial to attain off-ice performance variables to better predict on-ice speed and train accordingly.

**PURPOSE:** To determine the effects of a 6-week high speed treadmill running program on skating speed in male and female hockey skaters and to identify the strongest predictors of ice hockey skating speed.

**METHODS:** Thirty-six collegiate ice hockey players from a NCAA division III program, eighteen male (age= $19.5 \pm 1.1$  yr, ht. =  $187.0 \pm 8.1$  cm, wt.= $77.8 \pm 9.0$  kg) and eighteen female (age= $20.1 \pm 1.1$  yr, ht. =  $166.1 \pm 8.9$  cm, wt.= $68.8 \pm 9.1$  kg) participated in this program. Body fat by air displacement plethysmography, 40 yard sprint speed, one repetition max squat press, vertical jump, VO<sub>2</sub> maximum, and on-ice 35 meter skating speed were measured prior to sprint training. The athletes completed a six-week training program consisting of high-speed sprinting three days a week. Each sprint session consisted of 4 sets of 20 mph sprints on 0% incline for 20 meters then 4 sets of 20 mph sprints on 0% incline for 50 meters then 4 sets of 20 mph sprints on 10% incline for 20 meters with 90 seconds of rest between each set. Following training, the participants' performance characteristics were measured again.

**RESULTS:** After the six week period both the on-ice speed and off-ice sprint speed produced significant improvements. Average 40 yard dash score improved from  $5.93 \pm .22$  to  $5.79 \pm .31$  ( $p = 0.00015$ ). Average 35 meter skate score improved from  $4.67 \pm .16$  to  $4.54 \pm .23$  ( $p = 0.00118$ ). Additionally, this study revealed that the main predictor of 35 meter hockey sprint was 40 yard dash ( $r = .93$ ) and the analysis created a regression equation to predict on-ice speed based on 40 yard dash time: 35 meter skate time =  $0.2809 + 0.7218(40\text{-yard time})$ . The other four off-ice characteristics did not significantly contribute.

**CONCLUSIONS:** The use of off-ice sprint training for hockey teams during the off-season has taken on much added importance in the last decade and in this study, 6-weeks of high-speed treadmill training improved both running and skating speed. Supported by Augsburg College URGO program.

Lucchini, Kacie

Kristin Anderson, PhD

Art History

*Tattoos: Art or Cultural Oddity?*

Tattooing is one of the oldest and most widespread means of permanent body adornment. Dating back over thousands of years, tattoos have become more common as technological advances have been made in their design and application. However, tattooing is still not widely considered an art form. As tattoos play an increasing role in our society, the art world is challenged to accept them as more than just part of a deviant subculture, but as art. Tattooing is gradually becoming more the focus of academic work but is not yet a large field of study. By reading the work of tattoo historians, sociologists, psychologists, anthropologists, and doctors- and my personal experience in the tattoo community – I composed this research. I will aim to discuss the problems with tattooing fitting into the typical definitions of art and posit that by focusing on aesthetic value, technical skill, and artistic quality and with a gradual redefinition of what we consider art, tattooing will eventually leave its permanent mark on the art world.

Lund, Tim

Tony Clapp, PhD

Health, Physical Education, and Exercise Science

*Effects of a 6-Week Resistance Strength Shoulder Training on Throwing Distance in NCAA Division III Collegiate Football Players*

Seeking ways to improve throwing capabilities with shoulder strength and stability can be vital to overall athletic performance in any throwing athlete. **PURPOSE:** The purpose of this study was to examine the effects of a 6-week, specialized shoulder and rotator cuff, strength-mobility training program on throwing performance in non-quarterback, NCAA division III football players. **METHODS:** Twelve defensive-minded athletes from an NCAA Division III football team volunteered to participate in this study. The players (Age= $19.3 \pm 1.3$  yr, Ht. =  $182.2 \pm 5.1$  cm, Wt.= $88.7 \pm 4.5$  Kg) were matched and then randomly assigned to a shoulder strength training group ( $n=6$ ) or a non-shoulder training control group ( $n=6$ ). Throwing strength of each subject was determined by throwing a football for maximum distance. A t-test ( $p < 0.05$ ) was then calculated to determine if participation in the specialized shoulder training had a significant effect on the athlete's throw for distance. **RESULTS:** The mean ( $\bar{x}$ ) increase in throwing distance for shoulder training group was an increase from  $51.3 \pm 3.3$  yd. to  $53.3 \pm 2.2$  yd. Mean( $\bar{x}$ ) score for the control improved from  $51.25 \pm 2.6$  yd. to  $51.38 \pm 2.4$  yd. Subjects did show an improved throwing distance albeit not significant ( $p > .05$ ). **CONCLUSION:** This research showed that through this training, throwing distance for the training subjects did show an improved score albeit not significant.

Lurken, Marissa  
Tony Clapp, PhD  
Health, Physical Education, and Exercise Science  
*Effects of Rebounder Characteristics on Free Throw Performance*

Many factors influence optimal performance in athletics. Factors may include social facilitation, self-confidence, threats, and distracters. The presence of a human being may help or may be detrimental to a person's level of performance.

PURPOSE: The purpose of this study was to compare the performance of free throw shooting in the female collegiate basketball player employing either a male rebounder's presence, a female rebounder's presence, or no presence of a rebounder, to determine which condition would be most beneficial to enhance the free throw shooting performance.

