

2017 Symposium Abstracts

Afternoon Individual Presentations

AN ASSESSMENT OF THE ACCOMPLISHMENTS UNDER THE MILLENNIUM DEVELOPMENT GOALS

Presenter Ahimbisibwe, Isaac
Graduate, Economic

Mentor Prof. Rati Ram

Since the adoption of the UN Millennium Declaration by world leaders in September 2000, Millennium Development Goals (MDGs) have defined a large part of the scholarship and policy formulation relative to economic development in the developing countries. Since the last reference year for the MDGs was 2015, this research makes an assessment of the accomplishments related to the MDGs. The exercise has two parts. In the first part, an indication is provided of the extent to which selected targets for the various Goals have been met. It is shown that, as has been suggested also by the United Nations and the World Bank, success in reaching the targets varies considerably across the Goals. For example, poverty-reduction and access-to-water targets have been exceeded, while there is a shortfall in attaining the targets for maternal mortality and access-to-sanitation. The second part of the exercise, which is the core of this work, explores the extent to which the Millennium Declaration is likely to have made a difference in the progress on different targets. This is done by comparing, for each target, the global and regional pre-Declaration trends from 1990 to 2000 with the corresponding post-Declaration trends between 2000 and 2015. It is found that while the post-Declaration trends are higher in most cases, there is considerable variation in the difference, both globally and regionally, between the trends for the two periods and thus in the extent to which the Declaration may be deemed to have made a difference.

TEMPORAL AND SPATIAL VARIATION OF THE WATER TABLE IN RESPONSE TO TILE DIVERSION IN A RIPARIAN BUFFER

Presenter Akara, Mahawa-Essa Mabossani
Graduate, Geography/Geology

Mentor Prof. Eric Peterson

Subsurface drainage is a commonly used practice in the Midwest to increase agricultural profitability, but contributes to nitrates pollution. Due to the risk of excess nitrates on human health and aquatic ecosystems, different drainage management approaches have been developed; tile diversion represents one of these approaches and consists in redirecting a portion of drainage effluents into buffer zones before it enters surface water channels. This study aimed at better understanding the effect of tile diversion on the water table using the seismic refraction approach. Five seismic surveys were run at T3 and LKC research sites in Mclean County (IL), from September to November 2016. Seismic data were interpreted using the Rayfract tomography software. Results of the 2-D model suggest that the lithology has a strong influence on the ability of the seismic refraction method to delineate the water table. At LKC site where the surficial lithology is predominantly sandy outwash of the Henry Formation, the water table represents a distinct refractor as opposed to T3 site where clay materials are predominant.

importance of personal values, how well one "lives up to" their personal values, distress, and stigma associated with seeking psychological help. Data will be analyzed via hierarchical multiple regression analyses.

GUT FEELING: ILF CLUSTER FORMATION IN HATCHLING RED-EARED SLIDERS

Presenter	Ashford, Marc Graduate, Biological Sciences
Mentor	Prof. Laura Vogel
Co-Mentor(s)	Prof. Rachel Bowden
Authorship	Marc Ashford; Sarah Palackdharry; Rachel Bowden; Laura Vogel

An often underappreciated aspect of the immune system is gut immunity. Gut-associated lymphoid tissue (GALT) is essential for protection against ingested pathogens (many consumed in food) and maintenance of gut flora in general. It is estimated that over a trillion bacteria may inhabit the human gut at any given time and mismanagement of this population can lead to many gut-associated illnesses such as inflammatory bowel disease and others.. While much is known about mammalian gut immunity, it is poorly understood in reptilian species. Recent studies from our lab have identified isolated lymphoid follicles (ILFs), a common type of gut lymphoid tissue, in the red-eared slider turtle (*Trachemys scripta*). In mammals, ILF formation is not developmentally driven, but rather antigenically stimulated and changes over time, but it is unknown if this is also true in reptiles. Our lab has also previously found B cell function is impacted by temperature, but the effect of temperature on ILF development and function is unknown. In this study, we examined the appearance of ILFs in hatchling sliders to better understand the development of ILFs in these young animals. Additionally, we investigated the effect of incubation temperature on formation and distribution of ILF. We hypothesized that hatchlings incubated at higher temperatures would yield higher amounts of ILFs in GALT. Hatchling sliders were raised at different temperatures (1) 26.5 ± 2 °C, (2) 27.1 ± 2 °C, or (3) 27.7 ± 2 °C and formation of ILF clusters in intestines was measured by immunohistochemistry. Future research will focus on the effects of pathogen exposure during early in development on ILF formation.

BEHAVIORAL MOTIFS FOR MAGNETIC ORIENTATION IN THE NEMATODE C. ELEGANS

Presenter	Bainbridge, Chance Graduate, Biological Sciences
Mentor	Prof. Andrés Vidal-Gadea
Authorship	Chance Bainbridge; Jocelyn McDonald; Zachary Benefield; Samantha Padia; Andrés Vidal-Gadea

Many species rely on finely tuned sensory systems to orient to their surroundings. These sensory systems have evolved to detect a variety of environmental stimuli like light, sound, temperature and chemical cues. Animals adopt different behavioral strategies to optimize their orientation to these sensory stimuli. As such, these orientation strategies reflect how the animal uses stimulus information. Some animals, especially those that perform migrations, have evolved the ability to detect the magnetic field of the Earth. Despite the growing number of animals identified as able to detect magnetic fields, magnetosensation remains an understudied sensory modality. Previous research by our lab demonstrated that the nematode *C. elegans* detects and orients to

magnetic field information. How *C. elegans* uses and integrates magnetic information for appropriate orientation responses remains unknown. Here we determined combinations of simple behavioral strategies *C. elegans* uses to orient to magnetic fields. To do this, we investigate how strategies for magnetic orientation are unique from other well-characterized behavioral motifs used for orientation to temperature and chemical stimuli. Determining strategies that are unique to magnetic orientation would inform us of how *C. elegans* uses magnetic information to orient itself in space. Furthermore, differences orientation strategies depending on the presentation of these stimuli will inform us of how animals optimize their orientation based on the physical properties of incoming stimulus.

THE EFFECTS OF DISCOVERY ACADEMY ON MIDDLE SCHOOL STUDENTS' SCIENCE ATTITUDES

Presenter	Baldwin, Kara Graduate, Biological Sciences
Mentor	Prof. Rebekka Darner Gougis
Authorship	Kara Baldwin; Frackson Mumba; Rebekka Darner Gougis

Discovery Academy (DA) is a two week science, technology, engineering and mathematics (STEM) camp for middle school students taught by Illinois State University pre-service science and math teachers. This camp has two main goals: 1) providing college freshmen, sophomore, and junior STEM majors with teaching experiences and interactions with middle school students and 2) fostering STEM interest in middle school participants. This poster focuses on changes in middle school students' science attitudes during DA. Using a modified version of the Test of Science-Related Attitudes (TOSRA) developed by Frasier (1981), pre-post were compared using paired t-tests to measure overall change in attitudes. We also examined changes in subscales: Social Implications of Science, Normality of Scientists, Attitude to Scientific Inquiry, Adoption of Scientific Attitudes, Enjoyment of Science Lessons, Leisure Interest in Science, and Career Interest in Science. Change in overall TOSRA score was not statistically significant, although Career Interest in Science significantly decreased.

DEVELOPMENT OF THE HI-5 MODEL FOR ATOMIC COLLISIONS

Presenter	Bates, Mason Undergraduate, Physics
Mentor	Prof. Allison Harris
Authorship	Mason Bates; Jesse Lyon; Allison Harris

Vital insights into the dynamics of mutually interacting charged particles are gained through the study of atomic collisions. Unfortunately, computational challenges often limit the number of particles and interactions that can be included in theoretical models. In this work, we introduce the Heavy-Ion 5-Body (HI-5) model for charged particle collisions, which is only recently possible due to improvements in computing capabilities. This model is the first of its type to include the interactions of all five particles in the collision. Numerical techniques and computational challenges of the HI-5 model will be discussed.

TEMPERATURE-DEPENDENT IONIC MECHANISMS OF ACTION POTENTIALS

Presenter	Burek, Manuela Undergraduate, Physics
Mentor	Prof. Epaminondas Rosa
Authorship	Manuela Burek; Prithiv Kumar

In this presentation we discuss temperature influences on the action potential activity of a single model neuron. We implement the temperature effect on the ionic channels of the traditional Hodgkin-Huxley equations originally developed for mimicking neuronal activities. Our numerical simulations indicate that, in general, increasing temperatures increases the natural firing rate of the model neuron.

THE HUMANITARIAN SHORTCOMINGS OF THE ARMS TRADE TREATY

Presenter	Carman, Dakota Undergraduate, Politics and Government
Mentor	Prof. Michaelene Cox

According to the ICRC, the availability and misuse of weapons leave civilians around the world at risk. A focal point of the Arms Trade Treaty is protect civilians and strengthen humanitarian action. There is no doubt that the ATT looks different now than when it was first addressed in 2006, many believe this was caused by America's reservation of the policy. Which raises the question; did delaying the ATT cause the policy to move away from addressing humanitarian protection for civilians in states experiencing armed conflict? Furthermore, this paper will address the role American civilians played in the United States' delay. Is it possible that pressure placed by American civilians by way of public opinion and non-governmental organizations caused the delay in the United States signature? To analyze these questions I plan on using the successive approximation method. By using this method I will be able to break down my study and individually examine each major concept, this will help paint a large picture of the issue. This paper seeks to address the humanitarian shortcomings of the ATT, as well as, the causes behind those shortcomings.

APPLYING CONSTRUCTIVIST LEARNING THEORY TO ONLINE COURSEWORK

Presenter	Carter, Kellen Undergraduate, Psychology
Mentor	Prof. Dawn McBride

This study was conducted to examine how previous literature on constructivist learning theory can be utilized to enhance online learning. The constructivist view on learning involves students actively engaging in the formation process of new information (e.g., relating material directly to their immediate environment and themselves, Woo & Reeves, 2007). I hypothesized that for lessons where students are actively engaged in the constructivist material, they will both understand and retain the lesson information better than the lessons that did not employ a constructivist structure. To that end, a sample of college students from an Illinois State University psychology class were given additional assignments in three out of six online lectures. Additional assignments were created with the constructivist theory in mind (e.g., specifically instructing students to form scenarios related to lecture content and their own personal lives). To measure the potential impact of this teaching method, students were given a pretest

at the beginning of the semester, targeting information from all six lectures. Review quizzes were given throughout the semester; some of these quiz questions reappeared on the post-test at the end of the semester. For students who consented to the use of their online quiz scores, scores were downloaded and coded so that no identifying information was present. Pre- and post-test difference scores were compared across the three interaction and three control lectures to determine if learning was greater in the interaction lectures as predicted.

MILLENNIALS ONLY CARE ABOUT THEMSELVES... AND EVERYONE ELSE

Presenter	Carter, Tyler Graduate, Politics and Government
Mentor	Prof. T.Y. Wang

How does generation affect attitudes towards socialist programs? In order to answer this question, I examine survey data from the 2016 American National Election Survey pilot study. I hypothesize that millennials tend to support social services more than previous generations. My independent variable will be the millennial generation, separated from other generations as a dummy variable. My dependent variables will include attitudes of millennials and non-millennials towards social programs including tuition-free education, universal healthcare, and social security. Given the partisan division between these issues, it may be beneficial to isolate the generations within the parties as well.

THE EFFECTS OF RELATIONSHIP UNCERTAINTY AND SOCIAL COMPARISON ORIENTATION ON RELATIONSHIP SATISFACTION WHEN MAKING RELATIONSHIP

Presenter	Cary, Kyla Graduate, Sociology/Anthropology
Mentor	Prof. Susan Sprecher

According to Social Comparison Theory (Festinger, 1954), in the absence of objective means of evaluation, humans look to those around them and make social comparisons. These comparisons aid in self-evaluation, self-improvement, and self-enhancement (Wood, 1989). Social comparison theory can also be applied to relationships. Relationship social comparisons involve comparing one's relationship to another relationship that is better off (upward comparison) or worse off (downward comparison) than one's own. An individual's tendency to make these comparisons is described as their social comparison orientation (Gibbons & Buunk, 1999). Relationship comparisons are most likely to occur when one is uncertain in their relationship (Taylor, Buunk, & Aspinwall, 1990). The current study examined the effects of upward versus downward relationship social comparisons on relationship satisfaction with social comparison orientation and relationship uncertainty as moderating factors. Participants were 163 students at Illinois State University. Participants were randomly assigned to describe either a successful (upward comparison) or unsuccessful (downward comparison) relationship in their network. Participants also completed measures of current relationship satisfaction, relationship uncertainty, and social comparison orientation. Analyses revealed no significant difference in overall relationship satisfaction between participants who were asked to make upward comparison and participants who were asked to make downward comparisons. Social comparison orientation was not found to moderate the effect of comparison direction on relationship satisfaction. Relationship uncertainty was found to moderate the effect of comparison direction on relationship satisfaction.

THE AFRICANS, AFRIKANS, AND ALL OF THOSE IN BETWEEN

Presenter Chairse, DeAnna
Undergraduate, Anthropology

Mentor Prof. Liv Stone

Is there a difference in being African in America and on the continent of Africa? This student has been a member of ISU's African Student Association for the past three years and has noticed that within the organization there is a divide in the membership amongst those who were born here in the US, came to the US as children, or who are international students in the US for a limited time. The proposed research is interested in the differences between what could be called 'being African' and 'being Afrikan'. It asks: Why does this division exist and why is it meaningful to ISU students?

'UNDER THE VEIL' - THE NEGLECTED CASE OF ROHINGYA GENDER BASED EXPLOITATION.

Presenter Chowdhury, Farzana
Graduate, Politics and Government

Mentor Prof. Michaelene Cox

The Rohingya are one of the world's most persecuted minorities living in Myanmar and considered illegal immigrants. They are sent down to Bangladesh for being Muslim. Rohingya women are furthermore subject to significant sexual violence. The purpose of this paper is to determine the extent of such abuses and the extent of assistance by civil society. Many previous studies focused on the Rohingya migration problem in terms of unemployment, geopolitical dilemma with Bangladesh and regional security threats. However, my paper reflects the emergence of human trafficking is due to anarchy at the borders. From the post-colonial feminist perspective, I will examine this crisis. The perspective will focus on gender in relation to global and local hierarchies of race and class, as a part of a broader liberation struggle. My research paper would utilize illustrative method which uses the theory to justify my case. This method will explain the use of post-colonial feminist theory to clarify the situation ongoing in Myanmar-Bangladesh.

ROLE OF OCCUPATIONAL THERAPY IN AUTISM SPECTRUM DISORDER

Presenter Choy, Shruthi
Graduate, Technology

Mentor Prof. Sally Xie

Watching your child grow and develop new skills is one of the most exciting aspects of parenting. All parents look forward and record the development of our children, and most of the time they reach their developmental milestones on time. However, parents worry when a child does not do something to the age he/she is "supposed to do". And it's worse when a friend or relative tells you about the wonders that their child does when yours does not. Screening for development and speech delay should be done for all children aged from 18 to 24 months. Further screening can be done for autism to the children from 24 to 36 months as referred by your primary physician. There are screening tools to help identify children at risk of developmental delays or autism, such as below to name few:

- Ages and Stages Questionnaire
- List of modified verification of autism in young children

If periodic evaluations are normal, you can rest assuring that child is developing properly and that is good. When problems are identified, the first step is to get a referral for early intervention program. Your pediatrician may also refer your child to a specialist development that can provide medical and developmental evaluations and follow - ups for to development problems. Autism spectrum disorders are a group of biologically based neurodevelopmental disorders that affect a child's behavior and social and communication skills. Different therapies are available to treat the Autism Spectrum Disorder such as development therapy, speech therapy, occupational therapy etcetera depending on which type of category it falls. The purpose of Occupational therapy is to provide accessible and comprehensive information about Occupational therapy techniques in ASD. This research explores parental experiences with interventions, programs and services for their child with ASD. Data was collected through open-ended questionnaire and through observation. The problem statement is the role of occupational therapy in Autism spectrum disorder.

MAGNETIC FIELD OF AN ARRAY OF NANOSCALE DIPOLES

Presenter	Christ, Erich
	Undergraduate, Physics
Mentor	Prof. David Marx

This project is to model the magnetic field above an arbitrarily-sized array of magnetic dipoles. Our initial calculations have been done for a single dipole and for a small group of dipoles. This work is in support of a future project to produce an array of nanoscale coils that carry a small current.

THE ENVIRONMENTAL CONSEQUENCES OF ARMED CONFLICT

Presenter	Cichon, Dana
	Undergraduate, Politics and Government
Mentor	Prof. Michaelene Cox

The Environmental Consequences of Armed Conflict Research question: What are the environmental consequences of armed conflict in developing countries and how has this impacted sustainable development? Typically when it comes to prioritizing the threats facing a nation, environmental ones tend to rank relatively low. This allows for a general overlooking of the environmental degradation caused by actions during times of war even though it has been explicitly stated in International Humanitarian Law that the environment should be protected. "Warfare is inherently destructive of sustainable development. States shall therefore respect international law providing protection for the environment in times of armed conflict and cooperate in its further development, as necessary" (1992 Rio Declaration). This paper will analyze data from past wars and evaluate the impact different tactics used on the battlefield have had on the environment such as the application of weapons, the destruction of structures and oil fields, fires, military transport movements and chemical spraying. Through narrative, it will incorporate Green Theory to connect the dots between policy and action as it relates to ecocide as a result of warfare. It will take a look at specific conflicts such as the Vietnam War, the Persian Gulf War, and Southern Asia and compare the tactics and technology used throughout them, centering around the question of how this has hindered sustainable development. This paper will begin by defining ecocide and sustainable development. It will then examine already existing international policies written to protect the environment during times of war and analyze examples of past conflicts. This paper will conclude with an overall evaluation of the environmental consequences of war, and suggestions on how to minimize such harm in future conflicts with the goal being to prevent war and preserve nature.

PROSECUTING WAR CRIMES IN A GLOBALIZED WORLD

Presenter	Conaty, Ronan Undergraduate, Politics and Government
Mentor	Prof. Michaelene Cox

International humanitarian law (IHL) is a set of rules which seek to limit the effects of armed conflict around the world. IHL is inevitably broken in countries around the world. Prosecuting criminals for war crimes is difficult even in the globalized world that we live in today. Much of the research investigating the ineffectiveness of prosecuting war crimes in the international arena places blame on the fact that war is inherently brutal and every aspect of IHL cannot realistically be enforced. This research however will examine the following question: What impact does globalization, and a lack of central authority, have on the international community's ability to effectively prosecute war crimes and prevent further violation of IHL? First, the paper will examine the origins of prosecution of war crimes. Second, it will look at some of the issues that plague prosecutions of war crimes and explain them in context of a lack of an international central authority. Third, the paper will explain how the international court system should ideally function in regards to IHL. Using the Weberian ideal type to compare and contrast existing systems to preferred standards, the greater part of the paper will then focus on the impact globalization has had on the effectiveness of an IHL enforcement system. Finally, measures will be proposed that can improve the effectiveness of IHL enforcement mechanisms.

THE IMPACT OF EMPLOYMENT ON PROBATION RECIDIVISM

Presenter	Cottle, Clayton Graduate, Criminal Justice Sciences
Mentor	Prof. Jason Ingram

There is increasing need to understand and improve rates of recidivism in all fields associated with the Criminal Justice system. For this project, recidivism is defined as a new arrest after the date of release from probation. This research aims to analyze and interpret the influence that employment status and employment stability has on probationer recidivism. The results of this study will begin to fill a large void in correctional literature regarding the influence of employment on probationers. Additionally, the findings will provide the probation department with valuable information to refine their current probation practices.

A FILM ON MULTIRACIALISM: A WORK IN PROGRESS

Presenter	Dayson-Aravena, Camila Undergraduate, Anthropology
Mentor	Prof. Liv Stone

This ethnographic film project records peoples' experiences with being multi-racial. Multiracial people are often pulled in several different directions with their identities. This film project asks: How does being of multiracial descent impact a life in America? Presentation will be a multi-media presentation of this work in progress.

STATE-DEPENDENT TUNING OF A SENSORY ORGAN THROUGH BACK PROPAGATING ACTION POTENTIALS

Presenter	DeMaegd, Margaret Graduate, Biological Sciences
Mentor	Prof. Wolfgang Stein
Authorship	Carola Städele; Wolfgang Stein

Axons are responsible for the proper initiation and conduction of action potentials to establish long-term communication between nerve cells. While neurons primarily encode incoming stimuli in the frequency of action potentials near the location of stimulation, action potentials can also be generated in the axon trunk, spatially distant from the site of stimulus encoding. These so called ectopic action potentials can travel both forward and backward along the axon. In the latter case they also back propagate to the stimulus-encoding area in the neuron. Here we are testing whether these invading ectopic action potentials are able to alter the neuron's response to incoming stimuli.

To address this question, we utilized a combination of electrophysiology and computational modeling of the anterior gastric receptor neuron (AGR) in the crab, *Cancer borealis*. AGR is a muscle-tendon organ that is experimentally advantageous because of its several-centimeter-long axon. The axon spontaneously initiates ectopic action potentials in addition to its primary action potentials that occur in response to sensory stimuli from the muscle. Our results show that AGR's ectopic spike frequency is modulated by chemosensory neurons that encode olfactory information. The frequency and number of ectopic action potentials propagating towards the site that encodes sensory information diminished when these chemosensory neurons were active. We hypothesize that this modulation of ectopic spike frequency affects the neuron's response to sensory input and thus its ability to encode stimuli.

Our Hodgkin-Huxley axon model predicts that ectopic action potentials invade the area where sensory input is encoded and indeed influence the neuron's response to sensory stimuli. Number, onset latency, and frequency of action potentials produced in response to a given sensory stimulus changed as a function of ectopic spike frequency. A diminishment in AGR's ectopic spike frequency increased the total number of action potentials in response to the stimulus, but decreased the onset latency and average frequency of action potentials in response to the stimulus. This result suggests the frequency of ectopic action potentials may alter AGR's response to incoming sensory stimuli as well. Therefore, modulation of action potentials in an axon trunk can modify how a neuron encodes sensory stimuli.