METHODS: Thirteen intercollegiate athletes (age= $20.1 \pm 1.1$  yr, ht. =  $166.1 \pm 8.9$  cm, wt.= $68.8 \pm 9.1$  kg) participated in this program from an NCAA D-III Women's Basketball team were randomly assigned into one of three shooting order groups. All were required to shoot 30 free throws per shooting session for a total of 90 free throw attempts. One shooting session featured a self-phase rebounding format, where the female free throw shooter shot 30 attempts and rebounded the ball herself. One shooting session featured a male assistant who rebounded and passed the ball back, and one shooting session where the shots were rebounded and passed back by a female rebounder. Total makes for each shooting session was recorded. A repeated measures ANOVA was used to analyze the results ( $p < 0.05$ ).

RESULTS: Performance in the female subjects did not have significant differences between male rebounders, female rebounders, and no rebounders. When comparing the mean ( $\bar{x}$ ) of the three shooting formats, total made free throws had a p-value of 0.77 ( $p > 0.05$ ). The subjects average made free throws when rebounding themselves was 23.08. The average when a female rebounder was present was 22.46, and when a male rebounder was present the average was 22.15. The ANOVA test found a p-value of 0.95, meaning there was no significant difference found. The ANOVA also rejected the null hypothesis.

DISCUSSION: This study revealed that the presence of a test administrator (male or female), or not having one at all, showed no significant differences in performance between groups.

Ly, Nathaniel; Bowman, Eric  
Ben Stottrup, PhD  
Physics

*Image Analysis of Phase Separated Langmuir Monolayers Containing Polyunsaturated Fatty Acids*

Results from epifluorescence microscopy studies and image analysis of phase separated Langmuir monolayers of ternary mixtures containing polyunsaturated fatty acids (PUFAs), sphingomyelin, and cholesterol will be presented. We will focus on the results and implications from measurements of domain size distribution and area fraction for four different mixed acyl phospholipid species with varying degrees of unsaturation in the acyl chain (1, 2, 4, 6). We have applied a recently developed technique to measure the line tension of these systems using the size distribution [1]. This experimental approach allows us to investigate the relationship between the miscibility phase transition, line tension, and degree of unsaturation even for systems with small domains not otherwise amenable to line tension studies. [1] Lee et al., Relating Domain Size Distribution to Line Tension and Molecular Dipole Density in Model Cytoplasmic Myelin Lipid Monolayers. PNAS 108, 9425-9430.

Mahowald, James  
James Vela-McConnell, PhD  
Sociology

*Tattoos: Meaning and Identity Formation*

In Sociology, the symbolic interactionist perspective places heavy emphasis on symbols and the meanings we attach to them. Herbert Blumer (1969) laid out three premises to symbolic interactionism: (1) human beings act toward things on the basis of the meaning that the things have for them; (2) the meaning of such things is derived from, or arises out of, the social interaction that one has with one's fellows; and (3) this meaning is handled in, and modified through, an interpretive process used by the person in dealing with the things he encounters. Heavily influenced by the work of Herbert Blumer and Erving Goffman (who suggested theories of identity formation from a symbolic interactionist perspective), Richard Jenkins (1996) discusses how "our sense of identity is perhaps the most fundamental of all concepts in our efforts to understand human interaction". Jenkins suggests that "identity is our understanding of who

we are and of who other people are, and reciprocally, other people's understanding of themselves and of others (which includes us)". In other words, identity is all about the meaning that we attach to different symbols that arise in our interaction with other people. This research builds upon these ideas of identity formation and considers how the rise of tattooing in society has given people a new way in which to express and understand identity. In particular it looks at how individuals use tattoos and the meaning given to them to both reflect self identity and create social identity. The research seeks: 1) To identify the meaning given to getting a tattoo; 2) To identify how a tattoo- or tattoos- reflect the individual's conception of self; 3) To identify how those with a tattoo- or tattoos- interpret the perception and reactions of others; and 4) to identify how tattoos and tattooing reflects and shapes relationships and interactions.

Manning, Hillary

Colin Irvine, PhD and David Matz, PhD

English & Psychology

*Narrative Analysis and Discourse: Navigation of Story and Self in Emerging Adulthood*

The narrative turn in the social sciences has created demand for a new way of analyzing discourse. In the present study, 8 emerging adults (18-25 years of age) were interviewed for their life story. Additionally, participants were asked to describe the role 'story' has played in their lives. Interviews were analyzed narratively with an ear for common elements of self-other navigation, linguistic markers of temporal orientation, and meaning attribution. A dominant theme in many of the interviews was the concept of 'maturity'. One clip offered a particularly rich description, and was thus selected for further analysis. The clip was examined using methods of dialogical analysis to examine how one individual linguistically constructed meaning around a major theme in the lives of emerging adults (i.e. maturity). Preliminary analyses pointed towards a narrative tension between the dominant idea of what it means to be a successful adult, and what emerging adults perceive as possible in the current social and economic climate. This research suggests narrative analysis coupled with discourse analysis has great potential for identifying shared narratives, as well as exploring personal navigation of those dominant narratives.

Maru, Mahalet; Farah, Amal

Ron Fedie, PhD

Chemistry

*Physical Properties and Thermodynamics of Sodium Polyacrylate Forming A WaterLock Hydrogel Using an Equal-Cube Model*

Sodium Polyacrylate is remarkably water-absorbent. This polyelectrolyte had an increase of 250x its dry volume in forming a hydrogel. The enthalpy of mixing was exothermic helping to explain the apparent negative entropy of the ordered gel, measured to have greater density than water itself. An equal-cube model was applied to the Flory-Rehner-Peppas swelling model of cross-linked polymers. This allowed calculation of cubic volumes of water contained between linear polymer chains, cross-linked at the cube vertices. The water "nano-domains" cube edges were calculated to be 36nm at the maximum water:SPA gel ratio. FTIR spectra of increasing water concentrations from zero water to the gel point maximum confirmed a true "water-lock" up to the solvent-sphere ratio (5-7 water molecules per anion), and have approximately 6-7 layers of water molecules arraying out from the ions at the maximum water:SPA gel ratio. This equates to 12-14 layers between adjacent edge ions, reasonably agreeing with the cube model. Plasticizing the gel with NaCl was also measured to be exothermic. The thermodynamic energies and density changes of water to form the hydrogel will be used to further elucidate the gel's structure, both polymer and water solvent configurations, and the cube model assumptions will be addressed.

Meehan, Farrell; Safi, Amineh; Fritz, Carolyn; Mattos, Lizzy; Olson, Charlie

David Matz, PhD

Psychology

*Eye tracking and police lineups: The effect of the Appearance Change Instruction*

Little empirical research has been done on the effect of Appearance Change Instructions (ACI) on correct identifications of perpetrators in police lineups. An ACI, a statement that certain physical features such as hair, facial hair, and skin tone may have changed since the time of the crime, is sometimes used by police departments when eye witnesses are presented with lineups of suspected perpetrators. We hypothesized that the ACI is beneficial in providing more correct identifications by eye witnesses. We also hypothesized that the ACI will cause the participants to focus their attention on specific facial features. To test our hypotheses, participants from the

Augsburg Psychology Department Participant Pool were recruited to watch a short video of a crime and then evaluated a picture of a suspect while their eye fixations were monitored. Half of the participants received an ACI, the other half did not. Within each instruction condition, some participants viewed a picture of the culprit, some viewed a picture of the culprit with an appearance change, and some viewed a picture of an innocent suspect with similar characteristics to the culprit.

Melka, Yemissrach

Vivian Feng, PhD

Chemistry

*Catalytic reduction of p-nitrophenol by dendrimer encapsulated Cu, Pd and Pt Nanoparticles*

P-nitrophenol is used in the manufacturing of different types of drugs, insecticides, fungicides and darkening of leather. It is highly corrosive and exposure to it causes headaches, nausea, and drowsiness. By using dendrimer encapsulated nano-particles, this research investigates the kinetics, the intermediates, as well as the end products formed from p-nitrophenol reduction. Copper (II), Palladium (II) and Platinum (II) cations are loaded into dendrimer molecules that act as templates in which the nano-particles of dimensions less than 2 nm are formed. These dendrimers act as an effective shield keeping the nano-particles from agglomerating, hence forming particles of uniform size and high surface area. The kinetics for each of the nano-particles was studied and the components of the final mixture were analyzed.

Morris, Rob

Ron Fedie, PhD

Chemistry

*Research Octane Number (RON) Predictions Using Simplified Structural and Entropy Parameters in a Linear Fitting Approach*

This research project analyzed models for the prediction of the research octane number (RON) for saturated hydrocarbons and invented one that is of equal accuracy, yet simpler to understand using only linear molecular combinations of: linear chain length, number of chain branches, and branch location. Additionally, the molar entropy (as energy density) was added along with the simpler molecular considerations. The match to experimental RON values was very good, and best when molecules of low entropy density (most-ordered, symmetric molecules) were considered. For instance our predicted RON value for neopentane (2,2-dimethyl propane), a "tough" one to predict with earlier models, was 86.9 and the experimental value is 85.5 (Amer. Pet. Instit.). Thus, the inclusion of entropy considerations proved integral to the success of the model and should be looked into further for future hydrocarbon combustion models for predicting RON values, as our model proved to be highly accurate and could provide an economically sensible GC or other analytical alternative compared to traditional engine fuel testing.

Mosher, Marceleen

Kristen Chamberlain, PhD

Communication Studies

*There is no Fracking Problem: The Representative Anecdote of Environmental Technology in Halliburton's Hydraulic Fracturing Discourse*

Hydraulic fracturing, or fracking, is a controversial resource extraction method with implications for public health, national security, the economy, and the environment. Discourse about fracking has to represent the multiple sides of a complex issue. Burke's representative anecdote is a useful critical perspective for exploring how fracking discourse is shaping the public's understanding of this process. Halliburton employs representative anecdote of environmental technology to persuade that the hydraulic fracturing technologies they use are more than environmentally friendly; they are an example of technology and the environment working together for the benefit of all. Environmental technology provides a justification for further fossil fuel extraction rather than foster a shift toward energy conversation. In addition, the environmental technology anecdote presents a reality where people can stop worrying about the environment because technology can and will fix environmental problems.

Moua, Shoua

Michael Buck, PhD

Music

### *An Investigation of Instrumental Hmong Folk Music in the North American Diaspora*

Hmong instrumental folk music, like similar music of other cultures, possesses a long and purposeful history. Hmong music is largely unknown to most people. Through this qualitative research, I hope to contribute to a growing archive of Hmong history, disseminating this information to those within and outside of the culture. Instrumental Hmong folk music has been passed through many generations by oral and aural methods. Due to these traditions and the lack of written resources, learning Hmong folk music is difficult. Hmong elders and performing musicians are the carriers of this rich cultural history. Research for this paper includes gathering Hmong instrumental artifacts, interviewing teachers and performers, and describing similarities and differences to Western classical music. A valuable resource to this research and community was the Hmong Cultural Center in St. Paul, Minnesota. A notable finding of this research includes the observation that traditional usage of folk music have changed slightly. Traditional Hmong culture combined with American culture to influence the role of music in courtship. However, contemporary uses of folk music through religious ceremonies, festivals and funerals remain largely the same.