WORK-FAMILY DOMAIN INTERFERED BY TECHNOLOGY USE: AN INVESTIGATION OF CYBERSTRESS, WORK-FAMILY CONFLICT, AND BOUNDARY MANAGEMENT

Presenter	Dill, Kathleen Graduate, Psychology
Mentor	Prof. Kimberly Schneider

Technology improvements have made it easier for people to communicate anywhere at any time; however, this use has caused negative effects as well, specifically in the workforce. While recent technological advances make working from home much easier and more efficient than in previous years, employees may be experiencing new types of stress due to perceived pressure to be accessible to work. This new type of either perceived or actual stress is referred to as 'cyberstress'. There is now an expectation among many organizations that employees must stay connected to work during an employee's nonwork time. Recent research indicates that 45% of 'networked workers' (i.e., those with access to technology at home) report working outside of standard daytime work hours and at home during the evenings and on weekends (Ferguson et al., 2015; Madden & Jones, 2008). Access to technology on mobile devices to connect to work from home may provide the opportunity for more frequent work-related

interruptions that may be unwelcomed by either the employee him or herself and/or the employee's family. In the current study, the role that technological interruption has on nonwork time (i.e. home during the evenings and weekend hours) is investigated. Specifically, the study is investigating experienced stress due to actual work interruptions (e.g., urgent emails from students, texts or calls from colleagues related to work projects) and a perceived 'tether' to work (e.g., a self-imposed pressure or perceived need to check email during time at home; Ferguson et al., 2015). In the current study, both qualitative and quantitative data will be collected to assess employees at a non-profit organization levels of cyberstress, work-family conflict, and boundary management.

INTER- AND INTRA-INDIVIDUAL VARIATION IN PREDATOR-RELATED BEHAVIORAL PLASTICITY EXPRESSED BY FEMALE GREEN SWORDTAILS (*XIPHOPHORUS HELLERII*)

Presenter	DiSciullo, Rachael Graduate, Biological Sciences
Mentor	Prof. Charles Thompson
Co-Mentor(s)	Scott Sakaluk
Authorship	Rachael DiSciullo; Alexandra Basolo

Phenotypic plasticity is the ability of one genotype to express multiple phenotypes under variable environments. Behavioral plasticity is a type of phenotypic plasticity in which individuals adjust behavior in response to changes in environment. Often, behavioral plasticity is studied at the level of the population, rather than at the level of the individual. Further, few studies have considered the effect of individual traits, such as size and age, on the expression of behavioral plasticity, or, how individual plasticity may be correlated across different contexts. In this study, we used female green swordtails (*Xiphophorus hellerii*) to test the effects of body size at testing and age at maturation on the expression of predator-related behavioral plasticity in two social contexts: (1) intrasexual (two females) and (2) intersexual (two females and a male). We also tested the extent to which plasticity is correlated across contexts within individuals, to elucidate whether females that show a high degree of plasticity in one context also show a high degree of plasticity in another context. For two agonistic behaviors, we found differing effects of the interaction of body size at testing and age at maturation on the expression of predator-related plasticity across social contexts. These results suggest that individual traits interact in a complex manner to affect patterns of plasticity across contexts, and, that alleles influencing age at maturation may be associated with alleles that affect plasticity. Across contexts, we found no evidence of correlated plasticity in a given behavior, suggesting that individuals are not consistently plastic across the contexts tested. Within contexts, however, the plasticity expression for several different behaviors was correlated, and was similarly affected by body size at testing and age at maturation. Overall, this study indicates that the type and degree of individual predator-related behavioral plasticity expressed is partially dependent on multiple traits, and varies substantially between social contexts. Few studies have examined the effect of multiple factors on the expression of plasticity, or plasticity in multiple social contexts, and, our results indicate that the causes and consequences of phenotypic plasticity are likely to be complex.

INVESTIGATING PEER INTERACTIONS OF PHYSICS STUDENTS WORKING ON COMPUTATIONAL CODING

Presenter	Dizon, Reggie Undergraduate, Physics
Mentor	Prof. Rebecca Rosenblatt
Authorship	Reggie Dizon; Terry-Ann Sneed; Ray Zich

Video and voice data were recorded from two computational coding based labs done as part of an introductory modern physics course. Three small cube cameras, a larger camera with microphone that could see the whole room, and four live scribe pens recording additional audio were used to record the activities. Several themes emerged from the videos. A major theme was how the time was spent (on task vs. off task, about physics vs. about computation, on general principles vs. solving a specific problem, working alone vs. together). Another major theme was the mood and engagement of students while working in these different areas and where/how patterns of communication were different from those seen for non-computational problem solving activities. We will present these findings and discuss their implications for peer communication and learning in introductory computational physics courses.

OPTICAL SPECTROSCOPY OF METAL NANOPARTICLES AND SEMICONDUCTOR NANOCRYSTALS AT THE SINGLE PARTICLE LEVEL

Presenter	Eggena, Daniel Undergraduate, Physics
Mentor	Prof. Uttam Manna

Nano-materials synthesized by nano-chemistry suffer from inhomogeneities in nanoparticle size, and shape, which cause variations in the spectral responses. As is now well appreciated in single molecule science, these variations and heterogeneities cannot be uniquely ascertained from ensemble spectra; rather one needs to perform spectroscopy at the single particle level. In this presentation, I will talk about how we can measure scattering and fluorescence spectra at the single particle level; and how the variations in single nanoparticle spectral response due to inhomogeneities in nanoparticle size, and shape can be used as a calibration probe to test sensitivity of various charge-coupled detectors (CCDs).

A LONGITUDINAL STUDY INVESTIGATING THE ROLE OF PARENTS IN THE SPECIALIZING YEARS OF YOUTH SPORT

Presenter	Ellis, Jaclyn Graduate, Kinesiology & Recreation
Mentor	Prof. Scott Pierce
Authorship	Jaclyn Ellis; Scott Pierce

Research suggests that children learn through observation and may reproduce certain actions and behaviors displayed by the parents (Bandura, 1986). While anecdotal examples of 'crazy sport parents' imply that many issues exist with parenting behaviors in youth sport, the majority of parents in youth sport are, in fact, supportive and do not interfere with their child's development (Gould, Lauer, Rolo, Jannes & Pennisi, 2008). Research has found that parents have many stressors and expectations throughout their child's development that influence their sport parenting (Harwood, Drew, & Knight, 2010; Harwood & Knight, 2009). Greater insight is needed about the challenges that exist for parents in youth sport and how these challenges impact the parents' behavior over time. Therefore, the purpose of this project was to understand the role of parents through the specializing years of youth sport participation. Eight parents and four youth athletes participated in the longitudinal study. Each parent was interviewed at four time points over a two-year period to assess the changes in perceived parenting challenges and behaviors. Additionally, each parent and the individual athletes, aged between 10 and 13 years of age, completed a survey examining parenting involvement and parenting styles at each of the four time points. This presentation will explore a case study of one family, including a mother (40 years), father (40 years), and daughter (11 years) who

played basketball as her primary sport. A thematic analysis was conducted on the parent interviews to explore the similarities and differences in the roles and behaviors of the mother and father and to explore the changes in parenting roles and behaviors over time (Sparkes & Smith, 2014). Additionally, mean scores were calculated for each participant on the Parent Involvement in Sport Questionnaire (PISQ; Lee & MacLean, 1997) and Parental Authority Questionnaire (PAQ; Buri, 1991). The study found that the two parents had a range of similar and different parenting goals, challenges as sport parents and ways to cope with challenges over the two-year period. For example, enjoyment of the sport and achieving high success as an athlete were two major parenting goals shared by both the mother and father. Parenting roles (e.g., providing performance feedback) and perceived parenting style (e.g., controlling vs. supportive) were different between the mother and father. Conclusions will highlight the importance of understanding parents' perspective of their roles in youth sport along with recommendations for various youth sport stakeholders.

CURES FOR THE FUTURE: THE ROLE OF RESEARCH & DEVELOPMENT AND REGULATION IN THE PHARMACEUTICAL INDUSTRY

Presenter	Farrell, Bret Undergraduate, Economics
Mentor	Prof. Susan Chen

I will examine the importance of research and development (R&D) investment decisions to pharmaceutical companies through the use of game theoretic models. I will also analyze the relationship between R&D spending and the development of New Molecular Entities (NMEs). Further, I will discuss the role of regulation and patents within the pharmaceutical industry and discuss how patents allow for firms to maintain market power.

TAKEOVER ON THE TALLGRASS PRAIRIE: HOW LESPEDEZA CUNEATA AFFECTS THE ARTHROPOD COMMUNITY

Presenter	Fowler, Jessica Graduate, Biological Sciences
Mentor	Prof. Victoria Borowicz
Authorship	Jessica Fowler; Victoria Borowicz

Lespedeza cuneata is a non-native legume that is spreading through Midwestern grasslands, including prairies. I am interested in understanding how invasion by this aggressive plant affects the arthropod community. Specifically, I would like to understand how the taxonomic and ecological diversity of the arthropod community changes as *L. cuneata* increases in dominance. In Kansas oak savannas, for example, the number of insect families was lower in locations infested with *L. cuneata* (Eddy and Moore, 1998, Transactions of the Wisconsin Academy). I hypothesize that as *L. cuneata* dominance increases, plant diversity decreases and the opportunities for arthropods to make a living narrows, resulting in a decrease in the taxonomic and ecological diversity of arthropods. I intend to use the reconstructed John English Prairie to determine if the presence and abundance of *L. cuneata* is impacting the arthropod community. The prairie includes 96, 1-m² plots that have received 1 of 4 treatments (fertilizer/no fertilizer, and hemiparasite removal/no removal) for 12 years. Our lab has recorded presence/absence of *L. cuneata* and sampled biomass of *L. cuneata* and functional groups of vegetation during selected years, giving a good background regarding changes in the vegetation. Plots will be sampled with complementary methods to catch the full diversity of arthropods. 24-hour sampling of each plot every two weeks with pitfall traps will help describe effects of *L. cuneata* on ground-dwelling arthropods. Other types of arthropods will be sampled by sweeping with an insect net, visual observations, yellow pan traps, blue cross traps, and sticky strips. For each plot, I will also determine the number of plant species, including *L. cuneata*, and their canopy coverage using the Daubenmire

method. I will record cover in early June and at the end of August because cover will change throughout the summer months. Native plant species are declining in response to the spread of *L. cuneata* in the John English Prairie, and current techniques to limit growth, such as burning, are not working and may possibly promote the spread of *L. cuneata*. A better understanding of the direct and indirect effects of *L. cuneata* on native communities can inform management decisions intended to limit the spread of *L. cuneata*, which will then increase the arthropod and plant community diversity.

SOCIALLY DESIRABLE RESPONDING ON PERSONALITY SELF-REPORT TESTS AND ITS RELATIONSHIP TO JOB PERFORMANCE

Presenter	Frey, Trevor Undergraduate, Psychology
Mentor	Prof. John Binning

Decades of research on personality assessment have linked personality to job performance. Despite these demonstrable relationships, self-report personality test items are susceptible to socially desirable responding - exaggerating or faking answers to present oneself in a socially desirable manner. This study focuses on two aspects of socially desirable responding in self-report personality assessment.

The first aspect concerns socially desirable responding in the context of jobs where one's impression management would be directly relevant to job performance. If an individual exhibited socially desirable responding on self-report personality tests for a job requiring impression management, this response style might predict performance. The second aspect concerns the relationship between exceptionally low scores in personality factors associated with performance and their relationship to performance. If there is a linear relationship with a personality factor and performance, it would be expected that such low scores (too low to have been faked) would indicate poor performance. There have been calls for further research in both of these areas.

Eight hundred ninety employees of the customer service department of an entertainment streaming organization completed a 120-item personality inventory using a 7-point Likert scale that measured the dimensions of the Big Five personality factors (Openness, Conscientiousness, Extraversion, Agreeableness, and Emotional Stability) plus Ambition, a facet of Conscientiousness. The scores of employees who answered in a socially desirable way were investigated in order to determine if a relationship existed between socially desirable responding and performance. This study focused on three personality factors which were Conscientiousness, Extraversion, and Ambition due to their relationship to performance. The scores of employees who scored exceptionally low on the same three personality measures related to performance were also investigated in order to determine if the low score acted as a predictor for poor job performance.

Linear regression results showed a relationship between socially desirable responding on the three personality factors listed above and the performance index provided by the organization which measured a variety of valued behaviors for the organization. Employees with exceptionally low scores of Ambition also scored low on the performance index indicating a linear relationship between Ambition and performance.

"THE BYLINE OF EUROPE: AN EXAMINATION OF FOREIGN CORRESPONDENTS' REPORTING FROM 1930 TO 1941"

Presenter	Garvey, Kerry Graduate, History
Mentor	Prof. Katrin Paehler

American foreign correspondents were scattered across Europe in the 1930s and reported on the political events that led to World War II, thus providing the public with one of the few windows into these events. Newspaper owners and editors then shaped their reporting by putting together the actual papers. The historiography on journalism in the 1930s is focused on broad collective biographies of individual correspondents or on how specific newspapers and/or journalists reported on events in Germany. But how were individual journalists able to report from their host countries, especially on events in Germany? How did this effect the newspaper stories? Based on the *New York Times's* and *Chicago Tribune's* articles from 1930 to 1941, and individual correspondents' papers in the *Chicago Tribune* archive, the Wisconsin Historical Society, and at the New York Public Library, my poster investigates this question by examining how their correspondents were able to report from their respective European countries.

I argue that the correspondents' reporting was a product of an intricate system of information distribution from Europe to the media outlets in the United States. The correspondents were subjected to new publishing rules throughout the 1930s and had to learn how to work with various European governments in order to send news back home. However, information published was still dependent on the opinions and political leanings of editors and newspaper owners, who shaped the articles before releasing them to the public.

As a window into this, I primarily use Sigrid Schultz, the *Chicago Tribune* correspondent in Berlin from 1925 to 1941. She used different reporting methods throughout her time in Berlin in order to avoid Nazi censorship and gather information. For example, she wrote under a pseudonym, John Dickinson, and posted her articles from other countries. Schultz needed her identity to remain secret, because these articles would have angered the German government and possibly resulted in her expulsion from Germany or arrest by the Gestapo. I also examine other correspondents to explore how reporters generally reacted to press restrictions. The most defining factor in how correspondents reacted was dependent on how willing the correspondents were at pushing the press censorship rules. This case study breaks with the myth that newspapers were primarily shaped by their owners. It indicates instead the agency of journalists and the complexities involved in the making and shaping of the news-back then and today.

TO BENFORD OR NOT TO BENFORD

Presenter

Gramm, Reid

Undergraduate, Physics

Mentor

Prof. Rainer Grobe

Co-Mentor(s)

Prof. Q. Charles Su

Authorship

Reid Gramm; Jack Yost; Rainer Grobe; Q. Charles Su

There are many examples in nature such as election results, lengths of rivers, numbers appearing on the front page of magazines, and many more, whose distribution of their first significant digit reveals an interesting pattern referred to as the Benford law. Quite remarkably, it turns out that there are more "natural" numbers in our universe that begin with the first digit equal to 1 than there are numbers that begin with the first digit being 9. In this talk we will make sense of this fascinating law and try to verify Benford's law with recent general election results of counties across the US [1]. We acknowledge the support by the National Science Foundation.

[1] R. Gramm, J. Yost, Q. Su and R. Grobe, *Phy. Rev. E* (submitted)

BULLYING IN THE COLLEGE ENVIRONMENT: WHERE HAS IT NESTLED?

Presenter	Hawkinson, Garrett Undergraduate, Psychology
Mentor	Prof. Eric Wesselmann
Co-Mentor(s)	Leandra Parris
Authorship	Garrett Hawkinson; Eric Wesselmann; Leandra Parris

Where has it nestled? Bullying is a familiar topic for students, parents and educators, especially given the high-profile media cases in which bully victims have committed suicide. Bullying unfortunately is a common experience for many children and young adults and has many negative physical and psychological outcomes for victims. Research typically measures bullying within primary and secondary education settings (i.e., middle school and high school). Researchers have neglected studying bullying in higher education; folk wisdom suggests that once people enter college, bullying incidents taper off. However, researchers have substantiated bullying occurs among adults within an organizational context (e.g., employment). It is unlikely that bullying incidents disappear completely within the college context, only to reemerge when individuals become employed.

We suspect that individuals with bullying tendencies continue their behavior in college, but perhaps in different modes than bullying in primary/secondary education. Further, because college students do not experience the same restrictions to a small peer group that occur in primary/secondary educational settings, traditional bullying may occur less frequently (or be less visible to bystanders) because targets may simply switch to a new social group when they experience bullying.

We conducted an exploratory study by collecting data from a large lecture-based course on social psychology (N=212 undergraduates). Our overall aim was to explore college students' 1) definition of what constitutes "bullying," 2) provide a brief example of bullying, and 3) how often they have witnessed bullying (either in face-to-face or cyber environments) in college. We will analyze these data during Spring 2016, using both qualitative and quantitative methods to address several research questions. First, we will identify themes of what college students define as bullying, and compare these themes with the definitional components of bullying used in the academic literature. Second, we will identify any common characteristics from students' examples of bullying. Third, we will examine the frequency with which students report witnessing bullying.

DIAGONALIZING THE FIELD THEORY HAMILTONIAN - PART III

Presenter	Henderson, Joshua Undergraduate, Physics
Mentor	Prof. Neil Christensen
Authorship	Joshua Henderson; Neil Christensen; Cory Russ; Santiago Pinto

The theory of quantum chromodynamics that binds protons and neutrons together inside the nucleus of the atom is notoriously difficult to calculate. We investigate a new method for doing these calculations that involves the diagonalization of the field-theory Hamiltonian. In this talk, we will describe some preliminary results of our calculations. We will also show their comparison with perturbation theory, which is the standard method for calculating quantum chromodynamic quantities.

THE EXTREME RESPONSE STYLE AND PERSONALITY

Presenter	Hesse, Brianna Undergraduate, Psychology
Mentor	Prof. John Binning
Authorship	Brianna Hesse

The use of questionnaires and self-report surveys has become routine in applied psychological assessment. Such assessment tools are designed to tap into psychological constructs, such as personality, and have been shown to predict job performance. However, the quality of such measures can be diminished by response styles that occur when applicants respond in a consistent way to questionnaires based on something other than what the questionnaire is supposed to measure (i.e., basing responses on what is most socially desirable instead of a more accurate response).

In applied testing situations, hiring decisions can be affected by response styles. Existing research has focused on understanding the effects of many response styles such as socially desirable responding; however very little has been found about the extreme response style (ERS). ERS is a phenomenon observed on questionnaires using Likert style response categories and occurs when the test taker responds to most, if not all, questions using the extreme ends of the response scales. Explanations of this response style have been inadequate. To identify causes of this response style and its relations to job performance, a theoretical framework is proposed, relating this response style to personality dimensions that are known to influence job performance.

Studies have found that ERS is relatively consistent across traits (Wetzel et al, 2013) in personality assessment. This means that individuals exhibiting ERS on one dimension of a personality questionnaire exhibit ERS on all other dimensions as well and suggests that ERS may be more trait-like. Intriguingly, individuals with higher levels of extraversion and conscientiousness are more likely to exhibit ERS on any assessment (Austin et al, 2006; Paulhus, 1991). Research has also found evidence that individuals scoring higher in conscientiousness and extraversion, tend to perform better in situations that are emotionally laborious (Chou, 2015; Wasmund & Tate, 1988). In the current study, multiple metrics were created to measure ERS and were used to identify if a relationship exists between ERS, extraversion, and conscientiousness. Additionally, these metrics were used to examine if ERS actually relates to performance.

Data on incumbents' job performance and responses to a personality questionnaire was utilized. As predicted, relationships between ERS, extraversion, and conscientiousness as well as between ERS and performance were found. Thus, these results support the hypothesis that individuals exhibiting ERS may perform better in emotionally laborious work environments due to the positive relationship between ERS, extraversion, and conscientiousness.

TEXTILES AND TECHNOLOGY

Presenter	Hill, Anna Graduate, Theater and Dance
Mentor	Prof. Lauren Lowell

As technological components have become smaller, cheaper and easier to use, the world of wearable technology continues to expand. Last year I set out to discover the possible applications technology could provide in the world of clothing & costumes. Going beyond LEDs, I researched programming light sequences, and created a programmable Matrix (or LED screen) to display text I had assigned. I also looked at the use of motors in clothing and what considerations were needed to use a motor in a soft material. My projects made use of Arduino boards, basic programming, and specific customization utilizing 3D printing and laser cutting. This conference presentation will emphasize the need to learn and experiment with these options before long script acquisition, for optimal textile and technology costuming success.

CHARACTERIZATION OF $Sr_{3-3x/2}Ga_{1-x}M_xO_4F$ ($0 \leq x \leq 0.25$) OXYFLUORIDE ANTI-PEROVSKITES

Presenter	Hoagland, Chanse Undergraduate, Chemistry
Mentor	Prof. Eirin Sullivan
Authorship	Chanse Hoagland; Eirin Sullivan

The oxyfluoride materials $Sr_{3-x}A_xMO_4F$ ($A = Ca, Sr, Ba; M = Al, Ga$) crystallize in an anti-perovskite structure. When synthesized under reducing conditions to introduce anion defects, rare-earth free self-activating photoluminescence is observed. There is the potential for this material to be used for phosphor coatings in solid state lighting. Solid solutions with the composition $Sr_{3-3x/2}Ga_{1-x}M_xO_4F$ ($M = Mo, W; 0 \leq x \leq 0.25$) have been proposed to display self-activating photoluminescence without the presence of anion defects. The structures of these compositions were characterized using Rietveld refinements based upon X-ray powder diffraction (XRD) data.