Myrmel, Tiffany  
Professor Deb Redmond  
Communication Studies  
*Deep Democracy*

Conflicts and decision making processes are commonly avoided by people around the world. Myrna Lewis believes this is an unhealthy outlook that commonly creates superficial and fragile relationships. Along with help from Arnold Mindell and Myrna's late husband, Greg, she developed a four step method for addressing conflict and reaching decisions groups can agree on. Mindell provided the beginning point of Process Orientated Psychology, which Greg and Myrna used to develop what was dubbed Deep Democracy. Mindell also created his own interpretation of what deep democracy means in his theory of Worldwork. Lewis provides a way to help everyone be included in the decision making process and feel their views are being taken into consideration in a four step process. She adds an optional fifth step to address any disruptive conflict that might be uncovered in the process. This methodology could work well in education systems. If introduced to students at a younger age, this methodology could eventually permeate the workforce more quickly and help improve decision making processes in personal lives as well as in professional situations.

Noland, Brianna  
Stella Hofrenning, PhD  
Economics  
*An Economic Analysis of Financial Factors on Undergraduate Persistence*

Undergraduate college enrollments have increased in previous decades, but persistence and completion rates have not increased at the same rate. This study explores several possible reasons for this trend. First, student loan debt levels have steadily increased, which may impact students' persistence decisions, either directly or indirectly. Persistence rates may fail to increase with enrollments due to debt aversion, as some students may be reluctant to incur debt. Student and institutional characteristics, such as age, socioeconomic status, and tuition level, among others, may also have an impact on persistence decisions. Logistic regression analysis is employed on data collected from the National Center for Education Statistics Beginning Postsecondary Students survey (04:09) to analyze the relationship between student demographics, institutional characteristics, and education financing methods on within-year persistence. Loans proved to have a small positive impact on persistence, as did tuition level and need-based aid. Student and institutional characteristics demonstrated mixed effects on the probability of within-year persistence. Data on factors contributing to persistence can provide insights to inform improved financial aid policy and the importance of student support programs.

Okeke, Promise  
Ben Stottrup, PhD  
Physics  
*Comparison of line tension measurements in lipid monolayer*

The cell membrane is crucial to life, as it protects the cell from its environment. The cell membrane is made up of a lipid bilayer self-assembled from two monolayers. In our lab, we study lipid monolayer. We analyze a series of images to measure the line tension of

the liquid-ordered domains. Line tension regulates domain shape and directs domain formation. Following a previously published method in PNAS June 7, 2011 vol. 108 no. 239425-9430, we have written software which extracts the line tension between liquid-ordered domains and liquid-disordered phases by fitting a size distribution of liquid-ordered domains. We compare these results to line tension measurements based on another previously published technique. The values of line tension gotten from the two different methods were each plotted against surface pressure to observe the relationship between line tension and surface pressure. Our preliminary finding suggests some agreements between the two methods.

Olson, Charlie  
David Crowe, PhD  
Biopsychology

*Studying Brain Activity during Perception: A Comparison of Correlations across States of Perception*

Visual stimuli can be processed by the brain without reaching a state of consciousness. A previous experiment in our laboratory demonstrated that subjects shown an annulus made up of randomly-moving dots sometimes perceive a rotary motion of the dots and at other times perceive no motion. This experiment revealed that patterns of brain activity were more stable during perception. The hypothesis for this study was that this stable state is accompanied by, and perhaps mediated by, an increase in connectivity between areas of the brain. This theory was tested by measuring, via magnetoencephalography (MEG), the amount of correlated brain activity during periods when subjects perceived rotary motion and periods when they did not. It was found that the correlations between activity of MEG sensors was not significantly higher during states of perception. Additionally, inhibitory feedback from the front of the brain to the early visual areas during perception was found.

Owusu, Nana  
Mark Engebretson, PhD  
Physics

*Investigating the IMF Cone Angle Control of Pc 3-4 Pulsations Observed on the Ground, 1: Initial Results*

Electromagnetic waves with low frequencies, denoted Pc 3-4 pulsations, are generated in Earth's ion foreshock upstream from the bow shock. These waves, whose frequency is directly proportional to the magnitude of the interplanetary magnetic field (IMF), are most often observed in the dayside magnetosphere and on the ground when the angle between the IMF and the Earth-Sun line is  $< 45^\circ$ . In this study we compared the occurrence and frequency of band-limited Pc 3-4 pulsations observed by search coil magnetometers at four stations on Svalbard from June 1, 2010 to December 31, 2011. Data about the IMF were retrieved from OMNI database to calculate IMF cone angle and frequency. This frequency was overplotted on 0-100 mHz daily Fourier spectrograms from these stations, and its trace was color-coded to represent 3 cone angle ranges:  $0^\circ - 40^\circ$ ,  $40^\circ - 50^\circ$ , and  $50^\circ - 90^\circ$ . These spectrograms then provided a quick visual test of the expected IMF control of the observed waves. Some days with band-limited Pc 3-4 waves within 4 hours of local magnetic noon there was good agreement with the expected wave frequency, and on most days with low cone angles as well, however, a number of days showed band-limited Pc 3-4 waves simultaneous with cone angles considerably larger than  $50^\circ$ .

Pell, Nicholas  
Donald Gustafson, PhD  
History

*Pragmatism in History: George Washington and His Use of Pragmatism in the American Revolution*

History remembers George Washington as a soldier in the French and Indian War and as the hero of the American Revolution. Since this time, Washington has always been praised for his accomplishments and the great decisions he made. However, what if these choices were not the most practical ones Washington could have chosen? During his time as Commander of the Continental Army, Washington dealt with an unhappy soldier via letter exchange, launched a seemingly peaceful expedition into Canada, and interacted with the Native Americans. By using his recorded experiences as the basis for his decisions, I have found that while Washington did make some pragmatic choices, there were choices he made which were not by any means pragmatic.

Perrin, Joe  
Mark Engebretson, PhD



## Physics

### *Pc 1-2 waves Observed at Geosynchronous Orbit and on the Ground at Subauroral Latitudes: Dependence on Local Time and Storm Phase*

Earth's magnetic field reaches out far into space and creates a huge volume called the magnetosphere. This magnetosphere protects our planet from energetic particles and dangerous radiation emitted from the Sun. Some of the energy trapped by the magnetosphere generates plasma waves which magnetometers on satellites and on the ground are able to detect. I collected magnetic field data from two Earth-orbiting weather satellites and five high-latitude ground stations and analyzed waves with frequency around 1 Hertz that occurred during a full year from September 2011 to August 2012. The purpose of analyzing these waves was to investigate their relation to solar activity and time of year, and whether there was any correlation between the ground stations and satellites. We found that the waves detected were mostly present before, during, and several days after a magnetic storm. Several studies have shown that at the orbit of the weather satellites, these waves occurred most often in the afternoon sector, and our data support that. However, in the region of the Van Allen radiation belts, a focus of much current research, we found these waves to be rather evenly distributed in local time. We also found that Pc 1-2 waves occurred more during the spring and summer rather than the fall or winter seasons, at least during this year.

Puch, Carly

Diane Pike, PhD

Sociology

### *Representation of Disabled Characters in Current Primetime Television*

Representations of persons with disabilities today, specifically television programs, are often distorted. Previous studies are outdated or focus only on one show (Reid-Hresko, Reid 2005; Tropp 2005; Elliot, Byrd and Byrd 1983). This pilot study aims to bridge that gap by examining how characters with disabilities are currently represented by television. Twenty television programs aired between 2000-2010 were selected by a stratified random sample, 1 episode from each program. Programs range from comedy shows such as *The Big Bang Theory* to dramas such as *Criminal Minds*. The central research question is: how do television programs portray characters with disabilities and how have those portrayals changed over time? The results show that portrayal of characters who are disabled has changed over time but continues to often negatively present people with disabilities. Programs mostly portray white men with disabilities, which is in direct conflict with the demographic of people with disabilities in the United States. Role characteristic findings show that contrary to prior research (Longmore 1987), the character is less often a victim of violence, but more likely to be used as comedic relief. Future studies should focus on analyzing a larger sample.

Rich, Megan

Ann Impullitti, PhD

Biology

### *The use of Metabolites Produced by Fungal Endophytes to Reduce Growth of the Soybean (*Glycine max* (L. Merr)) Pathogens *Sclerotinia sclerotiorum* and *Diaporthe phaseolorum**

Fungal endophytes colonize their host plants asymptotically, and some have been shown to produce metabolites that suppress plant diseases. The purpose of this experiment was to determine if fungal endophytes isolated from soybeans (*Glycine max*) would inhibit growth of *Sclerotinia sclerotiorum* (Ss) and *Diaporthe phaseolorum* (Dp), the causal agents of the soybean diseases white mold and stem canker, respectively. Thirty-six endophytes were individually grown in a broth culture for 7 days and metabolites collected by separating the fungal mass from the broth using filtration. Metabolite concentrations of 0%, 5%, 10% and 20% (v/v) were then added to media, and each treatment was replicated three times and experiments were replicated twice. A 3x3 mm<sup>3</sup> cube of Ss or Dp was then placed on the amended media, and growth of the pathogens was evaluated every other day for 10 days. Of the endophytes that were evaluated, ten and four of the endophytes produced metabolites that significantly reduced growth of Dp and Ss, respectively, at concentrations of 10 and 20%. A 10% concentration of metabolites of the endophytes *Fusarium* sp.1 and an endophyte unable to be identified by sequencing (Unknown #2), reduced growth of Ss by 60% and 40%, respectively. A 20% concentration of metabolites of the endophytes *Fusarium* sp.1, *Fusarium* sp.2, *Fusarium* sp.3, and Unknown #2, reduced growth of Dp by 10-20%. We are currently developing assays to evaluate the effectiveness of the endophytes to reduce pathogens in soybean plants.

Ritchea, Dustin

Tina Tavera, Director, McNairs Scholars Program, Brian Greening, Assistant Director, McNair Scholars and Colin Irvine, PhD  
English

*Realistic Fantasy and Sub-creation: A Narratological Approach to Evaluating Storyworld Construction by Using J.R.R. Tolkien's Middle-earth*

This research examines why some fantasy stories feel real and others feel contrived or sentimental. Using J.R.R. Tolkien's Middle-earth to establish criteria for measuring and mapping a story world's re-presentation of reality, I essentially ask how readers interact with and create realistic storyworlds. Relying primarily on elements of narrative dynamics and Tolkien's insights on the creation of artificial worlds, I have developed a set of criteria to evaluate fantasy storyworlds; these include the following: 1) The storyworld's temporality and textual space can be mapped. 2) It is possible to identify nested frames and an implied author, in other words, one can identify who knows what when. 3) The textual reference world of the implied storyworld draws reference from, or allows readers to interact with, the actual world. 4) Magic, races, history, language, and characters' motivations have continuity with, and stay consistent to, the implicit and explicit laws of the storyworld. 5) The storyworld has a balance of unnarratable elements that allow readers to perceive vastness or mysticism, as if the readers are looking only at the portion of the full history. 6) The closure of the storyworld should not be predictable, it should however, be plausible by building from the summation of all events and information.