1. S. Park and T. Vogt, *J. Phys. Chem. C.*, **114** (26), 11576-11583, (2010).
2. E Sullivan, M. Avdeev, D. A. Blom, C. J. Gahrs, R. L. Green, C. G. Hamaker, and T. Vogt, *J. Solid State Chem.*, **230**, 279-286, (2015)

PROACTIVE PERSONALITY AND VOLUNTARY TURNOVER: THE MODERATING EFFECTS OF DEVELOPMENT AND PERCEIVED CAREER OPPORTUNITIES

Presenter	Huber, Amy Graduate, Psychology
Mentor	Prof. Alexandra Ilie
Co-Mentor(s)	Dan Ispas
Authorship	Amy Huber; Alexandra Ilie; Dan Ispas

Proactive personality describes the predisposition for individuals to think and behave in ways that are future-oriented and aim to positively alter one's environment (Bateman & Crant, 1993). Recent meta-analytic research has identified numerous benefits of employing proactive employees due to their high overall job performance, task performance, organizational citizenship behaviors, and positive job attitudes (Fuller & Marler, 2009; Spitzmuller et al., 2015). However, little research has examined the relationship between proactive personality and voluntary turnover. By better understanding the factors that encourage or deter proactive individuals from leaving their organizations, we can better understand how to retain these highly productive employees. Therefore, the present

study examines how proactive personality operates within the job embeddedness framework (Mitchell et al., 2001) of voluntary turnover to understand factors leading to their staying or leaving their organizations. More specifically, the purpose of this study is to examine the moderating effects of participation in developmental activities and perceived career opportunities (PCOs) on the relation between proactive personality and voluntary turnover. It is hypothesized that proactive personality will be (a) positively related to voluntary turnover when PCOs are low, and (b) negatively related when PCOs are high due to proactive individuals' high career motivation (London, 1983) and desire to create situations that are congruent with their career goals. Additionally, the present study hypothesizes that participation in developmental activities will moderate the relationship between proactive personality and turnover such that (a) the relationship will be negative when participation in developmental activities is low and (b) positive when participation is high. This ongoing analysis of archival data is part of a master's thesis in Industrial/Organizational Psychology, and will be completed in the spring of 2017.

INCORPORATING MULTICULTURALISM: A CASE STUDY OF A STORYBOOK

Presenter	Huber, Hannah Undergraduate, Teaching and Learning
Mentor	Prof. Miranda Lin

Banks (1993) suggests the use of children's literature as vehicles for introducing concepts such as prejudice, discrimination, and so forth in classrooms. In this case study, James Banks' (2006) Multicultural Curricular Integration Theory was used to analyze "Smoky Night" (1994) written by Eve Bunting. The components of Banks' theory are as follows: the Contributions Approach, the Additive Approach, the Transformation Approach, and the Decision-Making and Social Action Approach. The Contributions Approach is a simple approach that adds a broad idea of ethnic topics to an already existing lesson plan. Next is the Additive Approach, which keeps the same curriculum but adds multicultural activities that go along with the theme that the teacher has chosen. The third level is the Transformation Approach that involves the teacher restructuring the curriculum in order to present the students with multicultural themes and issues that they can relate to and think deeply about. Lastly, the Decision-Making and Social Action Approach has the same base as the Transformation Approach, but the ultimate goal is for the teacher to present issues that make students want to take action. Based on my analysis, this book falls in the Additive Approach. In this presentation, I will explain why this book did not fit in other approaches but Additive Approach. Implications of how to use Banks' theory to evaluate teaching materials/books as well as how this book will be discussed.

EFFECT OF DRUG USE AND ADDICTION ON YOUNG ADULT IN AMERICA AND INFLUENCING FACTORS

Presenter	Ifegwu, Oluchi Graduate, Technology
Mentor	Prof. Sally Xie

This descriptive study was carried out between August and December 2016 in 3 cities of Massachusetts. A researcher made questionnaire was developed to determine the knowledge, attitude, and practice of college students regarding addictive drugs and their influencing factor. This was accomplished by sharing out the questions among young adult in the colleges which was done by stratified random sampling. The designed questionnaire identified level of drug abuse according to age, ethnicity, gender and different colleges from the cities. The information about the most common type of substance abused by young adults, common causes of this substance abuse for the first time, mean age of abusers and mean age at the first trial. The reliability of this questionnaire

based on the alpha coefficient was 79% considering a cutoff point of 0.07. With the result obtained in this study the questionnaire designed is capable to assess the drug abuse level of college students of Massachusetts, it is important to pay a close attention to this group and carry out more information to increase their knowledge and correct their attitude towards illegal substance use. This intervention will have an important role in decreasing the rate of drug abuse among young adult in Massachusetts and consequently in America as a whole.

COMPARISON OF GENERIC PRESCRIPTIVE TARGETS BETWEEN HEARING AID MANUFACTURERS AND A REAL-EAR ANALYZER

Presenter	Jaderholm, Mary Graduate, Communication Sciences and Disorders
Mentor	Prof. Hua Ou
Authorship	Mary Jaderholm; Hua Ou

Prescriptive approaches are typically implemented for estimating the optimal gain and output during an initial hearing aid fitting. The real ear aided response is measured and compared to the generic prescribed targets from real-ear analyzers for verification. The findings from the present study indicated that for the same generic prescriptive method and the same degree of hearing loss, the targets varied up to 26 dB between hearing aid manufacturers and the real-ear analyzer, when all parameters were held constant.

EXPOSING STRUCTURAL VIOLENCE IN A SMALL COMMUNITY IN PEORIA, IL

Presenter	Johnson, Bob Undergraduate, Anthropology
Mentor	Prof. Liv Stone

What can the stories of people living in one small community in Peoria tell us about structural violence in the U.S.? This ethnographic research seeks to tell the individual stories of the residents in a low income apartment complex. How do these residents experience their challenges and struggles? What impact have structural violence had on their lives?

WHAT ARE THE MAIN REASONS THAT LEAD TO ACQUISITION OF A COMPANY

Presenter	Khurana, Mini Graduate, Technology
Mentor	Prof. Sally Xie

In today's market trends, we often get to hear that a particular organization has been acquired by another company. Acquisition is the process of taking over a company to build on strengths and weaknesses of acquiring company. There can be numerous reasons for acquisition varying from lack of strategic planning to not meeting the customer expectations. One common reason is the firm's inability to cope environmental changes caused by technological innovations. These are opportunities or threats to which firms must respond. The research aims to find major

reasons for acquisitions by taking into account five major acquisitions in recent past. It is a qualitative research using retrospective case studies approach using data from journals, company's annual reports and F20 forms.

CLEARING THE AIR: THE FIGHT FOR A HEALTHY EARTH

Presenter	Kokkat, Jason Undergraduate, Politics and Government
Mentor	Prof. Michaelene Cox

International humanitarian law holds states accountable for protecting the environment during times of armed conflict. The environment may take a big toll from these conflicts. But to what degree does armed conflict inflict a toll upon the environment? To explore any relationship between armed conflict and the natural environment, I will look at selected states within a given period and compare those that have experienced no armed conflict within their borders to those that have. I propose that the air quality will have degraded from the release of more pollutants and carbon dioxide during combat. During the Vietnam War, the U.S. proceeded to use the herbicidal weapon called Agent Orange. This deadly chemical induced severe damage on the wildlife by stripping away all vegetation in the selected areas. In the years after the Vietnam War, international laws were created to make clear rules against committing large, widespread, and severe damage to the environment. This example shows us the atrocities that can occur if we do not retain laws that will protect environment from further abuses. I will also utilize Green Theory as a framework for my research to help connect how states can approach these environmental issues in a broader scope and can apply these to international environmental issues.

ELECTRICAL SYNAPSES EFFECTS ON A *LINEAR* CHAIN OF THREE DIFFERENT NEURONS

Presenter	Ku, Jae Chan Undergraduate, Physics
Mentor	Prof. Epaminondas Rosa
Authorship	Jae Chan Ku; Daniel Moreno

In this presentation we discuss the case of three different model neurons electrically and reciprocally coupled in a linear chain format. We use bifurcation diagrams to show how the three neurons, initially behaving in very different ways, eventually synchronize for strong enough coupling. A particular case of interest is the configuration leading the outer two neurons into synchrony while the middle neuron remains out of synchrony.

"A PURGATORY OF NOISE": EXPLORING SOUND DESIGN IN SOPHIE TREADWELL'S "*MACHINAL*"

Presenter	Labonte, Amanda Graduate, Theatre and Dance
Mentor	Prof. Ann Haugo

In the preface to an early draft of her 1934 play "*For Saxophone*", Sophie Treadwell writes that her script, "...is written to be played with an almost unbroken musical accompaniment. It is really words for music. I did this because I think our audiences' nerves, tuned to pictures and radio, almost now demand it of any entertainment". While musical accompaniment was not unfamiliar to the stage, the recent increase of audio technologies was. Playwrights became both composers and writers, building a soundscape within the story. Utilizing the popularity of new audio technologies, Treadwell's 1928 drama, "*Machinal*", interweaves the narrative of "The Woman" with the mechanized rhythms in the world surrounding her in order to allow the audience to understand the journey of "The Woman" from an "ordinary woman" to murderer.

DYNAMICS OF NITRATE, PHOSPHORUS, AND SUSPENDED SEDIMENT TRANSPORT IN TWO AGRICULTURAL STREAMS IN CENTRAL ILLINOIS

Presenter	Lampo, Luke Graduate, Geography/Geology
Mentor	Prof. Catherine O'Reilly
Authorship	Catherine O'Reilly; Bill Perry; Eric Peterson; Victoria Heath; Richard Twait

Nutrients such as nitrate and phosphorus are necessary for life, but excessive amounts can be detrimental. Large amounts of nutrients entering bodies of water can lead to hypoxic zones such as the one in the Gulf of Mexico. Nutrients are also problematic in drinking water reservoirs, as high concentrations of nitrate in drinking water can cause health conditions such as blue baby syndrome and high phosphorus concentrations can lead to algal blooms. High nutrient concentrations are a recurring problem in the drinking water reservoirs for the City of Bloomington, Illinois where water is drawn from two reservoirs - Evergreen Lake and Lake Bloomington. The primary source for these nutrients is from agriculture, which dominates the land use in the area. To better understand the dynamics of nitrate, phosphorus, and suspended sediment being transported into these reservoirs, water samples are collected at the major tributary for each reservoir - Six Mile Creek for Evergreen Lake and Money Creek for Lake Bloomington. SedEvent, an autosampler system which uses a turbidity threshold sampling method to determine when a rain event is occurring, is used to collect water samples at both tributaries. Water samples are analyzed for nitrate, total phosphorus concentrations using flow injection analysis (FIA). Suspended sediment concentrations are also being examined, as it can be an indicator of pollutants and a means of nutrient transport. There are high nutrient and suspended sediment concentrations and loads in both creeks during or just after rain events, when discharge is high. Nitrate concentrations range from 1.58 to 13.3 ppm, total phosphorus concentrations range from 11.9 to 1250 ppb, and total suspended sediment concentrations range from 8 to 4000 ppm. This study will provide the City of Bloomington with information about how much, and when the most nutrients and sediment are entering their drinking water reservoirs and allow them to take the appropriate steps to improve their water management.

SYNTHESIS AND METALATION OF N-METHYLBENZOCARBAPORPHYRINS

Presenter	Latham, Alissa Undergraduate, Chemistry
Mentor	Prof. Timothy Lash
Authorship	Timothy Lash; Alissa Latham

Alkylation of a benzocarbaporphyrin 1 afforded N-alkyl derivatives 2 that underwent a metalation reaction with palladium(II) acetate to give organometallic derivatives 3 where the alkyl substituent had migrated onto the internal carbon atom (Lash, T. D. *Org. Lett.* 2011, 13, 4632-4635). In order to obtain insights into this unusual

chemistry, the synthesis of alternative alkylated benzocarbaporphyrins such as 4 has been targeted. Benzyl acetoxymethylpyrrole 5 was prepared in three steps from readily available ethyl 4-ethyl-3,5-dimethylpyrrole-2-carboxylate. Subsequent reaction of 5 with N-methyl-3,4-diethylpyrrole in refluxing ethanol and acetic acid afforded tripyrrane 6. Reducing the tripyrrane, and then reacting it with indene afforded the methylated benzocarbaporphyrin 4. Metalation with palladium (II) acetate led to formation of the metalated compound 7. The conversion of the methylated carbaporphyrin to the rhodium complex will also be studied. In addition, synthesis of N-N-dimethyl benzocarbaporphyrins will also be investigated, as well as the palladium metal version.

DIVERGENT SERIES AND AVOIDED CROSSINGS

Presenter	Lisowski, Creighton Undergraduate, Physics
Mentor	Prof. Rainer Grobe
Co-Mentor	Prof. Q. Charles Su
Authorship	Richard Pelphrey; Rainer Grobe; Q. Charles Su

We propose a numerical method that permits us to compute the sum of a diverging series from only the first N terms by generalizing the traditional Borel technique. The method is rather robust and can be used to recover the ground state energy from the diverging perturbation theory for quantum field theoretical systems that are spatially constrained. Surprisingly, even the corresponding eigenvectors can be generated despite the intrinsic non-perturbative nature of bound state problems [1,2]. We acknowledge the support by the National Science Foundation.

[1] C. Lisowski, S. Norris, R. Pelphrey, E. Stefanovich, Q. Su, R. Grobe, *Ann. Phys.* 373, 456 (2016).

[2] Q.Z. Lv, S. Norris, R. Pelphrey, Q. Su, R. Grobe, *Comp. Phys. Comm.* (submitted)

COMMUNICATING POVERTY ABOUT ORDINARY PEOPLE: A QUALITATIVE STUDY

Presenter	Long, Cecelia Graduate, Communication
Mentor	Prof. John Baldwin

As recently as 2016, one in every seven Americans live in poverty. The U.S. Census Bureau reports that about 43.1 million people are living in poverty circumstances which is about 13.5% of the population. Poverty is an underexplored point of study in the field of communication, even though the discipline has much to offer. Communication can be useful to finding practical solutions to creating more effective routes to responding to poverty. The communicative relationship between individuals and families in need and those who serve them exist in a context of certain assumptions and perceptions, all of which directly or indirectly influence the allocation of resources. Using a qualitative approach, this study focuses around employee and volunteer perceptions of the people they serve (homeless and impoverished individuals), as well as internal and external loci of control factors, differentiations between roles and responsibilities, and social survival. Data was collected from a mid-size homeless shelter located in a mid-west city in Illinois. In-depth interviews was determined to be the most useful method in answering the proposed research questions. All interview topics involved elements of communication styles and language use. The results indicated a variety of themes including perceptions influencing communication

style, internal and external loci of control, employee and volunteer communication differences, and social support. Theoretical, methodological, and practical implications suggest future research be done using communication theory.

ENGAGEMENT DURING RELATIONSHIP EDUCATION AND PSYCHOLOGICAL FUNCTIONING

Presenter	Luckett, Symone Undergraduate, Psychology
Mentor	Prof. Renée Tobin
Co-Mentor(s)	Leandra Parris
Authorship	Symone Luckett; Joel Dukett

Maintaining healthy interpersonal relationships promotes positive psychological functioning. Teaching relationship skills directly is one way to facilitate healthy relationships development among youth. Relationship education is “focused on skill building, interpersonal skills, safety, knowing oneself and setting the stage for healthy marriage” (Sparks et al., 2012, p. 21). In this study, we examined behavioral engagement during a relationship education curriculum and its links to the psychological functioning of at-risk youth. Behavioral engagement “includes behaviors such as effort, persistence, concentration, attention, asking questions, and contributing to class discussion,” as well as following classroom rules (Fredericks, Blumenfeld, & Paris, 2004, p. 62). We hypothesized that youth’s behavioral engagement during a relationship education curriculum would be related to their psychological functioning. In this study, 128 at-risk youth were administered 12 lessons from the evidence-based relationship education curriculum, *Loves Notes: Skills for Love, Life, and Work* (Pearson, 2016). During each lesson, researchers rated the engagement of each participant. Youth self-reports of psychological functioning were assessed individually using the Pediatric Symptom Checklist (Jellinek et al., 1988) before and after the *Love Notes* curriculum was delivered. For this presentation, we will examine the extent to which behavioral engagement during the *Love Notes* lessons predicts participants’ level of psychological functioning. We hypothesize that greater behavioral engagement during lessons will be related to better psychological functioning.

IONIZATION OF LITHIUM BY HEAVY PARTICLE IMPACT USING THE HI-5 MODEL

Presenter	Lyon, Jesse Undergraduate, Physics
Mentor	Prof. Allison Harris
Authorship	Jesse Lyon; Mason Bates; Allison Harris

Atomic collisions provide key insights into one of the most fundamental forces of nature – the Coulomb force. The study of atomic collisions is primarily used to understand the dynamics of charged particle interactions, but is vital to other areas of physics, such as plasma physics, astrophysics, and biophysics. The study of heavy-ion collisions with atoms is an increasingly important area of collision physics. In this work, we study the ionization of lithium by heavy-ion impact. Using our newly developed Heavy-Ion 5-Body (HI-5) model, we calculate fully differential cross sections for different heavy-ion projectiles. Results will be compared to other theoretical models, and the role of electron correlation and post-collision Coulomb interaction will be discussed.

INVESTIGATION OF $\text{Na}_2\text{Mo}_{1-x}\text{W}_x\text{O}_4$ AND Ce^{3+} -DOPED $\text{Na}_3\text{Mo}_{1-x}\text{W}_x\text{O}_4\text{F}$ AS PHOSPHOR MATERIALS

Presenter	Markello, Macie Undergraduate, Chemistry
Mentor	Prof. Eirin Sullivan
Authorship	Casey Gahrs; Macie Markello; Eirin Sullivan

A study conducted to find the effect of doping amounts of Ce^{3+} for Na^+ into the self-activating oxyfluoride $\text{Na}_3\text{MoO}_4\text{F}$ in relation to $\text{Na}_{3-3a}\text{Ce}_a\text{MoO}_4\text{F}$ ($0 \leq a \leq 0.25$) showed the optimum intensity of photoluminescent output is achieved for $a = 0.05$, producing maximum excitation $\lambda_{\text{ex}} = 216$ nm and emission $\lambda_{\text{em}} = 450$ nm. Similarly, the known oxide phases Na_2WO_4 and Na_2MoO_4 with spinel structure readily form an isostructural solid solution with general formula $\text{Na}_2\text{Mo}_{1-x}\text{W}_x\text{O}_4$ ($0 \leq x \leq 1$). These oxide materials also display self-activating photoluminescence with optimum intensity of photoluminescence observed for the tungstate, Na_2WO_4 .

EVIDENCE OF A VITAMIN C DEFICIENCY IN SCHROEDER MOUNDS

Presenter	McDaniel, Alexandria Undergraduate, Anthropology
Mentor	Prof. Liv Stone

Scurvy, a vitamin C deficiency, is a highly uncommon disease known in modern times. There is very little known on this disease at the speculative site of Schroeder Mounds (11He117). In order to understand the issue of the health of the individuals, the subadults and adults skulls were examined for any sign of porotic pitting. The orbits, temporal bones, ZAM, cheeks, and the gums closest to the teeth were examine for pitting. Cribrra orbitalia pitting in the orbits on the skull that are a contributor to the scurvy disease. Age and sex are categories to determine if scurvy was seen more in the young or later age. With evidence of scurvy in the Schroeder Mounds, this could be the possible cause of environmental stressors (e.g., agriculture).

THE FARMING COMMUNITY'S PERSPECTIVE ON NUTRIENT LOSS REDUCTION

Presenter	Marks, Benjamin Undergraduate, Agriculture
Mentor	Prof. Maria Boerngen
Authorship	Benjamin Marks; Maria Boerngen

The Illinois Nutrient Loss Reduction Strategy (Illinois NLRs) has established ambitious goals of significantly reducing nitrate-nitrogen and phosphorus loading to the Mississippi River from sources such as agricultural runoff, in accordance with the federal Gulf Hypoxia Action Plan 2008. For the farming community, this entails a delicate balance between protecting farmer income and protecting the environment. Efforts are currently underway in Illinois to establish best management practices for reducing runoff and maintaining economic viability, but the success or failure of these voluntary efforts relies on buy-in from the farming community. By capturing the

perspective of the population most directly affected by efforts to reduce agricultural nutrient loss, we provide a valuable contribution to a USDA-funded, multi-university project entitled Using Precision Technology in On-Farm Field Trials to Enable Data-Intensive Fertilizer Management, whose ultimate goal is to influence on-farm decision making to achieve the desired outcome of reducing agricultural nutrient loss in an economically viable manner. We are applying the concept of "customer discovery" to capture farmers' perspectives on nutrient loss reduction. This approach to entrepreneurship entails identifying customers' perceptions of a problem, and their need to solve it, which in turn allows the entrepreneur to meet the needs of the market. We are utilizing this entrepreneurial approach to discover the local farming community's perception of issues related to nutrient loss, which will thereby enable us to provide outreach to farmers that encourages compliance with the goals of the Illinois NLRs. Working through the McLean County Soil and Water Conservation District, we are providing farmers a unique opportunity to share their first-hand perspective on this timely issue. We have conducted interviews with grain farmers throughout McLean County (n=22), and have discovered that while they believe nutrient loss presents both economic and environmental concerns, they have made few changes to their farming practices in response to those concerns. While they have heard of the Illinois Nutrient Loss Reduction Strategy, they do not yet feel directly affected by it. Additionally, farmers report that universities are the most trusted information source that they consult for their farming practices. By continuing these interviews, we will expand our understanding of the farming community's perspective on these issues, enabling us to provide targeted outreach to farmers that will influence voluntary on-farm decision making to comply with the environmental goals of the Illinois NLRs while also protecting farmer income.

STIGMA BY ASSOCIATION AND PARENTAL STRESS IN PARENTS OF RURAL YOUTH

Presenter	Medema, Kristina Undergraduate, Psychology
Mentor	Prof. Adena Meyers
Co-Mentor(s)	Renée Tobin
Authorship	Kristina Medema; Danielle Gieschen; Kathryn Ferdon

Stigma by association (SBA) looks at social and psychological reactions to people who are associated with a stigmatized individual (Bos, Pryor, Reeder & Stutterheim, 2013). SBA is associated with higher levels of psychological distress and lower levels of perceived closeness to a greater degree in immediate family members than in extended family members (van der Sanden, Bos, Stutterheim, Pryor, & Kok, 2013). Multiple studies have also shown a positive correlation between SBA and burden. Burden can be defined as "the presence of problems, difficulties, or adverse events which affect the lives of the psychiatric patient's significant others (Platt, 1985). One study has shown that 87 percent of participants reported experiencing family burden (van der Sanden, Stutterheim, Pryor, Kok, & Bos, 2014). Relational frustration indexes one aspect of burden.