Rodriguez-Sotelo, Trevor

Brian Sangeorzan, PhD, Laila Guessous, PhD and Alex Alkidas, PhD

Engineering

*Physics*

Due to the demand for smaller, yet more powerful engines, higher specific output engines are currently being used in the automotive industry. However, power outputs are limited by the material properties of the piston crown as it reaches temperatures above 300°C. Oil cooling jets are one method that is currently being used to cool the under-crown area of the piston head. Yet, very little research has been done on predicting the rates of heat transfer to such jets. In particular, little is known about the heat transfer coefficient between the jet and the surface, which is needed to predict convective heat transfer rates. In this study, we developed an apparatus to experimentally measure the heat transfer coefficient between an oil jet and a flat plate and performed a Design of Experiment analysis to select the test conditions. Computational Heat Transfer simulations of the temperature distribution in a flat disk were performed to assist in the placement of the thermocouples.

Rutten, Emily

David Crowe, PhD

Biopsychology

*Perception of Causality*

Humans perceive causal relationships in their everyday experiences, often making judgments based on these perceptions. Our laboratory is interested in studying brain activity during causal perception, but before we can implement such an experiment, we must first determine suitable stimulus parameters. We explored the effects of two parameters, probability and timing, on subjects' perception of causality. Subjects viewed a display of moving and colliding spheres and reported whether or not the collisions of the spheres caused them to change color. In one experiment, we varied the time between sphere collision and color change; the color change could occur at various intervals either before or after the collisions. We found an inverse relationship between the distance in time between events and perception of causality, as well as an asymmetric effect whereby subjects were much more likely to assign causality when the collisions occurred before the color. In the second experiment, we varied the fraction of colliding spheres that resulted in a color change. We found a correlation between the fraction of collisions producing a color change and causal perception. Interestingly, subjects fell into two distinct groups, based on their tendency to assign causality to the stimuli.

Sasik, Lisa

Tony Clapp, PhD

Health, Physical Education, and Exercise Science

*Acute Changes in Cholesterol with a Single Session of Strength and Cardio Training in Moderately Fit Adult Males*

Exercise has been shown to reduce the risk of cardiovascular disease (CAD). Chronic exercise has been associated with a decrease in total cholesterol and an increase in HDL.

PURPOSE: To examine acute changes in total cholesterol over one single session of strength and cardio training.

METHODS: Ten male faculty members from Augsburg College (age =  $42.5 \pm 4.4$  yrs, Vo<sub>2</sub> max 39.9 ml/min, ht. =  $72.0 \pm 2.9$  in, wt. =  $188.5 \pm 15.9$  lb) participated in strength training consisting of 2 sets/12 reps on 8 weight machines and 25 minutes of treadmill cardio training @ 70% max heart rate. Total cholesterol was obtained at rest, post strength training, post cardio, and 15 minutes post exercise.

RESULTS: Mean (x) cholesterol was  $226 \pm 49.5$  mg/dl at rest,  $242.8 \pm 44.7$  mg/dl post strength training,  $237 \pm 47.7$  mg/dl post cardio training, and  $228 \pm 47.4$  mg/dl following 15 min rest. There was not a significant difference between any of the total cholesterol readings ( $p > 0.05$ ).

CONCLUSION: Elevations in cholesterol levels occurred with exercise with a notable increase following strength training, albeit not significant. However, further research could validate these findings with larger sample sizes.

Schiek-Abdi, Ugaso  
Stella Hofrenning, PhD  
Economics

*Transit Behavior of Light Rail Commuters in Minnesota: An Econometric Analysis*

Urban planners and policy makers frequently advocate for public transportation as a sustainable alternative mode of transportation in comparison to driving. The negative effects of driving or automobile dependency, is responsible for increased greenhouse gas emissions, traffic congestion, automobile fatalities and urban sprawl. Light rail transportation is an attractive option for many regions as its construction can easily be incorporated into existing infrastructure and can increase accessibility to urban centers. Proponents of light rail transit argue the increased accessibility garnered by light rail transit can help mitigate the effects of urban sprawl, the flood of property development away from urban areas. The Hiawatha Line is the first light rail transit system in the Minneapolis-St. Paul metro region and offers service from the urban center of downtown Minneapolis, to the southern metro region and several central business districts such as the Mall of America. This study investigates consumer behavior by linking demographic data and transportation patterns of users who live in within a specified distance of the Hiawatha LRT with their transit mode choice to the station closest to their residence. The mode choice decision process of light rail transit users is modeled by a multinomial logistic regression to calculate the probability of choosing to bike, rideshare or walk to a light rail station compared to driving. Significant relationships were determined between home location and mode choice, as well as some demographic factors such as income, gender, long-term public transit behavior, and trip purpose of recreation. Based on the scarcity of previous literature on this subject, this study recommends longitudinal transit behavior surveys be conducted by metropolitan regions to assess the viability of a particular public transportation model, based on the long-term mode choice behavior of its residents.

Schmit, Peter  
Matt Beckman, PhD  
Biology

*RNA Interference (RNAi) to Regulate Gene Expression and Gene Cloning in Daphnia Magna*

The crustacean *Daphnia pulex* has recently had its genome sequenced, which revealed over 30,000 genes. A closely related species that is the focus of much study in environmental toxicology is *Daphnia magna*, but one problem is that methods for gene characterization are not well developed in either organism. One method of characterizing genes is the use of RNA interference (RNAi), which uses short segments of RNA and the organism's cellular machinery to reduce the expression of specific genes. Using homology searches and PCR, known genes in the dopamine pathway from the fruit fly *D. melanogaster* and *D. pulex* were used to clone gene fragments from *D. magna*. In addition partial fragments of the distalless gene, which has been implicated in appendage formation in other organisms, and has been shown to control *Daphnia magna* 1st and 2nd antennae lengths, were also isolated and used for RNAi. Here I report on the successful isolation of various dopamine neuron specific gene fragments. These gene fragments were for in vitro synthesis of dsRNA, which was used for RNAi. Early stage *D. magna* embryos were extracted from pregnant females and injected with these various dsRNA molecules. This work has led to the successful cloning of genes from *Daphnia magna* and the beta testing of a micro-injection method as a way of introducing dsRNA to *D. magna* embryos.

Sievert, William  
Evren Guler, PhD  
Psychology

*Individual Differences in Autobiographical Memory: The Role of Working Memory*

This study will examine the relationship between Working Memory Capacity (WMC) and ability to recall specific autobiographical memories. College students will be recruited via an online recruiting system to participate in the study. Each participant will complete a working memory task and an autobiographical memory task. The working memory task, called the Ospan task, will involve holding a series of 3-7 letters in the memory while completing math problems between the viewing of each letter. The autobiographical memory task will involve responding with a specific autobiographical memory to each of ten cue words (bird, shoes, book, clock, apple, mountain, market, plate, flag, and ice cream). We hypothesize that the participants who score high on the WMC activity will record significantly more memories than those who do not score as high. We also hypothesize that the memories recorded will be more specific in the high WMC group.

Stevens, Zach  
Dawn Lowe, PhD  
Medicine

*Cardiac Response to Voluntary Exercise in Dystrophic Mice*

There is ongoing debate over whether exercise benefits boys with Duchenne-Muscular-Dystrophy (DMD). The disease is characterized by a failure to produce the protein dystrophin, leading to muscle deterioration. Because of this, treatment often focuses on maintaining mobility. However, the weakening of cardiac muscle is often the cause of death in DMD patients. Previous research has shown that exercise benefits dystrophic skeletal muscle, but less is known about the heart's response. This study tests the hypothesis that voluntary, low-intensity exercise causes no additional damage (such as fibrosis, deleterious hypertrophy, or other signs of cardiomyopathy) to dystrophin-deficient cardiac muscle. To investigate this, 4-week-old mdx mice (a mouse model for DMD) were assigned cages with (RUN, n=9) or without (SED, n=5) running wheels. Mice with wheel access ran 2.0 to 7.4km/24-hours. After 8 weeks, mice were sacrificed and hearts were examined histologically and biochemically for collagen content. Real-time-PCR was used to measure changes in gene expression associated with fibrosis and heart failure. No data obtained has shown that voluntary exercise increases fibrosis or heart damage. However, further investigation of heart functionality is required after finding higher levels of Myosin-Heavy-Chain-Beta (an early sign of heart failure) in RUN mice than in SED mice (p=0.014).

Stoiaken, Alexandra  
Diane Pike, PhD  
Sociology

*The Evolution of Female Investigative Portrayals in Television Crime Drama*

One of the ways society is structured is around gender. The media contribute to society's construction of gender through television shows. Crime dramas such as *C.S.I.* and *Criminal Minds* are typically male dominated. While progress has been made, (for example, the recent end of the direct combat exclusionary rule for female service members), occupational gender biases remain. The purpose of this pilot study is to explore the constructions of female investigators in television crime dramas over time. Do shows demonstrate a balance between the female investigator's family and work life? Does role stereotyping exist around emotion? Is there a difference between the gender of the victim and suspect in female led crime dramas? A longitudinal study was performed using a content analysis methodology. The sample consisted of four crime dramas: *Honey West* (1960s), *Police Woman* (1970s), *Prime Suspect* (1990s) and *The Closer* (present). Variables examined include: emotional response to a case, victim and suspect gender, conflict, and showing of non-professional side. Findings suggest these shows still portray female investigators with a highly masculine appeal; however, there is also a distorted degree of femininity leading to sexual objectification rather than a balance of power between sexes.

Svanoe, Rachel  
Sarah Combellick Bidney, PhD  
Political Science

*For Parents of White Children: Towards a White Racial Identity for a Just Society*

In the United States, there is a disturbing contradiction that persists between the contrasting realities of empirically demonstrable racial injustice and a racial majority group that is largely unaware of its severity. The default socialization process of White children in the United States is one that produces, at best, a limited understanding of their own, albeit unintentional role in the maintenance of societal racism. Scholars of race and Whiteness have studied the ways in which this particular racial "unconsciousness" continues to be reproduced and other scholars have studied the ways in which this "unconsciousness" can be transformed. Drawing on this scholarship, this paper focuses on three aspects of the default socialization of White children, describes the ways in which they contribute to an uncritical white racial identity, thus sustaining racism, and then proposes ways in which an antiracist white identity could instead be facilitated in White children towards a more just society.

Sward, Ryan

Tony Clapp, PhD

Health, Physical Education, and Exercise Science

*Effects of Caffeine on Anaerobic Sprint Performance among DIII Collegiate Athletes*

Evidence from the research literature suggests that 150 to 250 mg of ingested caffeine (~ 2 cups of coffee) improves exercise (aerobic endurance) performance. Some studies report an improvement in anaerobic exercise performance with caffeine while other studies have reported no improvement in anaerobic exercise performance with caffeine. the purpose of this study was to examine the effect of caffeine on short-term, high-intensity exercise in trained, D-III athletes using anaerobic sprint exercises to determine if it potentially impacts performance. Fourteen college athletes participated in running two sets of two 40 yard sprints before and after caffeine consumption. The average sprint time before caffeine consumption was 5.004 seconds. The average sprint time after caffeine consumption was 4.971 seconds.

Uahengo, Gottlieb

Elisa Maldonado, PhD

Engineering

*Development of Basic Visual Cortex Algorithm*

We have successfully demonstrated the counting and tracking of particles, using computer vision. The algorithm, built using MATLAB, has demonstrated satisfactory aptitude in the detection and assimilation of data from a series of digital images. Images were preprocessed using Mathematica 8.0 and segmented to generate binary image, from which particle data is acquired, stored and used to map particles through an image sequence.