In a rural Midwestern county, parents (n=110) of youth aged 2.5-19 years who screened positive for mental health risk completed personality and parenting measures. Parents completed the abbreviated versions of the Public Stigma Scale and the Stigma-by-Association Scale (Pryor, Bos, et al., 2012), the single-item Inclusion of Other in the Self Scale (Aron, Aron, & Smollan, 1992), and the Parent Relationship Questionnaire of the Behavior Assessment System for Children, Second Edition (BASC-2 PRQ; Kamphaus & Reynolds, 2006). It is predicted that perceptions of stigma will be related to parents' perceptions of the parent-child relationship. Specifically, we expect that stigma by association will be related to increased parental frustration. To test these hypotheses, correlations will be used to examine the associations among measures of closeness, parent perceptions of the parent-child relationship, parents' thoughts, feelings, and behaviors about the public stigma of mental illness, and the cognitive, emotional, and behavioral reactions to having a family member with a stigmatized mental health condition. In addition, t-tests will be used to examine differences between parents' self-perceptions and their perceptions of others' stigmatization. The findings from the present study will provide information about predictors of parent-child relationships among rural youth screening positive for a mental health concern. Results will be discussed within the

context of findings from the extant literature. The findings from this study may inform the practices of mental health services aimed at treatment for families experiencing mental illness.

A POSTCOLONIAL FEMINIST PERSPECTIVE ON SEXUAL ABUSE WITHIN ISIS

Presenter

Melchi, Allison

Undergraduate, Politics and Government

Mentor

Prof. Michaelene Cox

Syria and Iraq, the primary countries where the Islamic State resides, have a history of neo-patriarchy, which was reinforced after the colonial mandate of the Treaty of Versailles, the Hussein and al-Assad regimes and the rise of ISIS. One view assesses that men, as warriors, are empowered by protecting 'their' women; therefore to prove one's power over the enemy, they rape the women. Perversely, they consider it worse when they emasculate the men by raping them, because there is seemingly nothing worse than being a woman, where they believe the lack of power is built into one's very being. For my research paper, I will be focusing on what drives sexual abuse by ISIS members and why it should be considered a war crime. I will examine this problem from the postcolonial feminist perspective and will utilize the illustrative method, using the theoretical model to support my case. Including historical context and cultural differences, I will articulate the ongoing issue of sexual abuse within ISIS as well as offer a proposal for the action that the international community should take.

MOVING BEYOND TOLERANCE

Presenter

Menchaca, Mariah

Undergraduate, Teaching and Learning

Mentor

Prof. Miranda Lin

"Whoever You Are" Mariah A. Menchaca Illinois State University The publication "Whoever You Are" (1997) written by Mem Fox, summarizes the importance of equality and acceptance of other cultures, ethnicities and backgrounds. It is critical that educators make their classroom environment welcoming and safe to all of their students, along with their families, especially in our changing world today. In Sonia Nieto's article "Moving Beyond Tolerance in Multicultural Education" (1998), she stresses that acceptance implies that differences are acknowledged and their importance is either denied or belittled. Therefore, I used Nieto's theory to analyze Mem Fox's book. I found that differences that we all share are made obvious by the pictures portrayed in the book, but it is clear that they are something to be celebrated, not tolerated. Children start to form their own ideas and opinions and are especially curious about everything at a very young age. "Whoever You Are" though briefly engages students in different cultures, teaches acceptance. Although neither tolerance nor acceptance are specifically mentioned in the short storybook, it is apparent that the book portrays acceptance more than tolerance. To conclude my presentation, I will address how to implement multicultural education into my curriculum. As Nieto argues, people should stray away from relating the multicultural education to "tolerance". Exposing children to different views, cultures, and backgrounds can be very beneficial to the learning of the students, especially in early childhood. In younger years, children mainly learn through play, having knowledge on the differences between their peers can make play more imaginative and also make children from different backgrounds more comfortable. Educating children to move beyond tolerance is deemed to have children's best interest in mind for educators.

ASSOCIATION BETWEEN CHILDHOOD SEXUAL ABUSE AND SUBSTANCE USE IN WOMEN

Presenter	Merle, Jessica Undergraduate, Psychology
Mentor	Prof. Corinne Zimmerman
Co-Mentor(s)	Marla Reese-Weber

The purpose of this study was to examine the relationship between childhood sexual abuse and later drug/alcohol use. The participants in this study included a sample of undergraduate students at Illinois State University who received extra credit in exchange for their participation. Data were taken from two samples. Both sets of participants were asked to complete the same survey, including questions about their history of childhood sexual abuse as well as questions about their usage of alcohol, cigarettes, street drugs, and non-prescription drugs. It is hypothesized that those who were sexually abused in their childhood will report higher usage of alcohol and/or drugs. Implications of this study will be described later.

DIURNAL AND SEASONAL VARIATION IN GROUNDWATER NITRATE-N CONCENTRATION IN A RIPARIAN BUFFER ZONE

Presenter	Miller, Joseph Graduate, Geography/Geology
Mentor	Prof. Eric Peterson
Authorship	Joseph Miller; Everett Wood; Stephanie Dwyer; Austin Scott

Agriculture is recognized as a leading cause of surface water pollution by nitrate (NO_3^-). Excess NO_3^- loading causes eutrophication and hypoxia in near-shore marine waters such as the Gulf of Mexico. Agricultural runoff diversion into riparian buffer zones can reduce NO_3^- load by temporary or permanent removal. Although the mechanisms responsible for NO_3^- reduction in riparian buffer zones are well characterized, little is known about how NO_3^- concentrations vary temporally and what factors are involved in these changes. The objective of this study is to understand NO_3^- concentration variability in a riparian buffer zone on a diurnal scale within and among seasons. Diurnal and seasonal variation in NO_3^- may be driven by diurnal and seasonal changes in solar intensity. Solar intensity governs factor that may influence NO_3^- reduction such as air temperature, groundwater temperature, and growth of terrestrial plants. The leading question of this study is "Does riparian zone shallow groundwater NO_3^- concentration vary temporally?" This question is broken into the following testable hypotheses: 1) NO_3^- concentration will vary over a 24-hour period in each season. 2) Daily mean NO_3^- concentration will vary seasonally. 3) The mean daily timing of maximum and minimum NO_3^- concentration will vary seasonally. 4) The magnitude of mean difference between daily maximum and minimum NO_3^- concentration will vary seasonally. The outcome of this study will be an enhanced understanding of NO_3^- processing, which will aid in the development of best management practices designed to remedy excess nitrogen in agricultural systems. To address these hypotheses, sample events will occur weekly over the duration of one year, with data collection between September 2016 and September 2017. This study will occur at a riparian buffer zone, known as site T3, located 3km NW of Hudson, IL. Water samples will be withdrawn from a well screened in the surficial unconfined aquifer at 1.5m below the surface. Each sampling event will include groundwater samples taken every hour for 24-hours by an ISCO autosampler. A DIONEX ICS-1100 ion chromatography system owned by Illinois State University will be employed to analyze samples for NO_3^- and chloride. Chloride, a conservative tracer, will be used as a proxy for dilution. Seasons are defined as follows Spring: March,

April, May; Summer: June, July, August; Fall: September, October, November; Winter: December, January, February. Data analysis will include a 1-way ANOVA and Pearson correlation analysis with completion by December 2017.

NEUROLOGICAL SYSTEMS: FROM THE ANCIENT EGYPTIANS TO MODERN IMAGING AND COMPUTER SIMULATIONS

Presenter	Mobille, Zachary Undergraduate, Physics
Mentor	Prof. Epaminondas Rosa

Neurological systems have been intriguing humans from the beginnings of civilization thousands of years ago up to this date, with so many still unanswered questions. In this presentation we will discuss landmark discoveries in and contributions to neuroscience that enabled not only precise experimental measurements and imaging of neuronal activity, but also the development of mathematical models with physiological meaning capable of mimicking neuronal behaviors.

MEDIATOR COMPLEX SUBUNITS MED25 AND MED16 PROMOTE PAPILLAE FORMATION ON TRICHOME CELL WALLS

Presenter	Moore, Christy Graduate, Biological Sciences
Mentor	Prof. Viktor Kirik
Authorship	Christy Moore; Trevor Rickerd; Bangxia Suo; Mais Zahde; Katie Juveland; Viktor Kirik

The plant cell wall plays an important role in communication, defense, organization and support. The importance of each of these functions varies by cell type, with specialized cells, such as *Arabidopsis* trichomes, or leaf hairs, exhibiting distinct cell wall characteristics including papillae. To better understand the molecular processes important for papillae deposition on the cell wall surface, we identified the *GLASSY HAIR 1 (GLH1)* and *GLASSY HAIR 2 (GLH2)* genes, which are necessary for papillae formation. We found that a splice-site mutation in the component of the transcriptional Mediator complex *MED25* gene is responsible for the papillae-less phenotype of the *glh1* mutant. Preliminary elemental analysis indicates that calcium ion accumulation in trichomes is strongly reduced in *glh1* mutants, suggesting that the processes important for papillae deposition may also be important for calcium deposition at the trichome cell wall surface. Fortuitously, the *glh2* mutation was mapped to a gene encoding the Mediator complex subunit MED16. A GFP-MED16 fusion was shown to localize to the nucleus, consistent with a role in transcriptional regulation. The *MED25* and *MED16* genes are expressed in trichomes. The expression of the trichome development marker genes *GLABRA2 (GL2)* and *Ethylene Receptor2 (ETR2)* is not affected in the *glh1* or *glh2* mutants. Collectively, the presented results show that MED25 and MED16 are necessary for papillae formation on the cell wall surface of leaf trichomes and that the *Arabidopsis* MED25 and MED16 Mediator components are likely involved in the transcription of a subset of genes that promote papillae deposition in trichomes.

ANALYTICAL VALIDATION OF A PORTABLE MS SYSTEM FEATURING INTERCHANGEABLE, AMBIENT IONIZATION SOURCES DURING FIELD OPERATION

Presenter	Mukta, Shahnaz Graduate, Chemistry
Mentor	Prof. Christopher Mulligan
Authorship	Shahnaz Mukta; Zachary Lawton; William Fantigante; Herbert Oberacher; Christopher Mulligan

Portable mass spectrometric (MS) systems coupled to ambient ionization methods have the potential to allow rapid analysis of critical samples in the field setting, reducing the need for shipping to off-site laboratories. However, disciplines that would greatly benefit from in-situ chemical analysis, such as environmental science, homeland security and forensics, would also need this technology to maintain analytical performance similar to lab-scale instrumentation while being primarily utilized by non-technical operators. To demonstrate the viability of portable MS systems for field-based forensic applications, we have performed a rigorous analytical characterization of such a system, delineating the effect of novice user operation and outdoor environmental variables on reliability of chemical identification and instrument performance.

ELECTRICAL SYNAPSES EFFECTS ON A CYCLIC CHAIN OF THREE DIFFERENT NEURONS

Presenter	Moreno, Daniel Undergraduate, Physics
Mentor	Prof. Epaminondas Rosa
Authorship	Daniel Moreno; Jae Chan Ku

In this discussion, a case is presented about three distinct neurons electrically coupled in a reciprocal cyclic chain format. Using bifurcation diagrams we analyze the individual behavior of each neuron and find at what coupling strength they synchronize. We compare our results with those of similar setups but with the neurons coupled in a linear chain format. We observe that in some cases the cyclic format requires stronger coupling for synchronization than the linear format coupling.

STUDY OF EARTH'S MAGNETOSPHERE

Presenter	Osman, Noah Undergraduate, Physics
Mentor	Prof. Jay A. Ansher
Authorship	Nikhil Madugula; Jay A. Ansher

We investigate a ten-hour period of data from the GEOTAIL spacecraft with the hope of understanding the portion of the Earth's magnetotail that the spacecraft encountered on September 17, 1993. By studying the magnetic field measurements

(magnitude and components), along with electron flux from other instruments on the spacecraft, we speculate about the time periods that GEOTAIL was in particular regions of the magnetotail. Periods of time where the magnetic field is strong and radial are identified as when the spacecraft was in the lobes of the magnetotail. Times with low magnetic field magnitude and/or radial component reversal indicate the spacecraft encountered the central neutral sheet. Data from other instruments measuring particle flux are used to support these arguments.

FUNDING CRUNCH AFFECTING INDIAN ATHLETE PERFORMANCE IN ELITE SPORTS EVENTS

Presenter Panneer Selvam, Trinity
Graduate, Technology

Mentor Prof. Sally Xie

A Nation's Sports is a global vibrant medium that serves as a cause of National identity and unity. Sports is not just a country's culture to develop and prove team or individual excellence but it is a National Pride of participating and winning medals which create a significant impact in the worldwide competition. It is also a big business that caters to the National Economy. It helps a country to be notorious by its self-recognized abilities. Sporting field as an industry or a business for understanding is a vast sector in a country and it is responsible for healthy socio-economic impacts. India, being a highly populated country is ideally expected to contribute and perform at its best with spirited and well trained athletes in all possible events and score medal tally. However, the sports results show the extreme underperforming status causing global disappointment. This research is intended to highlight the need for focusing issues associated with the low level global competitiveness of Indian Sports System. During the initial days, sports were considered traditionally as a hobby. But now the trend has created awareness to make career wise options for sportspersons. It has increased the employability ratio for many aspirants to pursue their career in Sports. Sports, as a global the sector is estimated to be worth between \$480 - \$620 billion. However, to be very specific about Indian Sports, the country is yet to be identified as an industrialized sector. It is proved that sports as a full-fledged industry can contribute about 1 to 5 percent of the country's GDP. As per a study, sports business in India is expected to generate an annual revenue nearing \$2billion in India mostly boosted by the income from the TV media and sponsorships and the overall Indian revenue would witness an average annual growth of 5percent. Especially Cricket is just more than the matter of Sport, it is a big business in India to be transformed into a multi-billion dollar industry. This study basically provides evidence captured by correlation link between variable effects over the Sports performance. The purpose of the study is to focus on major problems faced by Indian Sports and Fitness Industry and few recommendations from different aspects to be handled by entrepreneurial routes and also to determine the cause of decline in medals over the years.

COMPARISONS OF FEMININE AND MASCULINE TRAIT PREFERENCES OF FEMALE CHILD SEXUAL ABUSE VICTIMS

Presenter Peloza, Julie
Undergraduate, Psychology

Mentor Prof. Corinne Zimmerman
Co-Mentor(s) Marla Reese-Weber

The purpose of this study was to examine the differences between feminine and masculine mate/partner trait preferences of survivors of child sexual abuse. The participants in this study were female undergraduate students

attending Illinois State University. Participants were compensated in the form of extra credit for their courses in exchange for their participation in this study. Participants completed a survey about their history of child sexual abuse and the BEM Sex-Role Inventory to examine preferences for feminine and masculine traits in romantic partners. It is hypothesized that individuals who were sexually abused will be more inclined to choose romantic partners portraying masculine qualities, than individuals who were not sexually abused. The implications of this study will be discussed.

EMERGENCE OF BOUND STATE FROM A FREE STATE, IS IT POSSIBLE?

Presenter	Pelphrey, Richard Undergraduate, Physics
Mentor	Prof. Rainer Grobe
Co-Mentor	Prof. Q. Charles Su
Authorship	Richard Pelphrey; Creighton Lisowski; Rainer Grobe; Q. Charles Su

It is often assumed that bound states of quantum mechanical systems are intrinsically non-perturbative in nature and therefore any power series expansion methods should be inapplicable to predict the energies for attractive potentials. We propose a new truncated Borel-like summation technique that can recover the correct bound state energy from the diverging sum. It can be used to calculate bound-state energies and wave functions for quantum field theoretical models and is based on the direct diagonalization of the corresponding quantum field theoretical Hamiltonian in an effectively discretized and truncated Hilbert space. We illustrate this approach for a Yukawa-like interaction between fermions and bosons in one spatial dimension and show where it agrees with the traditional method based on the potential picture and where it deviates due to recoil and radiative corrections [1,2]. We acknowledge the support by the National Science Foundation.

[1] C. Lisowski, S. Norris, R. Pelphrey, E. Stefanovich, Q. Su, R. Grobe, *Ann. Phys.* 373, 456 (2016)

[2] Q. Z. Lv, S. Norris, R. Brennan, E. Stefanovich, Q. Su and R. Grobe, *Phys. Rev. A* 94, 032110 (2016)

SYNTHESIS AND CHARACTERIZATION OF NOVEL SULFONAMIDE LIGANDS

Presenter	Penn, Austin Graduate, Chemistry
Mentor	Prof. Christopher Hamaker

Ruthenium-sulfonamide coordination compounds exhibit very dynamic properties such as photoactivity and potential applications in medicines. Adding a bipy-like imine group on the far end of a sulfonamide ligand may allow interesting crystal lattice stacking arrangements and afford unique hydrogen bonding pathways. The synthesis of these novel compounds follows scheme 1 (shown below) beginning with the synthesis of the sulfonamide ligand followed by coordination to the metal center. Standard characterization techniques including ATR-FTIR, ^1H NMR, ^{13}C NMR, Magnetic Susceptibility, and X-ray crystallography are used to evaluate the metal complex and ligands associated. The synthetic pathway has proven to be successful using copper as a model metal center to validate the ligand's abilities, characterization and crystallization are currently underway. Results so far confirm that these

prairies have a moist loamy soil with dense vegetation, thus plants must be capable of competing for light resources. In contrast, sand prairies have a well-drained soil with sparse vegetation, thus plants must be drought tolerant. As *C. fasciculata* is an annual species, it is expected to have strong selection to quickly grow and reproduce, although the set of characteristics enabling this plant to achieve success in a restored tallgrass site could be dependent on seed source. Overall, we wanted to assess if seeds from tallgrass prairies show greater success in a restored tallgrass site in comparison to seeds from sand prairies when subject to differences in light availability. Specifically, we planned to assess if seed source impacted, growth, survivorship, development, reproduction, plant defenses, and interactions of the individual plants. Franklin Farms, the site chosen for this study, was historically used for agriculture until it was converted to a restored tallgrass prairie 15 years ago. A common garden field experiment, using a split-plot design, was conducted at this site to test if seed source from sand and tallgrass prairies differ in their relative success in differing light environments. *Chamaecrista fasciculata* seeds were collected from tallgrass and sand prairie populations and transplanted as seedlings into the one of the six split-plot replicates. Each plot was separated into trim and non-trim treatments to change the light environment by cutting away all vegetation that was not *C. fasciculata*. I will be presenting an early analysis of some of this data. Results from this study could inform restoration efforts, if prairie type specific responses are found in *C. fasciculata* this would support the use of prairie-type-specific seed source depending on type of prairie being restored.

DIAGONALIZING THE FIELD THEORY HAMILTONIAN - PART II

Presenter	Pinto, Santiago Undergraduate, Physics
Mentor	Prof. Neil Christensen
Authorship	Santiago Pinto; Neil Christensen, Cory Russ, Joshua Henderson

The theory of quantum chromodynamics that binds protons and neutrons together inside the nucleus of the atom is notoriously difficult to calculate. We investigate a new method for doing these calculations that involves the diagonalization of the field-theory Hamiltonian. In this talk, we will describe the computational algorithms involved in taking the formal expression for the Hamiltonian matrix and turning it into a matrix of complex numbers which can be computed using standard mathematical packages. We will describe our algorithms in the context of the Mathematica software package.

CAN A SCALING RELATIONSHIP BETWEEN PEAK DISCHARGE AND DRAINAGE AREA BE USED TO IDENTIFY TILE DRAINAGE INPUTS INTO AN AGRICULTURAL STREAM?

Presenter	Plath, Ryan Graduate, Geography/Geology
Mentor	Prof. Catherine O'Reilly
Co-Mentor(s)	Eric Peterson
Authorship	Catherine O'Reilly; Rick Twait; Eric Peterson; William Perry; R.J. Rowley; Jeremy Neundorff; Eric Deck

Though tile drains have been shown to contribute to high levels of nitrate in agricultural streams, the locations of tile drains on a watershed scale are unknown due to tile drains being located on many separate parcels of private property. This study evaluates the capability of a methodology for locating areas of large tile drainage contribution to agricultural streams and examines if there is a difference in the scaling relationship between tile-flow and non-

tile flow conditions. A scaling relationship between peak discharge and drainage area will be created and locations that plot above the scaling relationship have a higher peak discharge relative to drainage area and represent a transition break. A tributary entering a main stream channel causes a transition break, so GIS will be used to identify whether this unknown flux is a tributary entering the main channel or if an area of large tile drainage contribution to the stream is replacing the function of a tributary. Stage data were taken every fifteen minutes and discharge measurements were taken twice a week at eight sites, ranging 6.4 km²-77.2 km² in drainage area, along Money Creek near Bloomington, Illinois. Money Creek is the tributary of Lake Bloomington, which serves as the drinking water source for Bloomington, Illinois. From this data, rating curves will be used to compute peak discharge for four storm events at each site. Preliminary results from data taken on July 1st, 2016 during base-flow conditions show that there is a tight relationship between drainage area and discharge ($R^2= 0.9875$). I expect outliers that plot above the tile-flow scaling relationship to disappear during non-tile-flow conditions. Outliers can be identified in several different ways; these include using confidence intervals for the regression, looking at residuals, or using percent differences. If this method is effective at Money Creek, it could be applied to tile drained areas throughout the Midwest to locate target zones for best management practices in nutrient reduction.

THE THEORY OF THE SCANNING THERMOELECTRIC MICROSCOPE

Presenter

Rahe, Alex

Undergraduate, Physics

Mentor

Prof. Justin Bergfield

A scanning tunneling microscope measures the charge transport into an atomically sharp tip in response to an applied voltage and has revolutionized how we “see” at the nanoscale. In response to an applied temperature difference, current flows until a voltage is built up to oppose the flow. The ratio of the voltage to the temperature difference is a measurable quantity known as the thermopower. Although thermoelectric devices are important for a variety of heating and cooling applications, we propose that the thermopower is also of interest as a microscopic observable because it is a probe of the second moment of the transport. In this work, we derive the theory necessary to describe this new microscopic technique. We also simulate several images produced by a scanning thermopower probe (SThM) and discuss the implications of the technique.

SPECTRAL THEORY OF FINITE DIGRAPHS

Presenter

Richardson, Kirsten

Graduate, Mathematics

Mentor

Prof. Fusun Akman

"Adjacency matrices" that represent finite undirected graphs have been studied extensively. Eigenvalues of such matrices are invariants of the graph, and they tell us a lot about the properties of the graph. The adjacency matrices of directed graphs (digraphs) are also well-known; one example is the one that is used by Google PageRank, which determines the relevance of websites for a search. Although digraphs are usually known as representations of networks (such as websites or acquaintances), they are also representations of "relations" and "functions" on a finite set. I will describe the properties of relations and functions that we can glean from the adjacency matrix of a finite digraph.

GLH3: A GENE INVOLVED IN REORGANIZING PLANT TRICHOME CELL WALLS

Presenter	Rickerd, Trevor Graduate, Biological Sciences
Mentor	Prof. Viktor Kirik
Authorship	Trevor Rickerd; Christy Moore; Katie Juveland; Chaz Im; Viktor Kirik

Plant cell walls are used in dynamic ways to aid in a number of functions, such as mechanical support, cell shape, transport of solutes, and defense from pathogens. Specialized cell types can organize their cell walls in unique ways pertinent to their function. Trichomes, or plant hairs, develop relatively thick cell walls that develop small, round, opaque structures called papillae in late-stage cell wall development. Although the function of trichome papillae is not well established, the papillae have been observed to give trichome cells a birefringent quality, leading us to believe that the papillae may be involved in defending the young, growing seedling from harmful UV irradiation by dissipating light waves. One project that we are developing in our lab focuses on the glassy hair 3 (glh3) mutation that results in a "glassy", transparent trichome phenotype, caused by the lack of developed papillae structures on the trichome. We have found that a gene encoding a pectate lyase enzyme has a mutation in its coding region that is thought to affect the ability of the protein to perform its pectin hydrolysis activity. By comparing this mutant to other glassy trichome mutants, we have observed that the glh3 mutant produces a semi-dominant phenotype. We are testing a hypothesis that the nature of this mutation may allow the mutant version of the pectate lyase to behave in a dominant negative manner, preventing the wild-type pectate lyase from performing its hydrolytic function. We are developing further assays in order to characterize the semi-dominant nature of our mutant phenotype based on subcellular localization of our protein of interest, the ability to rescue the mutant phenotype, and analysis of the papillae via Scanning electron microscopy.

EXECUTIVE FUNCTION AND DIFFERENCES IN FOCAL VERSUS NON-FOCAL PROSPECTIVE MEMORY

Presenter	Ringhofer, Grace Undergraduate, Psychology
Mentor	Prof. Dawn McBride

The present study examines focal and non-focal prospective memory and whether they are theoretically and conceptually intertwined, as well as their relationship to various facets of executive functioning. Prospective memory (PM) involves remembering to complete an intended action at a future point in time (i.e., you need to remember to pay your credit card bill, and later on remember to do so when see a commercial for that card). Executive function is a set of mental processes that give humans the ability to plan, focus attention, remember lists or sets of instructions, and engage in several tasks simultaneously. This study will examine relationships between focal and non-focal PM and various facets of executive functioning to see the role executive function plays in each type of PM. Participants will be given a series of four tasks, two of which will be either focal or non-focal PM tasks, and the other two tasks will measure facets of executive functioning. The order of the tasks will alternate across subjects. We anticipate that focal and non-focal PM will share some of the same underlying processes, though they show differences across different aspects of executive function (task switching and inhibition). Specifically, we expect that while non-focal tasks may require more task switching since participants must constantly monitor the

task for cues, focal PM tasks may only require inhibition processes. It is expected that the exact processes that allow for controlled attention will differ between the two PM tasks.

ENDURANCE TRAINING CAN SLOW THE PROGRESSION OF MUSCULAR DEGENERATION IN C. ELEGANS MODELING DUCHENNE MUSCULAR DYSTROPHY

Presenter	Rodriguez, Anjelica Graduate, Biological Sciences
Mentor	Prof. Andrés Vidal-Gadea
Authorship	Anjelica Rodriguez; Andrew Schuler; Kori Cuciarone; Andrés Vidal-Gadea

Duchenne muscular dystrophy (DMD) is a degenerative disease afflicting up to one in 3,500 males. It results from a mutation in the gene encoding the dystrophin protein. Lack of functional dystrophin results in progressive muscle cell damage and death. The exact mechanism by which this occurs remains unclear. Previous human studies looking at strength training in dystrophic muscles show minimal to no amounts of strength gain; however, the type and level of muscular exertion that is beneficial for dystrophic muscles has not been established. We previously showed that *C. elegans* lacking functional copies of the dystrophin gene (*dys-1*) parallel many of the motor and muscular deficiencies observed in DMD patients. In order to establish if strength or endurance training have protective effects on dystrophic muscles, we subjected wild type and *dys-1* worms to strength or endurance treatments over varying time intervals. Preliminary data suggest any duration of strength training has negative effects on dystrophic muscle, while endurance training at intermediate durations slows muscular degeneration. It is possible that our strength training treatment has a high level of muscular exertion, and the next step in our study is to subject worms to graded levels of exertion in the strength training treatment. Given our findings, physical therapy programs should consider endurance training as an alternative to strength training, however these results should be confirmed within the mammalian system.

DROSOPHILA MELANOGASTER DRUG SCREENING

Presenter	Roustio, Loren Undergraduate, Biological Sciences
Mentor	Prof. Alysia Mortimer

Limb-Girdle Muscular Dystrophy (LGMD) is a group of progressive disorders caused by mutations in ~30 genes, which cause muscle atrophy, leading to a variety of problems from loss of ambulation to cardiomyopathy. As there are limited treatments and no cure for LGMD, there is an apparent need for research to develop improved treatments. We have developed a new model of LGMD using the fruit fly, *Drosophila melanogaster*. We have found that the *Drosophila* p38Kb gene interacts with known LGMD genes, HspB8 and BAG-3, which work together as a part of the CASA complex, which targets damaged proteins for either repair or degradation. Loss of p38Kb results in premature locomotor defects and increased protein aggregation in the muscle, which is also associated with human LGMD. Our preliminary data suggest that p38Kb may be acting as a node to regulate the repair/clearance of multiple LGMD proteins. The p38Kb mutant flies are a good model of LGMD and may be used as a screening platform for potential therapeutics. The locomotive behavior of these flies can be recorded using the *Drosophila* Activity Monitor, which can track the movement of each individual fly over the course of drug treatment. I will discuss the results of the screening of a library of polyheterocyclic alkaloid mimic drugs. This preliminary screening and subsequent data will lead to more focused testing on drugs that improved the locomotion behavior of the flies. This data provides the

foundation for future research that has the potential to provide treatments for not only LGMD, but many other progressive muscular and neurodegenerative diseases.

DIAGONALIZING THE FIELD THEORY HAMILTONIAN - PART I

Presenter	Russ, Cory Undergraduate, Physics
Mentor	Prof. Neil Christiansen
Authorship	Cory Russ; Neil Christensen; Santiago Pinto; Joshua Henderson

The theory of quantum chromodynamics that binds protons and neutrons together inside the nucleus of the atom is notoriously difficult to calculate. We investigate a new method for doing these calculations that involves the diagonalization of the field-theory Hamiltonian. In this talk, we will describe the theoretical structure of the Hamiltonian for a general field theory related to the Higgs boson (discovered recently at the Large Hadron Collider in Switzerland). Part of this description will involve some technical aspects of using creation and annihilation operators, which are at the heart of calculating the matrix form of the Hamiltonian.

THE EFFECTIVENESS OF A 4-WEEK YOGA INTERVENTION ON THE CORE MUSCLE ACTIVATION, PAIN, AND DISABILITY IN PEOPLE WITH AND WITHOUT LOW BACK

Presenter	Sagadore, Tamara Graduate, Kinesiology & Recreation
Mentor	Prof. Noelle Selkow
Authorship	Tamara Sagadore; Rebecca Begalle; Noelle Selkow

Low back pain (LBP) is one of the most common reasons people seek orthopedic medical care in the United States. Musculature of the core can affect alignment of the spine. Core strengthening is often prescribed in reducing and preventing low back injury. If spine instability is the root of low back pain, core musculature such as the transversus abdominis and lumbar multifidus are strengthened to provide the needed lumbar stability. Teaching patients to perform muscle contractions through traditional exercises that target the transversus abdominis and lumbar multifidus is often difficult and time consuming. Using yoga as an alternative medicine and therapeutic treatment technique to treat low back pain has recently been used and demonstrated to provide improvements in patient's low back pain symptoms. The aim of this study is two-fold. First, to determine the effectiveness of a 4-week yoga intervention on the timing of muscle activation and activation ratio of the transverse abdominis (TrA) and lumbar multifidus (LM) among all participants, both LBP and healthy participants. Second, to determine the effectiveness of a 4-week yoga intervention on pain and functional disability among LBP participants. We hypothesize that yoga will result in increased thickness of the TrA and LM and decrease the time it takes for the TrA and LM to contract and stabilize the spine. Based on our results, we hope to be able to recommend yoga as a treatment option for people with LBP.

EFFECT OF SUPPLEMENTARY VIDEOS ON SCIENTIFIC-REASONING IN A GENERAL-PHYSICS COURSE

Presenter	Sammons, Amber Undergraduate, Physics
Mentor	Prof. Rebecca Rosenblatt
Authorship	Amber Sammons; Jessica Tolmie; Terry-Ann Sneed; Reggie Dizon; Ray Zich

We will discuss initial findings and impressions from an ongoing study investigating the impact of an instructional reform on student scientific reasoning skills and general attitudes toward science. We will explain the assessments, the teaching intervention, highlight some of the things we learned in making the videos, and report on baseline data collected from the study. The intervention is nine 5-7 minute videos given during lab. Each video consists of an explanation of its target concept, a hands-on demo with observations and YouTube clips highlighting the topic being discussed. While viewing the videos, students were required to answer specific questions testing their comprehension of the concepts and scientific reasoning being displayed. Preliminary results indicate that students appreciated the video presentations, and that they learned from the activity.

YOU'RE NOT GETTING IN DRESSED LIKE THAT: IMMUNE MECHANISMS MEDIATING SPECIFICITY OF BUMBLEBEE GUT MICROBIOTA

Presenter	Sauers, Logan Graduate, Biological Sciences
Mentor	Prof. Ben Sadd
Authorship	Logan Sauers; Ben Sadd

Microbes are ubiquitous in nature, and most organisms are associated with microbial communities of varying complexity, known as microbiota. Gut microbiota, within digestive systems, have received increasing attention due to their role in digestion, development, and infection. Symbiotic microbiota and host immunity interact constantly, and thus it can be expected that immune interactions influence host microbial communities. Evidence of immune regulation comes from Hydra and Drosophila, and it is proposed that specific gut microbes may have evolved mechanisms to coexist with host immune responses. Immune compatibility is important for broader specific host-microbe interactions, but it remains largely understudied in some key insect-microbe interactions. These interactions can shed light on ecological and evolutionary determinants of microbial community membership. Social bees (Apidae) have specific gut microbial communities found within their hindgut and represent an excellent model for understanding evolutionary and ecological relationships between hosts and associated beneficial microbes. The goal of this research is to investigate the specific interactions between bumblebee hosts (*Bombus* spp.) and their key microbiota. Multiple strains from different host species of the bacterium *Snodgrassella alvi*, a key member of bumblebee gut microbiota has been isolated and preliminary in vitro growth assays established. The ability to raise germ-free *Bombus impatiens* has also been demonstrated. These techniques are being used in experiments aimed at answering a key hypothesis, that specificity of bumblebee-gut microbiota members on the host-species level is host immune-mediated and a consequence of coevolution.

IT'S GETTING CROWDED IN HERE: DENSITY EFFECTS ON PER CAPITA GROWTH RATE AND IMMUNITY

Presenter	Sauers, Logan Graduate, Biological Sciences
Mentor	Prof. Steven Juliano
Co-Mentor(s)	Ben Sadd
Authorship	Logan Sauers; Steven Juliano; Ben Sadd

Logistic Growth is the most commonly employed model of density dependent population growth, and it postulates that per capita growth declines linearly with density. Alternative models (e.g. θ logistic) postulate nonlinear relationships and predict rapid changes in population growth as density is altered, for example, via human interventions. Mosquito species are critical vectors for many diseases threatening public health in both developed and underdeveloped countries. Predicting the efficiency of these mosquito control strategies requires an understanding of the effects of density changes caused by such interventions. In addition to population growth, changes in density may affect physiological processes, including investment in immunity. Mosquito immunity will play an important role in determining disease transmission of diseases. Under the model of density dependent prophylaxis, increased density leads to greater investment in immunity due to the greater risk of disease encounter in crowded environments. In contrast, reduced density could alleviate resource constraints, due to more nutrients being available to surviving individuals, which could lead to higher levels of constitutive immunity. This research investigates whether per capita growth follows a linear or non-linear pattern in the mosquito species *Aedes albopictus*, *Aedes triseriatus*, *Aedes aegypti* and *Culex pipiens*. In addition, a measure of constitutive immunity is assayed in these populations, to assess how investment changes under different densities. Tests using a logistic model show that the per capita growth rate of the mosquito species follows a non-linear pattern. Analyses of the immune data are currently ongoing. This result shows the simply reducing larval mosquito density is not an optimum control strategy.

TIME EVOLUTION USING A NUMERICALLY EXACT PATH INTEGRAL APPROACH

Presenter	Saxton, Torrey Undergraduate, Physics
Mentor	Prof. Allison Harris
Authorship	Torrey Saxton; Allison Harris

The Path Integral technique is an alternative formulation of quantum mechanics that is completely equivalent to the more traditional Schrödinger equation approach. Developed by Feynman in the 1940's, following inspiration from Dirac, the path integral approach has been widely used in high energy physics, quantum field theory, and statistical mechanics. However, only in limited cases has the path integral approach been applied to quantum mechanical scattering. We introduce a numerical method for calculating the quantum mechanical propagator exactly and present results for the time evolution of various systems.

EVALUATING RELATIONSHIPS BETWEEN ROCK STRENGTH AND LANDSCAPE EVOLUTION IN THE SOUTHERN GUADALUPE MOUNTAINS, TEXAS

Presenter	Schoenmann, Samuel Graduate, Geography/Geology
Mentor	Prof. Lisa Tranel
Authorship	Samuel Schoenmann; Lisa Tranel

The geomorphology of longitudinal bedrock rivers may supplement speleological research that aims to constrain Miocene to Pliocene tectonic and climatic histories of the Guadalupe Mountains. Anomalous hillslope gradients were identified within these mountains and are speculated to have formed due to differential rock strength, tectonics, or local faulting. These speculations are unsupported, however, and require further investigation to confidently justify which mechanisms likely control the local geomorphology. Resampled 10m DEMs were constructed to model the Guadalupe Mountain landscape and perform topographic analyses that identify spatial distributions of erosional feature, faults, and river confluences. Twenty-four locations were sampled in McKittrick and Pine Springs Canyons for Schmidt hammer rebound values and rock mass strength (RMS) analyses. Bedrock channel and hillslope gradients will be coupled with rock strength analyses to locate and disseminate the relationships between rock strength and landscape morphology in the Guadalupe Mountains.

Anomalous convexities in longitudinal river profiles associated with statistically different rock-strengths are considered features related to differential rock-strengths and reflect quasi-equilibrium conditions. Conversely, anomalous convexities in bedrock river channels that do not correlate with statistically significant changes in rock-strength may have formed due to other processes independent of rock strength. These processes include tectonic uplift or subsidence, local faulting, global or local climate change, and random landscape processes. Each of these processes are related to some form of disequilibrium and reflect regional transient landscape evolution.

In addition to understanding the driving forces for landscape evolution in the Southern Guadalupe Mountains, new geomorphic techniques are utilized here that aim to develop a technique for identifying mechanically controlled variations in river channel and hillslope morphologies. T-tests and naturally occurring residual errors within regression analysis obtained from longitudinal stream profiles are pitted against local channel slope, concavity, steepness indices, and rock strength measurements obtained from Schmidt hammer and RMS analyses. If relationships between residual errors and rock strength, this technique may be useful for predicting the spatial variability and distribution of mechanically controlled landscape evolution.

Understanding the forces driving landscape evolution in these mountains will determine if the American southwest is currently recording Miocene to Pliocene tectonic and climatic history. Developing new ways to predict where these forces affect erosion will aid in directing further research.

MODEL OF DOPAMINE NEURONS PROCESSING TEMPORAL DIFFERENCE ERRORS

Presenter	Schuweiler, Douglas Graduate, Biological Sciences
Mentor	Prof. Paul Garris
Authorship	Douglas Schuweiler; Paul Garris

Temporal difference errors (TDEs) bidirectionally signal the differences between predicted and actual rewards and are used by the temporal difference learning algorithm (TDL) to update predictions about future rewards, i.e., learn. Positive TDEs occur when actual events are better than predicted, e.g., in response to unpredicted rewards and reward-associated cues. Negative TDEs occur when events are worse than predicted, e.g., when predicted rewards do not occur. A well-accepted hypothesis of mesolimbic dopamine (DA) neuron function posits that these neurons encode TDEs as the amplitude of phasic changes in action potential firing and transmit these signals to target neurons as the amplitude of phasic changes in extracellular DA.

Mesolimbic DA neurons have a basal firing rate, ≈ 4 Hz, that briefly increases to ≈ 40 Hz when an animal encounters unpredicted rewards and reward-associated cues. This slow basal rate potentially challenges the hypothesis that DA neurons bidirectionally encode TDEs, because there is a floor effect for the firing rate decrease caused by negative TDEs. Electrophysiological evidence suggests that, unlike positive TDEs, negative TDEs may alternatively be encoded by the duration of a pause in action potential generation. Neurochemical evidence suggests, however, that both positive and negative TDEs are signaled by the amplitude of a phasic change in extracellular DA. It has yet to be determined if asymmetric encoding of TDEs by DA neuron firing could cause bidirectional DA signaling of TDEs to target neurons.

To determine if the changes in DA neuron action potential firing caused by TDEs could also cause bidirectional changes in extracellular DA we conducted a computational modeling experiment. We functionally coupled a TDL model to a model of DA neuron action potential generation, and in turn, a model of extracellular DA. Our models reveal that encoding of negative TDEs by pause duration, but not amplitude, is sufficient for bidirectional changes in extracellular DA. Thus, TDL remains a viable framework for understanding the function of mesolimbic DA neurons. Surprisingly, our models reveal that the amplitude of the reduction in extracellular DA while no action potentials are generated is not increased by greater DA uptake, but instead by greater action potential-dependent DA release. This paradoxical result is due to the effects of DA release increasing, and uptake decreasing, basal extracellular DA combined with the concentration-dependency of DA uptake. These results highlight the utility of our models for understanding the complex regulation of DA signals and generating predictions about reinforcement learning.

THERMOELECTRIC SIGNATURES OF DNA NUCLEOTIDES

Presenter

Sellers, Colin

Undergraduate, Physics

Mentor

Prof. Justin Bergfield

We investigate the thermoelectric response of single-stranded DNA in the direction perpendicular to the backbone axis. We find that each nucleotide carries a unique thermoelectric signature due to the different electronic and chemical structure of the four bases. Our results suggest that it may be possible to sequence single-stranded DNA by scanning its length through metallic probes (e.g. a nanopore) and measuring the thermopower.

THE EFFECTS OF STEREOTYPICAL MEDIA PORTRAYALS ON LATINO(A) ETHNIC IDENTITY AND SELF-ESTEEM

Presenter

Shafer, Jessie

Graduate, Psychology

Mentor

Prof. Rocio Rivadeneyra

Portrayals of minority groups in popular United States media have a history of being erroneous and full of negative stereotypes. Content analysis has shown that Latino(a) characters suffer greatly in terms of

underrepresentation (Children Now, 2004; Monk-Turner et al. 2010) and a disproportionately over-representation of negative stereotypes (Children Now, 2004; Dixon & Linz, 2000; Monk-Turner et al., 2010). I investigated the influence that these media portrayals have on Latino(a) viewers' ethnic identity and self-esteem. I also investigated the role that stable aspects of ethnic identity, such as centrality (or how central one's race/ethnicity is to his/her self-definition), had in moderating the effects of media portrayals on the more fluid parts of ethnic identity, such as private regard (how one views their own race/ethnic group) and public regard (how one feels that others view their race/ethnic group) as well as on self-esteem.

One hundred and thirty-eight participants from across the United States participated in a custom 2 (media condition: stereotypical and neutral) x 2 (ethnic centrality: low and high) between-subjects design that analyzed media content and ethnic centrality's effect on ethnic regard and various aspects of self-esteem. A multivariate analysis revealed a significant main effect of ethnic centrality, $p \leq .000$, $\eta_p^2 = .247$. Private and public regard had the largest effect sizes, $\eta_p^2 = .168$ and $\eta_p^2 = .113$ respectively, such that participants with higher ethnic centrality reported higher private and public regard.

There was a marginally significant interaction of ethnic centrality and condition on ethnic centrality and self-esteem, $p = .055$, $\eta_p^2 = .102$. Social, global, and appearance self-esteem displayed the largest effect sizes ($\eta_p^2 = .035$, $\eta_p^2 = .027$, and $\eta_p^2 = .022$ respectively). Participant with high centrality displayed a decrease in social and global self-esteem from the neutral condition to the stereotype condition while participants with low centrality showed an increase in social and global self-esteem. Additionally, participants with high centrality also displayed a decrease in appearance self-esteem from the neutral to the stereotype condition; however, participants with low centrality reported similar appearance self-esteem in both conditions. The non-significance of media clips alone combined with the marginally significant interaction effect may indicate that it is not content alone that influences viewers, but a combination of different phenomena that influences the impact of media content. Implications for the role of ethnic centrality in moderating the effects of media portrayals are discussed in light of the findings.