Wahlstrom, Amber; Manning, Hillary; Kroma, Jartrud

David Matz, PhD

Psychology

*Does a Woman's Hair Color and Length Affect Perceptions and Attentional Focus?*

Research has demonstrated that a woman's hair length and color can influence perceptions of traits that are said to be desired by potential mates, such as youth, health, and attractiveness. It is believed that these traits serve as signals to biologically important information (such as fecundity). In the present study, we tested the hypothesis that variants in hair length and color might influence how perceivers attend to different features of a target. Male participants viewed photos of women who differed in terms of their hair length and color. While viewing the photos, the men's eye-movements were tracked. Preliminary results indicate that participants fixated more often on the facial features of women with medium-length hair than those with short hair. Additionally, participants fixated more often on the facial features of women with black hair than women with brown hair.

Waters, Ashley

Sandra Olmsted, PhD

Chemistry

*A Method of Synthesizing Organic Scaffolds for Radiopharmaceutical Diagnostics and Therapeutics*

An easy, practical, and fast protocol for the synthesis of a library of coordination compounds using 2-(aminomethyl)pyridine, two different aldehydes, and three different boronic acids via the Petasis-borono-Mannich reaction was investigated. Four different organic molecules were successfully synthesized in dichloromethane, chloroform or acetonitrile. The products were isolated by simple filtration, and purified by recrystallization. Slightly impure products were obtained. The project proved to highlight the potential that the PBM reaction has in the organic synthesis of a library of coordination compounds convenient to nuclear chemistry, with the vinyl boronic acids being the most reactive of the four used.

Willborg, Jessica; Weitz, Anna; Hinz, Sandra

Jennifer Bankers-Fulbright, PhD

Biology

*Human Airway Secretions Inhibit Pseudomonas aeruginosa Activity: Effects on Survival, Growth, and Flagellar Motility*

*Pseudomonas aeruginosa* is a ubiquitous opportunistic pathogen that is a leading cause of morbidity and mortality in patients with cystic fibrosis (CF). The relative selectivity of *P. aeruginosa* colonization in CF patients suggests that the CF airway, in contrast to normal airways, is particularly hospitable to *P. aeruginosa*. One likely possibility for this difference is that normal but not CF airways secrete compounds that attenuate the virulence of *P. aeruginosa* and prevent colonization. In this study, we examined the ability of normal airway epithelial secretions to inhibit two properties of *P. aeruginosa* associated with colonization: proliferation and flagellar motility. For these initial experiments, we used apical secretions from polarized Calu-3 cell monolayers and the *P. aeruginosa* strain PA14. Treatment of PA14 cells with Calu-3 secretions dramatically reduced both average swimming speed (30 vs. 15  $\mu\text{m}/\text{sec}$ ) and the number of motile bacteria (56% vs. 42%). Inhibition of PA14 growth was not seen after 24-hours of incubation with Calu-3 secretions, in contrast to previous reports. Our preliminary attempts to identify the active component(s) in Calu-3 secretions suggest that one or more proteins >50 kDa are responsible. We conclude that normal airway epithelial secretions directly inhibit certain *P. aeruginosa* functions associated with airway colonization.

Yang, Nou

Shana Watters, PhD

Computer Science

*Impeding Business and Hindering Productivity: Would SOPA and PIPA Negatively Affect Businesses on the Internet?*

The Stop Online Piracy Act (SOPA) and the Preventing Real Online Threats to Economic Creativity and Theft of Intellectual Property Act of 2011 (PIPA) are legislation created by the United States Senate and House of Representatives to try and stop copyright infringement on the Internet. However, a wide range of businesses that rely on Internet commerce are concerned the legislation could negatively affect them if passed. Other companies, like the Recording Industry Association of America (RIAA), believe the legislation could help curtail piracy on the Internet. SOPA and PIPA have caused so much controversy because of the ambiguous language in both texts, and the abstruse phrasing is the reason why businesses involved in Internet commerce are worried. The language of the legislation can be interpreted in many different ways. This research focused on translating and annotating the legislation for ambiguity. Public comments were collected and compared to the annotations. The legislation, SOPA and PIPA, were rewritten and changed to become more explicitly written. By clarifying the legislation, piracy could be curtailed and the rights of online companies targeted by the legislation could be safeguarded. More specifically, the producers of the media being stolen would be more fully protected if the legislation were more precise.

Zank, Allison; Sorum, Alex

Jennifer Bankers-Fulbright, PhD

Biology

*Human Airway Epithelial Secretions Inhibit the Formation of Pseudomonas aeruginosa Biofilms*

*Pseudomonas aeruginosa* is a ubiquitous opportunistic pathogen that rarely causes respiratory disease except in individuals with specific risk factors, such as cystic fibrosis (CF). The ability of *P. aeruginosa* to readily form biofilms in vivo is associated with airway colonization in susceptible individuals. Thus, we hypothesized that non-CF airway epithelial cells secrete one or more compounds that inhibit *P. aeruginosa* biofilm formation. To test this, we modified and optimized a static biofilm assay and tested the ability of apical Calu-3 cell secretions to inhibit biofilm formation by the *P. aeruginosa* strain, PA14. PA14 formed robust biofilms after 18-24 hours and

biofilm formation was significantly inhibited in the presence of Calu-3 secretions. Preliminary experiments using secretions from a Calu-3 cell line not expressing the CF transmembrane regulator (CFTR) suggest that CF-like secretions do not inhibit PA14 biofilm formation. Thus, normal airway epithelial cells, but not CF-like epithelial cells, appear to secrete one or more compounds that inhibit *P. aeruginosa* biofilm formation.