INITIATION AND DURATION CHANGES OF LARYNGEAL CLOSURE IN POST-STROKE PATIENTS

Presenter	Sienza, Kaylee Undergraduate, Communication Sciences and Disorders
Mentor	Prof. Taeok Park
Authorship	Kaylee Sienza; Taeok Park; Byung-Mo Oh

The purpose of this study was to examine changes in initiation of laryngeal closure (ILC) and laryngeal closure duration (LCD) in post-stroke patients by analyzing initial videofluoroscopic swallowing exams (VFSEs) during the subacute stage of a stroke and one month after the initial VFSE. A total of 16 stroke patients with unilateral cortical and subcortical lesions were included in this study. Each participant swallowed two of each 2ml and 5ml thin liquids and two 5ml yogurt boluses. The initial VFSE was performed during the subacute stage from 1 to 3 weeks after stroke onset and the follow-up VFSE was performed after one month (± 1 week, average 27 days). To measure ILC and LCD, each swallow was analyzed for the following points: 1) bolus passing the ramus of mandible, 2) first contact of arytenoids and epiglottis, and 3) final contact of arytenoids and epiglottis. Statistical comparisons were completed with the paired t test. Significance level was set at $p < 0.05$. The ILC in the follow-up VFSE was significantly shorter in stroke patients than initial VFSE [$t(65)=3.171$, $p=0.002$]. The mean ILC of initial VFSE was 1.74 seconds and mean ILC of the follow-up VFSE was 1.11 seconds. The LCD did not differ between initial VFSE and follow-up VFSE [$t(72)=-0.618$, $p=0.539$]. The mean LCD in initial and follow-up VFSEs was 0.46 seconds. Stroke patients initiated laryngeal closure more rapidly after one month than during the subacute stage of the stroke. Rapid initiation of laryngeal closure is associated with a decreased risk for aspiration. The results of this study may

indicate that there is improvement of sensory receptor responses in the oropharynx that aid in laryngeal closure. The recovery of initiation of laryngeal closure in stroke patients may result from neuroplasticity, spontaneous recovery, and swallowing treatment. Neuroplasticity is the brain's ability to adjust or compensate for lesions to certain areas that result in deficits (Hamdy et al., 2000). If dysphagia is a result of a stroke lesion to the brain, other areas of the patient's brain may compensate for the affected area to produce a normal swallow. Spontaneous recovery in stroke patients may allow the improvement of dysphagia symptoms over time that cannot be linked to a specific treatment or event (Kidd et al., 1995). Swallowing treatment such as the supraglottic swallow, Mendelsohn maneuver, and effortful swallow may help with recovery of the airway protection (Logemann, Pauloski, Rademaker, & Colangelo, 1997).

A CRITICAL FIRING RATE ASSOCIATED WITH SYNCHRONOUS TRANSITIONS IN COUPLED MODEL NEURONS

Presenter	Shaffer, Annabelle Undergraduate, Physics
Mentor	Prof. Epaminondas Rosa
Co-Mentor(s)	Prof. Allison Harris
Authorship	Annabelle Shaffer; Zachary Mobbie

In this presentation we discuss a critical firing rate associated with synchronous transitions in triads of distinct neurons coupled via electrical synapses. Our numerical simulations show that the three neurons can synchronize for a strong enough coupling, and the firing rate at which they synchronize is directly connect with the typical firing rate found at the transition between tonic and bursting regimes for the single neuron. We show bifurcation diagrams and color maps of parameter space to illustrate our results.

ACCURACY OF ACTIVITY MONITORS DURING TREADMILL TESTS

Presenter	Edward, Sinovich Undergraduate, Kinesiology & Recreation
Mentor	Prof. David Q. Thomas
Authorship	Edward Sinovich; David Q. Thomas; Kristen Lagally; Daniel Dodd; Samantha Ward; Austen Bozarth; Tom Atiyeh; Jady Chipman

A number of monitors that provide estimates of physical activity have flooded the market recently. These monitors, worn at the hip, wrist, arm or around the chest, claim to measure step count, heart rate and/or energy expenditure.

PURPOSE: To compare physical activity estimates among several of the most popular new monitors during physical activity performed at different intensities.

METHODS: Forty-six participants were fitted with four physical activity monitors. Subjects walked, jogged and ran on a treadmill at 3, 5, and 7 mph, each for 3 minutes. Heart rate, step count, and rate of perceived exertion (RPE) were recorded during the last minute of each stage from each device that assesses that variable. Actual step count was recorded via a hand-held clicker device. Step count from all monitors was compared to the step count from the clicker. Individual

two-way t-tests were used to check for significant differences.

RESULTS: The results of this study are mixed. For stages 1 (3 mph) and 2 (5 mph), the wrist and arm worn monitors produced significantly different ($p < .05$) step counts than the clicker, while the waist worn monitor produced non-significant differences. For stage 3 (7mph), both wrist worn monitors produced non-significant differences in comparison to the clicker, while the arm and waist worn devices produced significant difference ($p < .05$).

CONCLUSIONS: The four physical activity monitors produced conflicting results. The waist worn monitor was accurate at the slower speeds, but inaccurate at the higher speed. The wrist worn monitors were inaccurate at the slower speeds, but accurate at the high speed. The arm band monitor was inaccurate under all conditions. Caution should be used when electing to utilize physical activity monitors to estimate physical activity.

DEVELOPMENT OF AN EFFECTIVE WRITTEN INSTRUCTION FOR A PERSONAL SOUND AMPLIFICATION PRODUCT

Presenter	Skaggs, Miranda Undergraduate, Communication Sciences and Disorders
Mentor	Prof. Hua Ou
Authorship	Miranda Skaggs; Hua Ou

The increasing use of Personal Sound Amplification Products (PSAPs) and self-fitted amplification devices provides a low-cost option to consumers. It is critical to provide intelligible instruction manuals for consumers to promote the appropriate use of hearing devices. A selected PSAP user guide was not coherent when evaluated with the Suitability Assessment of Materials, readability formulae, and guidelines for self-fitted hearing devices. An effective written instruction was developed for this hearing device and evaluated with the same rating scales.

SOCIAL INTERACTIONS AND THEIR INFLUENCE ON MATING ASPIRATIONS AND SELF-ESTEEM

Presenter	Slaughter, Alison Graduate, Psychology
Mentor	Prof. Eric Wesselmann
Co-Mentor(s)	Matthew Hesson-McInnis
Authorship	Alison Slaughter; Eric Wesselmann; Matthew Hesson-McInnis

We are investigating how romantic rejection effects one's mating aspirations and self-esteem. Recent research has shown that self-esteem influences individuals' mating desires. Researchers suggest that self-esteem works as a "sociometer," fluctuating in response to social acceptance or rejection (Leary, Tambor, Terdal, & Downs, 1995). Further, there is evidence suggesting that there are sociometers for specific domains. We are interested in the "mating sociometer", individuals' perceived value to potential romantic partners, and how this sociometer is influenced by romantic acceptance or rejection. Further, how do fluctuations in one's mating sociometer influence their mating aspirations (i.e., preference for "higher" or "lower quality" mates)? One experiment demonstrated that when individuals were rejected by potential mates, their self-esteem decreased and, in turn, their mating aspirations decreased as well (Kavanagh, Robins, & Ellis, 2010). We are replicating and extending this previous study by using a different paradigm: we will manipulate romantic acceptance and rejection by asking participants to

recall the most recent time when they had experienced one of these events, bringing to mind the affective states associated with these occurrences (Chen, Williams, Fitness, & Netwton, 2008). We will also add a control condition, which was not present in the previous research. Additionally, we will include measures of participants' general and mating-focused sociometers as potential meditators. Finally, we will present participants with pictures of varying physical attractiveness (high, average, low) to assess their mating aspirations. We expect to find that recalled rejection, compared with the recalled acceptance or a control event, will result in decreased global and mating sociometers. Participants' two sociometer scores will in turn predict lower mating aspirations.

CHANGES IN ANTHROPOMETRIC AND PHYSIOLOGICAL CHARACTERISTICS OF MALE COLLEGIATE RUGBY UNION PLAYERS THROUGHOUT A SEASON

Presenter	Smith, Edward Graduate, Kinesiology & Recreation
Mentor	Prof. David Q. Thomas
Authorship	Edward Smith; David Q. Thomas; Dale D. Brown; Tyler Langosch; Jonathan Grimwood; Nathan Fillers; Daniel Dodd

Rugby Union is a physically demanding sport requiring a variety of anthropometric and physiological characteristics to maximize performance. Factors such as muscular power, speed, agility, maximal aerobic power, mobility, and body composition all factor into player performance.

PURPOSE: To determine changes in body composition, height, speed, muscular power, maximal aerobic power, mobility, and agility of collegiate rugby union players throughout a competitive season.

METHODS: Participants included 29 (20.32 ± 1.49 yrs) men from a collegiate rugby club. Muscular power (vertical jump), speed (10m and 20m sprint), agility (L-drill), mobility (FMS active straight leg raise and shoulder mobility) maximal aerobic power (VO₂peak via 20m multi-stage shuttle run SR), height, body mass, fat mass (ADP), fat-free mass (ADP), and body fat levels (ADP and sum of 7 skinfolds (SKBF%)) were assessed during the pre-season (PRE) and mid-season (MID). Training and match loads were estimated for each player by multiplying each player's rating of perceived exertion (RPE: 6-20) by the amount of training/playing time.

RESULTS: PRE and MID variables were compared using a Paired-Samples T-Test with an alpha level of $p < .05$. The mean PRE SKBF% of 16.57 ± 6.29 was significantly higher than the mean MID SKBF% of 13.77 ± 7.61 ($t(28) = 2.472$, $p = .02$). The mean PRE 10m sprint time was $1.81 \pm .12$ s and was significantly faster than the MID mean 10m sprint time $1.94 \pm .11$ s ($t(19) = -4.782$, $p < .001$). The mean PRE 20m sprint time $3.15 \pm .16$ s was significantly faster than the mean MID 20m sprint time of 3.3 ± 1.8 s ($t(20) = -4.155$, $p < .001$). The mean PRE VO₂peak was 44.65 ± 5.43 ml.kg⁻¹.min⁻¹ and was significantly lower than the mean MID VO₂peak of 46.97 ± 6.43 ml.kg⁻¹.min⁻¹ ($t(19) = -2.26$, $p = .036$).

CONCLUSION: Maximal aerobic power increased from PRE to MID while the estimated body fat levels decreased from PRE to MID. Improvements in both variables are likely due to conditioning during training and increased activity levels of participating in sport. Speed may have decreased from PRE to MID due to fatigue from the first-half of the season with accumulating training and match loads.

CHALLENGING PRE-SERVICE TEACHERS' EVOLUTIONARY ACCEPTANCE IN INTRODUCTORY BIOLOGY

Presenter	Sparks, Rachel Graduate, Biological Sciences
Mentor	Prof. Rebekka Darner Gougis
Authorship	Rachel Sparks; Rebecca Darner Gougis

In this study, we examine the efficacy of an instructional intervention on pre-service teachers' trajectories in acceptance of evolutionary theory. This instructional intervention involves diagnostic question clusters (DQCs) being used in conjunction with ORCAS discourse in a whole-class lecture setting. ORCAS consists of Open-ended questioning by the instructor, student Responses, highlighting Contradictory claims, student Assessment of contradictions, and a Summary of the content. The use of this discourse pattern elicits initial responses from students, which demonstrate their prior knowledge and misconceptions, as well as compelling students to evaluate claims with supporting evidence. Following the instructional intervention, students were prompted to revisit and comment on their earlier statements about their acceptance of evolutionary theory, discussing any ways in which their views changed and the reasoning behind those changes. Student scores on pre- instruction assessments regarding evolutionary acceptance were divided into quartiles and analyzed in conjunction with post-instruction assessment scores and qualitative pre- and post- responses to identify trends in acceptance of evolution and how it related to changes in understanding of evolutionary mechanisms and the nature of science. We discuss implications for educating pre-service teachers who do and do not initially accept evolution.

THE EFFECTS OF DIETARY INTAKE ON FUEL METABOLISM AT AEROBIC CAPACITY EXERCISE

Presenter	Stephenson, Taylor Graduate, Kinesiology & Recreation
Mentor	Prof. Dale D. Brown

About 45 million Americans each year participate in a diet regimen in order to lose weight. Of these 45 million Americans they spend on average 33 million dollars in weight loss products, such as diet pills, fat burners, tea detoxes, waist wraps, and 10 day weight loss programs. While these shortcuts may be effective for a short time period, they do not keep the weight off long term.

Diet and exercise are common methods used to assess physical fitness, body composition, and over health in an individual. It is known that in order to produce mechanical energy, the body must oxidize carbohydrate, fat, or protein in order to produce ATP through metabolic processes. Total body metabolism depends on factors such as the intensity, duration of the exercise, the diet composition, and the current level of fitness. During low intensity exercise fat is the primary macronutrient that is oxidized for energy, as the exercise intensity increases the body switches mainly to carbohydrate oxidation. An individual's dietary composition (percentage of carbohydrate, fat, protein) can effect which macronutrient is utilized during exercise based on its stores and availability. There is limited research when it comes to comparing a variety of long term diets, and how this may effect fuel metabolism during increasing intensity exercise. The purpose of this study aims to examine how dietary intake effects the changes in how fat and carbohydrate are oxidized during increasing intensity exercise (low, moderate, maximal). Resistance trained males and females between the ages of 18-35 years old, will be recruited to volunteer for this study. Subjects must be currently on a diet for a minimum of 4 weeks

prior to the study. Once inclusion criteria has been met the subjects will be asked to log their caloric intake for 5 days (3 week days, 2 weekend days) using a calorie counting app. If their diet is consistent for the 5 days the subjects will be placed into groups based on similar dietary composition. Subjects will individually perform a maximal Fuel Utilization test using the Astrand Running Test protocol. During the test heart rate response (HR), blood pressure, Respiratory Exchange Ratio (RER), VO2 Max, and metabolic responses will be recorded.

Based on recent studies we hypothesize that participants with a low carbohydrate intake will primarily oxidize fat as their primary energy source, during increasing intensity exercise compared to those on a moderate or high carbohydrate diet. Participants on a moderate to high carbohydrate diet will primarily oxidize carbohydrate as their primary energy source during increasing intensity exercise.

TO TRUST OR NOT TO TRUST? THE IMPACT OF IMMIGRATION ON UKRAINIANS' PERCEPTION OF THE EUROPEAN UNION

Presenter	Stevens, Danielle Graduate, Politics and Government
Mentor	Prof. T.Y. Wang

This study hypothesizes that Ukrainians' opinions on immigration affect their trust in the European Parliament. Considering the European Parliament's (EP) role in implementing immigration policy, it is important to address whether these policies affect trust in the EP. Using data from the 2012 European Social Survey, this study's Independent Variables will include opinions on allowing immigration from many/few of same race/ethnic group as majority, many/few of different race/ethnic group as majority, many/few from poorer countries outside Europe; perception of whether immigration is good/bad for the economy; and perception of whether immigration enhances cultural life. The Dependent Variable will be trust in the EP. Ukraine is considering membership with the European Union, and this research will provide implications for whether they should continue pursuing that membership.

THE EFFECT OF EXPRESSIVE WRITING ON REAPPRAISAL

Presenter	Taour, Benjamin Undergraduate, Psychology
Mentor	Prof. Jeffrey Kahn
Authorship	Benjamin Taour; Alleana Micaela Fuentes; Kyle Lawell

Expressive writing is a tool that is used as a form of emotional disclosure when a person writes about trauma, stress or any other negative experience. Reappraisal is an effective strategy for dealing with negative emotions. This process takes a negative event or stressor and re-evaluate it in an attempt to focus on the positive aspects or reinterpreting stressors. This study is designed to identify whether third person expressive writing or first person expressive writing has an impact on reappraisal for an individual. The first hypothesis of this study is the belief that the use of third person expressive writing will lead to an increase in reappraisal. The second hypothesis is third person writing will have a higher positive affect. The next hypothesis is third person writing will tend to have an individual to have a higher post-writing insight. This study will use at least 64 undergraduate students from Illinois State University. They are excellent candidates for this study because this population is prone to higher stress levels. Emotional regulation is going to be monitored by Emotion Regulation Questionnaire (ERQ; Gross & John, 2003). Affect will be measured by the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegan, 1988). The participants will be asked three questions relating to a current stressor they are facing. The participants

are then prompted to free write for 15 minutes without stopping, and they are told to write in a random perspective. They are then asked questions about insight they have gained about their stressor based on the writing task. The Strategies Questionnaire by Ehring et al (2010) was adapted to assess the writing task and not related to a movie. This questionnaire is used to assess emotion regulation or emotion regulation strategies. We will use LIWC or The Linguistic Inquiry and Word Count software as a manipulation check to see the amount of first or third person words being used. The rest of the data will be analyzed by the Statistical Package for Social Sciences (SPSS).

THERMAL TRANSPORT IN COMPOSITE MATERIALS

Presenter	Tennant, Ben Undergraduate, Physics
Mentor	Prof. David Marx

The side of a small specimen of carbon composite material was periodically heated using a laser. The top of the sample was viewed using a high sensitivity infrared camera. Thermal waves can be seen traversing the surface in 24 frames of data that were collected in sync with the periodic heating. Emissivity differences were taken into account by calibrating every pixel in the image to produce temperature versus intensity data. The result is a temperature versus time profile for every pixel. This enable the use of a two dimensional Fourier transform to evaluate these temperature versus time data series and allow for the determination of the thermal diffusivity between any two points in the composite material.

EFFECTS OF SO₂ AND SO₃ IN THE ATMOSPHERE

Presenter	Terry, Cole Undergraduate, Chemistry
Mentor	Prof. Jean Standard

The burning of fossil fuels has negative effects through the release of sulfur oxides. These sulfur oxides can create harmful compounds in the atmosphere such as sulfuric acid, which is the leading cause of acid rain. Smoke stacks from factories and other such facilities are releasing these sulfur oxides from fossil fuel combustion into the atmosphere in major quantities. Ethers are extremely effective molecules in binding to sulfur oxides. The formation of complexes of sulfur trioxide and sulfur dioxide with ethers has been studied using ab initio methods. For the computational research performed, the level of theory is B3LYP and the basis set is aug-cc-pVDZ. Several ethers were chosen to be studied and calculated while bonded to sulfur trioxide and sulfur dioxide while the gas phase and liquid phase. These molecules include water, dimethyl ether, oxirane, oxetane, tetrahydrofuran, tetrahydropyran, 1,4-dioxane, and 1,3,5-trioxane. Many other ethers containing multiple oxygen atoms have also been studied and observed. S-O bond lengths and charge transfer from the ether to sulfur oxide have been calculated. The properties of the sulfur oxide complexes in the gas and liquid phases have varying characteristics such as geometries, binding energies, and charge transfer. An example of differences between phases is in the gas phase, the S-O bond length of SO₃-oxirane is 2.294 angstroms, while in the liquid phase, the S-O bond length is 2.077 angstroms. This is a notable difference that changes the properties of the complex. Correlations between properties and differences in gas and liquid phase results have been investigated.

SYNTHESIS OF 3-ALKOXYBENZIPORPHYRINS

Presenter	Tomlovich, Rachel Undergraduate, Chemistry
Mentor	Prof. Timothy Lash
Authorship	Rachel Tomlovich; Timothy Lash

Benziporphyrins are an important group of porphyrin analogues where one of the pyrrole units has been replaced with a benzene ring. This system is generally nonaromatic, although the presence of electron-donating substituents can induce a degree of diatropic character. In this study, the synthesis of a new class of benziporphyrins has been developed. Alkylation of commercially available dimethyl 5-hydroxybenzene-1,3-dicarboxylate with alkyl halides and potassium carbonate in refluxing acetonitrile gave a series of alkoxy derivatives 1. Reduction with LiAlH₄ afforded the related dialcohols and subsequent oxidation with pyridinium chlorochromate gave the required dialdehydes 2. Condensation of 2 with tripyrrane 3 in the presence of trifluoroacetic acid, followed by oxidation with DDQ, gave good yields of 3-alkoxybenzporphyrins 4. This strategy is currently being adapted for the synthesis of benziporphyrin dimers that are connected by ether linkages.

FEMINIZATION OF WAR REFUGEES IN THEATRICAL REPRESENTATION: IMAGINING OF WOMEN IN ELLEN MCLAUGHLIN'S "THE TROJAN WOMEN"

Presenter	Tossie, Kaitlyn Graduate, Theatre and Dance
Mentor	Prof. Ann Haugo

In the past ten years, the feminization of refugees has emerged as a developing discourse in response to post-20th century genocides. Photographs in mass media of wailing refugees, mostly women, clutching children to their sides began to appear in the early 1990s when reports of the Bosnian genocide appeared in the United States. These images, and the stereotypes that undoubtedly surrounded them, contribute to the universal imagining of war refugees as feminine. Feminization is abundantly clear in our Western media, but these stereotypes and images are also used in theatrical representations of war. Though the way in which theatre comments on the conceptualization of feminized refugees has largely been ignored, theatre has a unique ability to comment on, reflect, and in some cases, create a culture that often contributes to the imagining of categories of people, including war refugees. Using feminist performance theory, this paper looks at how historical stereotypes of women shapes the way audiences categorize and imagine refugees in theatrical representations of genocide. In Ellen McLaughlin's *The Trojan Women*, three traditional stereotypes of women are portrayed: the mother/nurturer, the over-emotional/hysterical woman, and the sexualized object. McLaughlin uses these stereotypes to juxtapose the feminization of the refugee to the strength of the women in *The Trojan Women*, countering the images of feminized refugees we see in Western mass media.

KASHMIR DISPUTE TRIANGLE BETWEEN INDIA, PAKISTAN, AND THE KASHMIR: THE FAILURE OF INTERNATIONAL EFFORTS IN RESOLVING THE CONFLICT AND POST-

Presenter

Tran, Bich

Graduate, Politics and Government

Mentor

Prof. Michaelene Cox

Kashmir is among the most militarized places on earth. The dispute has been around for seventy years. Even though a countless number of efforts have been made both internationally, regionally, and domestically, there has no sign of settlement agreed by India and Pakistan. The recent incident of two Pakistani soldiers being killed in the disputed territory in September 2016 contributes to the boiling tension in the region between the two states. The Pakistan's Prime Minister, Muhammad Nawaz Sharif said in his statement published after the incident that he would convene an emergency cabinet meeting about the "deteriorating situation" in Kashmir (CNN). India, on the other side, claimed that the action was "surgical attacks" in the "disputed region to foil a terrorist attack" (CNN). Picking on the event, in this research paper, I will first discuss the origin of the Kashmir dispute. Second, I will examine the literature on the dispute and employ the postcolonial theory as an attempt to explain the lasting dispute as for the lack of understanding ideologies and cultures in the postcolonial era; simultaneously, I will point out the failure, indeed incapability of international communities in resolving the dispute. Finally, I will raise a proposal to resolve the conflict. In short, by employing postcolonial theory, I will examine the cause, evolution, effects, and future of the Kashmir dispute, mainly focus on the three players: Pakistan, India and the Kashmir itself.

QUANTIFYING THE ACTIVITY OF ANTIBODY CONJUGATED TO GOLD NANOPARTICLES

Presenter

Tripathi, Kiran

Graduate, Chemistry

Mentor

Prof. Jeremy Driskell

Authorship

Kiran Tripathi; Jeremy Driskell

Gold nanoparticle (AuNP) enabled biosensors are emerging technologies that have the potential to provide rapid results and that can be employed in the field. Biosensor configurations include antibody-based systems, enzyme-based detection and DNA-based sensors. In addition to speed, AuNP-based biosensors have the potential to generate highly sensitive results due to the unique optical, electronic and magnetic properties of nanoparticles. The conjugation of nanoparticles with antibodies combines the properties of the nanoparticles themselves with the specific and selective recognition ability of the antibodies to antigens. The activity of immobilized antibody is critical to the success of the biosensor but few methods exist to evaluate their activity. The focus of this work is to develop a simple and sensitive method to quantify the activity of antibody conjugated to gold nanoparticles (AuNPs). To this end, anti-HRP antibodies were conjugated to AuNP (30nm and 60nm) via direct adsorption. Optimal conditions for synthesizing and maintaining the stability of Ab-AuNP conjugates were investigated by varying pH and antibody concentration and a protocol for preparing stable Ab-AuNP conjugates is presented. Ab-AuNPs(30 nm and 60 nm) conjugates were symmetrically modified with antibody. Excess Horse radish peroxidase (HRP) was added to the conjugate to saturate all active Ab binding sites. After removing excess HRP, ABTS, a substrate for HRP enzyme, was added to the conjugates. Thereafter, AuNP probes with HRP were exploited in absorption based assay to screen the binding specificity of two different Ab (IgG1 and IgG2b) to the same HRP and the rate of the enzymatic reaction was determined from absorption of products and directly correlated with the number of HRP captured. The effects of AuNPs size and the Ab type on the activity of immobilized antibody were systematically investigated. As expected,

AuNP 60 nm particles provide more active binding sites than 30 nm conjugates. In addition, we found IgG2b conjugate is more sensitive than IgG1 conjugate.

REMOVAL OF SELF-INTERACTIONS IN THE DIRAC-MAXWELL EQUATIONS IN SPATIAL DIMENSION

Presenter	Unger, Jonathan Undergraduate, Physics
Mentor	Prof. Rainer Grobe
Co-Mentor(s)	Prof. Q. Charles Su
Authorship	Jonathan Unger; Reid Gramm; Rainer Grobe; Q. Charles Su

We propose a theoretical framework that permits us to eliminate the unphysical self-repulsion that occurs if a spatially localized charged particle interacts with its own electric field. As an example of this framework, we study the time-resolved interaction between an electronic and positronic wave packet by solving the coupled set of two-particle Dirac-Maxwell equations. The restriction of the dynamics to only one spatial dimension permits us to neglect the magnetic field and therefore any effects due to retardation are absent. Here the unwanted self-repulsion can be removed by separating the total electric field into two portions, each of which is generated by only one particle and is evolved independently of the other. For example, the Maxwell equation for the electronic field has only the electronic charge density as a source term and only this field is coupled to the positron in the two-particle Dirac equation. [1] We acknowledge the support by the National Science Foundation.

[1] S. Norris, J. Unger, Q. Z. Lv, Q. Su, and R. Grobe, Phys. Rev. A 93, 032131 (2016)

FIT BETWEEN INDIVIDUAL VALUES AND JOB SATISFACTION - A COMPARISON BETWEEN THE EMPLOYEES IN LEADERSHIP POSITION AND NON LEADERSHIP

Presenter	Venkataraman Baskar, Dharshianie Graduate, Technology
Mentor	Prof. Sally Xie

The main purpose of this study is to assess the relationship between the Values of an individual - terminal and instrumental values and Job satisfaction. The scope of the study primarily focuses on the study by Rokeach (1973) on personal values and how it effects on job satisfaction. This study mainly contributes to the human resource development in an organization, in order to compete in International Markets. There were 30 individuals targeted, 15 from management, basically employees in leadership position and 15 technical people who actively participated in answering the questionnaires. The data was analyzed using chi square test, to estimate the correlation between these two variables. Based on the results, there is a significant difference between the job satisfaction level among the management leadership employees and technical employees. They also differ significantly in certain terminal values and certain instrumental values. There are certain terminal values, certain instrumental values that highly correlates with the job satisfaction levels. This study greatly helps the organization to understand the personal values of an employee, and create an environment for the benefit of the employee. Value system of an individual helps in driving them towards job satisfaction, organizational commitment, organizational culture, absenteeism, turnover and factors as interpreted in the literature. This study may help greatly during recruitment processes and appraisal processes.

THE EFFECT OF THE CARE4U PROGRAM: THE IMPACT ON COMMUNICATION AND CONFLICT RESOLUTION AMONG AT-RISK YOUTH

Presenter	Volk, Samantha Undergraduate, Psychology
Mentor	Prof. Leandra Parris
Co-Mentor(s)	Renée Tobin
Authorship	Samantha Volk; Leandra Parris; Renée Tobin; Ani Yazedjian

Communication is a key component to developing healthy relationships and is a means of connecting with others (Wasaki et al., 2014). Improving communication skills allow at-risk youth to learn better ways to solve conflicts. This study was conducted within the context of the Champaign Area Relationship Education for Youth (CARE4U) program. The aim of this program is to provide at-risk youth with relationship, job-readiness, and financial literacy skills to prepare them for future occupations. Facilitators of the CARE4U program use a psychoeducational curriculum of 12 relationship education lessons that are provided at several partnering sites in the Champaign-Urbana area. This study specifically looks at the influence the relationship education component of the program has on participants' experiences with, and obtained knowledge of, communication and conflict resolution skills. This study applied qualitative methods and Grounded Theory (Nastasi, 2009) to focus group responses to assess changes that occurred during the program as well as, which skills were most salient. This study also used a constant comparative and inductive methods (Nastasi, 2009) to determine the themes in participant responses' regarding the influence of the program on their communication and conflict resolution skills. These methods were chosen as they are best practiced when exploring participant experiences and perceptions (Nastasi, 2009). During focus group interviews, many participants mentioned barriers that occurred throughout the program that hindered their ability to use the tools they have learned. The biggest barrier that occurred for participants were the participants' communication partners. Additional results of this study revealed that participants were able to recall some specific communication techniques they learned (e.g., listening skills). Participants also stated that they used slightly more positive than negative conflict resolution strategies since beginning the CARE4U program. Results of this study will inform service delivery within the CARE4U program and the larger research literature.

PROMPTING PROCEDURE SKILL ACQUISITION: THE ROLE OF PERFORMANCE FEEDBACK

Presenter	Wing, Ellen Graduate, Psychology
Mentor	Prof. Karla Doepke

There is a need for educators to implement evidence-based treatments for children with autism. Effective training of professionals is essential in ensuring treatment is implemented with integrity. Behavioral Skills Training (BST), an efficacious staff training method, identifies feedback as a critical component of training; however, the role of feedback in this process has not been systematically examined. This research evaluates the effectiveness, efficiency, and acceptability of performance feedback when compared to general feedback in BST.

THE POLITICS OF LABELING AND INTERVENTION IN CASES OF GENOCIDE: A REALIST PERSPECTIVE

Presenter

Wolan, Aleksandra

Undergraduate, Politics and Government

Mentor

Prof. Michaelene Cox

The Rohingya, a Muslim minority located in Myanmar, has been denied recognition and citizenship by the government, resulting in egregious violations of human rights. Violence has escalated, with Burmese security forces raping, killing, and driving the Rohingya from their homes and into neighboring Bangladesh. While the Burmese government has been accused of conducting ethnic cleansing and genocide by several media sources and nongovernmental organizations, the international community has stayed relatively quiet on the subject of the Rohingya. How does realist theory inform the debate about the characterization of mass killings as genocide and the international community's subsequent response? The first phase of this study will explore whether or not, under existing codified international law, what is occurring in Myanmar is indeed genocide. Going further, it will – through a realist lens – analyze the politics of labeling and intervention as applied to Rwanda, Darfur, and Burma.

RHYTHM TECHNIQUES IN RUNNING

Presenter

Wolz, Rachel

Undergraduate, Music

Mentor

Prof. Roy Magnuson

Running is a basic fundamental movement pattern learned in early childhood. It is improved during growing years and requires an understanding of the principles of biomechanics and metabolic energy. Understanding and analyzing the basic principles for running provides further opportunities for performance enhancement in distance running. By using a number of rhythmic solmization tools, a runner can train more efficiently and improve running time in flat level running. Running with an objective awareness and understanding of rhythm can make running more efficient by helping to control movement, manipulate stride length and frequency, maximize energy, and improve running economy. This allows the runner to effectively utilize the available energy which enables optimum performance and an overall increased running speed. Running economy is the amount of energy or fuel it takes to travel a certain distance. Also called submaximal running, this is a way for runners to maximize their energy. It is the amount of work done as a proportion of the energy expenditure. Stride has a direct impact on the amount of energy used during a run. Stride frequency and length are intrinsic factors that are beneficial in improving running economy. Any change in the mechanics of running that results in less energy being used at a given speed is advantageous to the running speed. A runner can learn to precisely control and time their movements in a pattern that would use energy in the most effective way. Using a rhythmic solmization system strengthens internalized patterns. The takadimi method is one of the types of solmization patterns. Runners can use these tools to have exact timing in movement in order to use up all of the stored energy in the most efficient way. A focused and controlled style of running ultimately leads to an improved running economy and improved running time.

ADULT FOOT AND ANKLE TRAUMA AT SCHROEDER MOUNDS (11HE177): A LATE WOODLAND PERIOD SITE IN ILLINOIS

Presenter Woollen, Katharine
Undergraduate, Anthropology

Mentor Prof. Liv Stone

Foot and ankle trauma in adults may be accidental or caused by physical activities that increase the likelihood of injury. Little is known about the organization of labor or health of the presumed forager-farmers of the Late Woodland (~AD 900-1150) period mortuary site of Schroeder Mounds (Henderson County, Illinois). In order to better understand the physical activities or hazards of the individuals from this site, thirty-seven adult skeletons preserving at least one essentially complete mid (metatarsals) and hind (tarsals) foot were examined for reactive changes that are consistent with traumatic injury. This data is compared to published reports from other Illinois Late Woodland sites. The study is comprised of 17 females, 14 males, and 6 skeletally unsexable adults. In the Schroeder Mounds sample, there were six cases of foot/ankle pathology (6/37, 13.5%), five of which (3/17, 17.6% females; 2/14, 14.3% males) are diagnostically traumatic injuries (5/37, 13.5%). A sixth case is a likely congenital foreshortening of a metatarsal (brachymetatarsia). There is no significant difference between the sexes in the frequency of ankle/foot trauma ($p=1.000$, Fisher's test). However, given the small sample size, the results are tentative. The trauma pattern of the Schroeder mounds cases consists of the clinically infrequent tarsometatarsal (Lisfranc joint complex) high-energy misstep injuries, a vertical jump/fall (Pilon fracture), and stress ("march") fractures of the metatarsal shafts. These injuries are consistent with a highly active and/or mobile community where trauma hazards are arguably equally experienced by both adult males and females.

APPLICATION OF BENFORD LAW IN QUANTUM MECHANICS

Presenter Yost, Jack
Undergraduate, Physics

Mentor Prof. Rainer Grobe

Co-Mentor(s) Prof. Q. Charles Su

Authorship Jack Yost; Reid Gramm; Rainer Grobe; Q. Charles Su

The quasi-empirical Benford law predicts that the distribution of the first significant digit of random numbers obtained from mixed probability distributions is surprisingly meaningful and reveals some universal behavior. We generalize this finding to examine the joint first-digit probability of a pair of two random numbers and show that undetectable correlations by means of the usual covariance-based measure can be identified in the statistics of the corresponding first digits. We illustrate this new measure by analyzing the correlations and anti-correlations of the positions of two interacting particles in their quantum mechanical ground state. This suggests that by using this new measure, the presence or absence of correlations can be determined even if only the first digit of noisy experimental data can be measured accurately [1]. We acknowledge the support by the National Science Foundation.

[1] R. Gramm, J. Yost, Q. Su and R. Grobe, *Phy. Rev. E* (submitted)

2017 Symposium Abstracts

Afternoon Group Presentations

USING COMICS TO TEACH THE PSYCHOLOGY OF MORALITY

Group Leader	Atkinson, Christopher Undergraduate, Psychology
Group Members	Paul Daly, Undergraduate, Psychology. Feng Ji, Graduate, Psychology
Mentor	Prof. Eric Wesselmann
Co-Mentor(s)	Prof. J. Scott Jordan
Authorship	Christopher D. Atkinson; Paul J. Daly; Feng Ji; Eric D. Wesselmann; J. Scott Jordan

Researchers from various disciplines (e.g., history, philosophy, cultural studies, rhetoric and composition; Brozo, Moorman, & Meyer, 2014; Miller; 2015; Syma & Weiner, 2013) argue that comic books, like other types of texts (e.g., novels, film), can be used to teach course material. We suggest that comic books can teach readers about the psychological research topics such as moral convictions, moral decision-making, and hero schemas (i.e., what makes someone a "hero," or defines certain acts as "heroic"). We highlight a specific text - Marvel Comics' Civil War- as an exemplar for teaching these concepts. We provide both qualitative and quantitative data from two different class settings: a seminar-based undergraduate capstone course and a large lecture-based undergraduate social psychology course. In both classes, an instructor provided key examples from the text to illustrate course concepts. In the senior seminar course, the students read the text in conjunction with the lectures and wrote reflections (both informal notes and a formal paper) on the text. In both courses, students indicated their perception of the utility of using comic books to facilitate discussions about morality at the beginning of the semester and then after the lectures on Civil War. Both qualitative and quantitative data suggest that students gained a new appreciation for comic books, how they can be interpreted within the context of psychological theories, and how they can be used to teach course concepts to individuals of various ages.

STUDENTS' RESPONSE TO STANDARDS-BASED GRADING IN A NON-MAJORS GENERAL CHEMISTRY COURSE

Group Leader	Baldwin, Emilee Undergraduate, Chemistry
Group Member	Kyle Lieberum, Undergraduate, Chemistry
Mentor	Prof. Sarah Boesdorfer
Authorship	Emilee Baldwin; Kyle Lieberum; Sarah Boesdorfer.

In a standards-based grading system, students are not graded traditionally with points on assignments and exams. Rather, standards or objectives are created upon which students demonstrate their achievement towards these objectives and then are given a "score" on each standard. There is a push for standards-based grading in classrooms across the country. This assessment method has been implemented at the high school level, but comparatively less at the collegiate level, and neither is well researched. Our research focused on the implementation of standards-

based grading of a general chemistry lecture course at Illinois State University. With IRB permission, we collected confidential data about the student's thoughts on the standards-based grading system and their test scores throughout the semester. Students completed a survey of their thoughts on the assessment and a small sample was interviewed about their thoughts to receive more in depth information on student thinking. Through this data, we were able to see the effect this assessment method had on the way the students approached studying and learning chemistry. This included the number of times a student retook an objective, their achievement on the objectives, and their overall achievement in the course. This research study adds to our understanding of standards-based grading and its impact on student learning and achievement.

COLORFASTNESS OF NATURALLY-DYED FABRICS USING CONTACT DYING METHOD AND NATURAL MORDANT

Group Leader	Barker, Lauren Undergraduate, Family and Consumer Sciences
Group Members	Evelyn Ekstrom, Undergraduate, Family and Consumer Sciences. Paulina Wietocha, Undergraduate, Family and Consumer Sciences
Mentor	Prof. Ui-Jeen Yu
Authorship	Lauren Barker; Paulina Wietocha; Ashya Winters; Evelyn Ekstrom; Ui-Jeen Yu

The textile industry has been making efforts to advance more sustainable and eco-friendly dyeing methods by using natural dyes. However, natural dyes still are exclusively used with chemical mordants and large quantities of water, making the process of natural dyeing unsustainable. The use of the contact dyeing method and natural mordant may have potential for reducing water wastes and developing a more sustainable way of natural dying. The use of natural dyes is still very limited, due to a lack of standard color retention, and little is known about colorfastness of contact-dyed fabrics with a natural mordant. Thus, the purpose of this study was to examine colorfastness of naturally-dyed fabrics using contact dyeing and a natural mordant in relation to different mordant concentrations, mordanting procedures, and dyeing times. Mashed blue berries mixed with a very low liquor ratio of water were sprayed on bleached cotton fabrics, and vinegar, used as a mordant, was applied in different concentrations: 25, 50, or 100% on weights of fabric. Mordanting treatment was applied in pre-, consecutive-, or post-dyeing procedures. After dyeing, specimens were heated in a microwave for 10, 15, or 20 minutes and dried before colorfastness testing. AATCC 61 Colorfastness to laundering was conducted. Results indicated extended heat exposure and stronger concentrations of vinegar yielded better colorfastness. Mordanting procedures had little impact on colorfastness-to-laundering. However, overall colorfastness of the contact-dyed cotton fabrics was poor to moderate, unfeasible for mass production. Further research is needed to improve colorfastness of contact-dyed fabrics using natural mordants.

DOGGONE AFFORDANCE: EFFECTS OF ADDED WEIGHT ON REARING IN THE DOMESTIC DOG (CANINE FAMILIARIS)

Group Leader	Berenbaum, Antonia Undergraduate, Psychology
Group Member	Isabella Raymundo, Undergraduate, Psychology
Mentor	Prof. Valeri Farmer-Dougan
Co-Mentor(s)	Prof. Jeff Wagman
Authorship	Antonia Berenbaum; Isabella Raymundo; Matthew Langley

Performance of a behavior requires both the capability to engage in that behavior and the knowledge that one can perform it under the particular environmental circumstances. From the ecological approach, the possibilities for such behaviors are known as affordances (Gibson, 1966; Reed, 1996). Perception of affordances is demonstrated through action-scaling, an organism's fit between its action capabilities and the environmental properties presented. Research examining humans navigating varying environmental situations (e.g. moving through doorways, lifting weighted objects or moving up inclines) have found perceptual boundaries between one set of behaviors (i.e. walking through a doorway with straight shoulders) and another set of behaviors (i.e. turning shoulders sideways). For example, a ratio of approximately 1.2 doorway-to-shoulder-width is required for perceiving that a doorway can be walked through without turning in humans. Two recent studies have also provided evidence of affordances in animals: Cabreraa, et al. (2013) found that hamsters and rats perceived affordances when lever pressing. The ratio of lever pressing to body height was found to be nearly identical for both rats and hamsters. Langley, et al. (2016) found that dogs transitioned from standing to rearing to retrieve a food treat at a constant 1.5 shoulder to floor height. The current experiment expands the work of Langley et al. by investigating how carrying an additional weight affects this rearing ratio. Twenty dogs (*canine familiaris*) were tested under two conditions: First, dogs were required to retrieve a high value food treat (hot dog) from a cup as it was gradually raised above their heads. The height at which they transitioned from standing/reaching on 4 feet to rearing/reaching on 2 feet was recorded. Second, the same dogs were outfitted with a backpack containing 10% of their body weight, and the procedure was repeated. Again, the height at which dogs transitioned from standing to rearing was recorded. Results indicated that the excess weight resulted in a consistently lower transition height, and thus a lower shoulder to floor ratio, when the 10% weight was added. This adjustment in rearing is consistent with data from humans who must reach while wearing weights. The data add to the understanding of affordances on a theoretical level, and assist dog trainers in understanding the implications of carried weight on body movement during training and working situations.

PERVIOUS PLASTIC CONCRETE COMPOSITE MADE WITHOUT CEMENT

Group Leader	Bhattarai, Samikaran Graduate, Technology
Group Member	Md Kaiser Ahmed, Graduate, Technology
Mentor	Prof. Pranshoo Solanki
Authorship	Samikaran Bhattarai; Md Kaiser Ahmed; Pranshoo Solanki

The growing amount of post-consumer polyethylene terephthalate (PET) waste bottles has resulted in the accumulation of plastic wastes and causes serious environmental problems due to littering and illegal landfilling or incineration. Therefore, the primary objective of this study was to develop and evaluate a novel form of concrete by replacing Portland cement in conventional pervious concrete with post-consumer PET. In this on-going study, number of mixtures containing different replacement level of PET shredding, fly ash, scrap tire screenings, clay and aggregates were designed. Using the mix designs, cylindrical specimens of pervious PET concrete composite (PPCC) were produced by melting PET shredding and mixing with heated aggregates in accordance with proportions determined from mix designs. Furthermore, cylindrical specimens will be tested for tensile strength and permeability. It is expected that this study will address the feasibility of recycling PET waste bottles in producing a sustainable pervious pavement material.

PARKIN AND PINK1 INTERACT WITH THE CASA COMPLEX TO REGULATE MITOPHAGY AND LOCOMOTOR BEHAVIORS

Group Leader	Bossle, Kristyn Undergraduate, Biological Sciences
Group Member	Megan Knoernschild, Undergraduate, Biological Sciences
Mentor	Prof. Alysia Mortimer

Mutations in either the parkin or PINK1 genes are known to cause familial forms of Parkinson's disease. Both of these genes play a role in the degradation of damaged mitochondria with mutations in parkin or PINK1 resulting in fewer and larger mitochondria. We are looking further to understand what other genes interact with parkin and PINK1 to regulate mitochondrial health and locomotor functions. Since parkin and PINK1 are involved in targeting of damaged mitochondria for degradation, we wanted to first test for interactions with protein degradation pathways. One pathway is the Chaperone-Assisted Selective Autophagy (CASA) complex, which targets the degradation of specific damaged proteins. By testing the role of the CASA complex in the regulation of mitophagy, we will look at how overexpression and loss of the CASA complex influences mitophagy and locomotor behaviors alone and in combination with parkin and PINK1. Our preliminary results suggest that parkin and PINK1 genetically interact with the CASA complex.

COST-BENEFIT ANALYSIS OF LIGHTING RETROFITS AND RENEWABLE APPLICATION AT ADVOCATE BROMENN MEDICAL CENTER

Group Leader	Burkitt, Trenton Undergraduate, Technology
Group Members	Jordan Seymour, Undergraduate, Technology. Catherine Foley, Undergraduate, Technology
Mentor	Prof. Jin Jo

In an effort to reduce energy consumption as well as monetary costs, fluorescent lighting will be phased out through the installation of LED fixtures in conjunction with other methods, such as automated lighting fixtures, and solar photovoltaic (PV) array systems. This project assists Advocate BroMenn Medical Center located in Normal IL in running an unsurpassed quality of service and efficiency by upgrading the current lighting systems, with the added benefits of an on-site PV system. Data about the site including yearly consumption rates, current and possible lighting specifications, building occupation, site regulations, and several other parameters were collected through personal meetings and continued coordination with the Advocate Bromenn operations management team. Solar resource site assessments were performed using a PV performance model in order to determine solar electrical generation potential. The methodological approaches utilized for this study include: on-site meetings, existing lighting analysis, followed by an LED potential assessment, lighting quantity takeoffs, specification comparisons, energy use analysis, PV site assessment, and PV performance analyses. Cost benefit analyses were performed to help the institution decide proper strategies.

INFORMATION TECHNOLOGY SUPPORT CENTER - PROCESS IMPROVEMENT

Group Leader	Campbell, Kyle Graduate, Technology
Group Members	Shanthala Baleger, Graduate, Technology. Swetha David, Graduate, Technology
Mentor	Prof. Borinara Park
Authorship	Kyle Campbell; Shanthala Baleger; Swetha David; Andre Downing

The project summary overview presents the final report on IT Support Center's incident management process improvement initiative for a medium sized, mid-west corporation. The report demonstrates the application of the DMAIC model (Define, Measure, Analyze, Improve, and Control) to address the problem of inadequate level of incident report claims resolution in less than 30 minutes, amounting to 30 to 40 percent of the calls breaching the 30 minutes deadline threshold for high priority incidents. The less than satisfactory resolution times, in regard to RLO's (response level objectives), had caused a decrease in overall productivity of the company. The project team leveraged the six sigma DMAIC, a data and customer driven methodology as a road map for achieving customer satisfaction and cost saving of approximately \$500,000 per year by minimizing the downtime for organization. The project started on Oct. 1st, 2016, ended April 1st, 2016 and achieved reduction of the high priority incident breaches to 15 percent in 3 months and reduced breach levels to 3 percent in 6 months.

ASSESSMENT OF MALE BODY IMAGE ON THE ILLINOIS STATE UNIVERSITY CAMPUS

Group Leader	Dietz, Brigitte Undergraduate, Health Sciences
Group Members	Maddie Ryan, Undergraduate, Health Sciences. Brad Groves, Undergraduate, Health Sciences. Ariel Sutton, Undergraduate, Health Sciences
Mentor	Prof. Jacqueline Lanier
Authorship	Brigitte Dietz; Brad Groves; Maddie Ryan; Ariel Sutton

Purpose: There is a distinct lack of research on what impacts male body positivity in comparison to the wealth of information on female body image. Trying to complete a precursory search for information on male body image lead to almost exclusively information concerning female body image. This presents an issue to the Illinois State University Health and Wellness Division because only half the student population is female, leaving the male half of the population without support for body image issues. It is especially important on a college campus to provide resources to students experiencing difficulty with confidence because the four years students spend on this campus are a foundation for the rest of adult life. With constant stress and students' first efforts at autonomous function, many challenging health decisions are made, and it would help the population for the university to supply guidance and tools to better make those decisions. Research Questions: How many male students utilize campus resources when facing confidence issues? What behaviors in college age males produce good body mindset and bad body mindsets? How does the population feel about the stigma of men not being "allowed" to have body image issues? Does it affect them daily? Do daily habits like social media impact that? Project Plan: Using five specific areas of study set aside by the Illinois State University Health and Wellness Center--reclaiming health, practicing intuitive self-care, developing a practice of self-love, embracing the body's attractiveness, and building a positive community-

we will research existing literature explaining how to develop these aspects of body positivity and identify gaps in research, concerning gender gaps specifically. Once the gaps we find in public research have been identified, we will utilize campus resources to collect more specific information from the Illinois State population. By sending mass surveys to men on campus, we hope to collect generalized information on campus fitness trends, and possibly identify the way three generic social groups--fraternity men, athletes, and other campus males--interact with their bodies. After collecting generalized trend information from the surveys, we hope to form focus groups for each social category to delve deeper into the reasoning behind their behaviors. Finally, while condensing and analyzing the final information, we will interview local physical trainers, coaches, and professors.

DIVERSITY ON THE RUNWAY

Group Leader	Enyart, Natalee Undergraduate, Family and Consumer Sciences
Group Members	Christina Pabon, Undergraduate, Family and Consumer Sciences. Meredith Roof, Undergraduate, Family and Consumer Sciences
Mentor	Prof. Ui-Jeen Yu

Previous studies revealed a lack of diversity on fashion runways, which may have a negative effect on underrepresented minorities with regards to their self-image or social belonging. The fashion industry is progressing and embracing American diversity, but non-white models are still spurned on runways, based on skin color. Thus, the purpose of this study was to examine the diversity of the runway models in current American fashion shows. A content analysis was conducted using the Spring/Summer 2017 fashion collections of eight well-known American designers. A total of 327 fashion models were analyzed with regards to ethnicity. Results indicate most fashion models on American runways were 71% of Caucasian with fair skin and light eyes as opposed to minority ethnicities. Non-white models were underrepresented or excluded on runways. This study suggests more inclusion of minorities on runways to truly represent the diversity of the entire population in the fashion industry. This study provides an insight of the importance of diversity and representation in fashion shows.

DOES PARENT-CHILD SPATIAL LANGUAGE PREDICT STEM SUCCESS?

Group Leader	Flaherty, Megan Undergraduate, Psychology
Group Member	Morgan Maydew, Undergraduate, Psychology
Mentor	Prof. Alycia Hund
Authorship	Megan Flaherty; Morgan Maydew

Success in science, technology, engineering, and mathematics (STEM) domains is an important national priority. Recently, researchers have begun studying early childhood predictors of STEM success, hoping to facilitate improvements. This research has focused on parent-child interactions during activities such as puzzles, blocks, and stories as one mechanism for promoting early spatial and mathematical understanding, which is a critical component of STEM success. For example, Levine et al. (2012) found that among children who played with puzzles, the frequency of play predicated spatial transformation skill and average puzzle difficulty was correlated with more spatial language exposure ($r = .68$) and parent engagement ($r = .44$). These results suggest that children who are challenged with more difficult puzzles and who receive more spatial language and parent engagement show stronger spatial transformation skills. The current study investigated the specific links between spatial dialogue and problem-solving strategies in parent-child communication and math performance among preschool-aged children.

One hundred four children ages three to six years ($M = 4$ years, 6.22 months) participated, each with a parent assisting. Identical truck puzzles were placed in front of each child and parent, as they sat side-by-side. The researcher removed the pieces from the child's puzzle and set them off to the side, along with three different colored pieces that were not used in the model puzzle. The experimenter asked the child to make his/her puzzle look just like mom/dad's puzzle by placing the same colors in the same places in the cargo area. The parent was instructed to help their child anytime help was needed. Children also completed the applied problems subtest of the *Woodcock – Johnson III Tests of Achievement (WJ III; Woodcock, McGrew, & Mather, 2001)* to measure mathematics performance. Raw scores were converted to W scores, a scale that accounts for item difficulty and ability regardless of age. The experimenter transcribed the video recordings from the puzzle task and coded important special cues and problem-solving strategies used in the parent-child communication. We hypothesized that parent and child spatial language will be positively related to one another and to child math performance. Furthermore, exploratory analyses will focus on problem-solving strategies and supports that facilitate successful puzzle completion. These findings will provide important details about spatial understanding and STEM success during early childhood.

DIFFERENTIAL REINFORCEMENT EFFECTS IN DOGS EXPERIENCED AND INEXPERIENCED WITH TRAINING

Group Leader	Henning, Julia Undergraduate, Psychology
Group Members	Antonia Berenbaum, Undergraduate, Psychology. Ashley Vasquez, Undergraduate, Psychology. Mariah Mell, Undergraduate, Psychology
Mentor	Prof. Valeri Farmer-Dougan
Authorship	Julia Henning; Antonia Berenbaum; Ashley Vasquez; Mariah Mell

According to the Disequilibrium Model (Timberlake & Farmer-Dougan, 1991) the degree to which the ratio of instrumental (I) to contingent (C) responding is disrupted from a baseline bliss point (O_i/O_c) results in varying reinforcement/punishment effects. When the contingency reduces the contingent response below baseline ($I/C > O_i/O_c$), a reinforcement deficit is imposed for the contingent response (e.g., treat eating), and the rate of instrumental responding (e.g., initiate to human) increases. Punishment effects occur when the I/C is pushed above baseline: Too many treats may punish initiations (a satiation effect, $I/C < O_i/O_c$). Thus, low reinforcement rates are ineffective and high rates may produce satiation, but moderate rates of reinforcement should produce optimal rates of responding. However, inexperienced dogs are likely to have different I/C baselines: Their baseline approach to humans may be lower, thus a contingency which requires increased approaches may push the dog into approach excess more quickly (reducing approaches reduces human contact; $I/C > O_i/O_c$), and high food reinforcement rates may be necessary to offset punishment of newly trained behavior. Thus, depending on the dog, the same reinforcement rate may invoke very different reinforcement outcomes. The present study investigated this using dogs highly experienced with and inexperienced with training. Dogs were assessed for baseline rates of approaches to humans and treats, and then their approaches to humans to earn a treat was reinforced at 5 I/C ratios: 200%, 100%, 75%, 50% and 25%. Experienced dogs showed highest rates of initiation to humans at 25-50% disruption, supporting the disequilibrium model: Experienced dogs needed lower rates of reinforcement to elicit optimal behavior and avoid satiation. Inexperienced dogs showed a slowly increasing rate of initiations to humans as reinforcement rates increased. This supported the hypothesis that inexperienced dogs need higher rates of reinforcement to maintain response rates and offset the less rewarding human interaction. The present results have important implications for training, and suggest that reinforcement procedures should be matched to training experience levels.

NEUROTICISM AND CONSCIENTIOUSNESS AND RESTRICTED EATING: EXPECTANCY OF LOSS OF CONTROL AS A MEDIATOR

Group Leader	Hodge, Brandon Graduate, Psychology
Group Members	Morgan Wember, Undergraduate, Psychology. Renee Ciccola, Undergraduate, Psychology. Benjamin Taour, Undergraduate, Psychology. Kristi Kroll, Undergraduate, Psychology
Mentor	Prof. Suejung Han
Authorship	Suejung Han; Brandon Hodge; Morgan Wember; Renee Ciccola; Benjamin Taour; Kristi Kroll

Purpose: Disordered eating behaviors such as restricted eating are highly prevalent and a health concern in non-clinical populations such as college students (McCabe & Ricciardelli, 2004). Restricted eating involves the limitation of food intake due to a concern for gaining weight (Stice, Zoer, & Kees, 1997). Personality risk factors such as Neuroticism—a tendency to feel vulnerable, depressed, and anxious easily (Davis, Shapiro, Elliott, & Donne, 1993) has been associated with restricted eating. Conscientiousness—a tendency to have control and feel competent—shows more complex association. Restricted eating requires self-regulatory capacity (i.e., high Conscientiousness) but is associated with a sense of ineffectiveness (i.e., low Conscientiousness; e.g., Mulligan, Merrilees, Woods, & Fairouz, 2001). Moreover, how Neuroticism and Conscientiousness contribute to restricted eating has not been examined sufficiently. Thus, we propose an expectation of losing control over eating as a mediator, because restricted eating is viewed as an effort to control oneself and environment by controlling food intake (Surgenor, Horn, Plumridge, & Hudson, 2002). In other words, a sense of vulnerability (i.e., Neuroticism) and ineffectiveness (i.e., low Conscientiousness) as a general risk factor may contribute to disordered eating specific vulnerability of low self-efficacy in maintaining control over eating, which in turn lead to restricted eating behavior. We tested this path model (Figure 1).

Procedure. A sample of 74 college students participated in this paper-pencil survey study for psychology research participation credits. Data collection is in progress and complete results with a sufficient sample size will be reported. The mean ages were 21.64 for males (N=11) and 19.32 for females (N=62). The survey included Neuroticism and Conscientiousness subscales of Big Five Inventory (John & Srivastava, 1999), Expectance of loss of control subscale of Eating Expectancy Inventory (Hohlstein, Smith, & Atlas, 1998), and restricted eating subscale of Dutch Eating Behavior Questionnaire (Van Strien, Frijters, Bergers, & Defares, 1986). A path analysis was conducted using AMOS.

Results. A preliminary path analysis, despite the small sample size, fit the data relatively adequately, $\chi^2(2, N = 74) = 3.90, p = .14, CFI = .94, RMSEA = .114, 90\% CI (.00, .28)$. All the paths were significant or marginally significant in the expected direction (Figure 1).

Conclusions and Implications. Personality risk factors may contribute to restricted eating via a maladaptive belief that they may lose control during eating. Treatment could target the belief in treating maladaptive restricted eating behavior.

NEUROTICISM, CONSCIENTIOUSNESS, AND BINGE EATING: EMOTIONAL EATING, EATING EXPECTANCY, AND SELF-CONTROL AS MEDIATORS

Group Leader	Hodge, Brandon Graduate, Psychology
Group Members	Jordan Mccoy, Undergraduate, Psychology. Alyssa Wilhelm, Undergraduate, Psychology. Megan Schwab, Undergraduate, Psychology. Samantha Hawkinson, Undergraduate, Psychology.
Mentor	Prof. Suejung Han
Authorship	Suejung Han; Brandon Hodge; Jordan Mccoy; Alyssa Wilhelm; Megan Schwab; Samantha Hawkinson

Problem or Purpose. Binge eating, eating a larger amount of foods with a sense of loss of control (APA, 2013), is highly prevalent and causes health and mental health issues in a non-clinical population such as college students (McCabe & Ricciardelli, 2004). Various risk factors for binge eating include personality vulnerabilities such as Neuroticism (Lee-Winn, Townsend, Reinblatt, & Mendelson, 2016; Tylka, 2004) and low Conscientiousness (Koren et al., 2014). How Neuroticism and Conscientiousness contribute to binge eating, however, is not clear. We propose that an emotional eating tendency when having higher expectation that eating will help emotion regulation (i.e., a mediation by emotional eating moderated by eating expectancy) as a mechanism for Neuroticism-binge eating association (e.g., Heatherton & Baumeister, 1990). We also propose that low self-control capacity as a mediator for low Conscientiousness-binge eating (e.g., Claes et al., 2006). We tested these two path models (Figure 1).

Procedure. Seventy four undergraduates participated in this paper-pencil survey for research participation credits. Data collection is in progress and complete results with a larger sample will be reported. The mean ages were 21.64 for males (N=11) and 19.32 for females (N=62). The survey included Neuroticism and Conscientiousness subscales of Big Five Inventory (John & Srivastava, 1999), Expectance of Eating Expectancy Inventory (Hohlstein, Smith, & Atlas, 1998), Emotional Eating Scale (Arnou, Kenardy, & Agras, 1995), Self-Control Scale (Tangney, Baumeister, & Boone, 2004), and Binge Eating Scale (Gormally et al., 1982). Two path analyses were conducted using AMOS.

Results. A path analysis with Neuroticism as a predictor, interaction terms between emotional eating and eating expectancy as a moderated mediator, and binge eating as a dependent variable fit the data relatively adequately, $\chi^2(1, N = 74) = 2.22, p = .14, CFI = .94, RMSEA = .13, 90\% CI (.00, .37)$. Another path analysis with Conscientiousness as a predictor, self-control as a mediator, and binge eating as a dependent variable revealed a relatively poor fit to the data, $\chi^2(1, N = 74) = 4.50, p = .03, CFI = .94, RMSEA = .22, 90\% CI (.05, .44)$, possibly due to a small sample size. All the paths in both models were significant in the expected direction except for Neuroticism-mediator.

Conclusions and Implications. Low Conscientiousness might contribute to binge eating via low self-control capacity, which could be intervention target (Wei et al., 2005). More data is needed to test the path model for Neuroticism.

THE JOKE'S ON US: A CONTENT ANALYSIS OF CURRENT INSTRUCTIONAL HUMOR RESEARCH AND PRACTICE

Group Leader	Horn, Dakota Graduate, Communication
Group Members	Anna Wright, Graduate, Communication. Samantha Dunn, Graduate, Communication
Mentor	Prof. Cheri Simonds
Authorship	Dakota Horn; Anna Wright; Samantha Dunn

Teachers can use humor in the classroom for a variety of reasons and research has explored the use of humor in the classroom. This qualitative study explores how classroom humor research is represented on open-source teacher websites. Results suggest that while most open-source teacher websites have suggestions that do reflect the research, there are a few concepts on these websites that humor research has not clearly explored. Further, most of these websites do not cite research in making their claims.

DOES COGNITIVE FLEXIBILITY TRAINING IMPROVE READING COMPREHENSION FOR ELEMENTARY SCHOOL STUDENTS?

Group Leader	Howe, Adrienne Undergraduate, Psychology
Group Members	Jasmin Smith, Graduate, Psychology. Patricia Charczuk, Undergraduate, Psychology. Nina Van Beuning, Undergraduate, Psychology. Rebecca Bove, Undergraduate, Psychology. DaShae Rodriguez, Undergraduate, Psychology
Mentor	Prof. Alycia Hund

Successful reading requires the ability to think about multiple details (Cartwright, 2002). For instance, reading comprehension involves constructing meaning from text using a variety of information from the text, reader, and situation (Gnaedinger et al., 2016). One factor linked to improving reading comprehension is executive functioning, especially cognitive flexibility-the ability to switch fluidly between activities (Cantin et al., 2016). Previous studies have found that a training program focusing on reading-specific cognitive flexibility has led to gains in reading comprehension (Cartwright, 2002, 2006; Cartwright et al., 2016). The purpose of this study is to test the mechanisms by which cognitive flexibility improves reading comprehension during the elementary years by comparing four training procedures, which involve sorting object or word cards in multiple ways at the same time or on subsequent trials. We also included measures of oral reading fluency, vocabulary, executive functioning, and demographics as control variables. We are recruiting children in second to fifth grades to participate in our study, as well as their parent or legal guardian. We will include 80 children and parents/guardians. Parents complete the demographic form. Children complete six tasks throughout the study. Each child will read a passage for three minutes and select the correct word that makes the most sense in that specific sentence. This data will serve as the baseline measure of reading comprehension prior to receiving the cognitive flexibility training. There are four versions of the training, and each participant is randomly assigned to one condition. Two conditions require simultaneous sorting to follow a pattern in a matrix whereas the other two conditions require sequential sorting into separate bins. The cards contain words or pictures of objects. Then, another reading comprehension task is given to assess change. Participants read a passage aloud to measure oral reading fluency and provide definitions of common words to measure vocabulary. The final task is the verbal fluency subtest from the Delis-Kaplan Executive Function System (D-

KEFS, 2001), where children provide lists of words with certain features. We expect the training procedure utilizing simultaneous sorting of words to produce the greatest gains in reading comprehension, consistent with past findings. Ours is the first test of training using sequential sorting of words, and we expect some gains in reading comprehension. We do not expect either of the training procedures involving object cards to lead to significant gains in reading comprehension, though there is potential for small benefits.

PACKING POISON? THE EFFECT OF INVASIVE SPECIES ON NATIVE SEED GERMINATION RATES

Group Leader	Kew, Alex Undergraduate, Biological Sciences
Group Member	Kristen Corcoran, Undergraduate, Biological Sciences
Mentor	Prof. Victoria Borowicz
Authorship	Alex Kew; Kristen Corcoran; Victoria Borowicz

Lespedeza cuneata is an invasive plant species introduced from Asia and now thriving in infertile soils in the Midwest. This exotic species suppresses the growth of native species and can dominate grasslands, including prairies. The exact mechanism underlying this species' success is still not clearly known but two forms of competition have been postulated. (1) Interference competition through tannin-rich leaf litter. This invader produces leaf litter rich in tannins, which are known to inhibit germination and growth of some species. The tannins are assumed to leach into the soil and chemically inhibit germination of seeds from competing species. (2) Resource competition for light. The thick layer of accumulated litter can also block light and thereby inhibit seedling growth. Through these two mechanisms, *L. cuneata* can suppress nearby plants. To test these two alternative hypotheses for the success of *L. cuneata*, we will conduct a greenhouse experiment with a common, local prairie species, *Coreopsis tripteris* (tickseed). Groups of 40 cold-stratified *C. tripteris* seeds will be added to replicate cups containing prairie soil. Each replicate will be assigned one of five treatments: no litter, 1 g of air-dried *L. cuneata* litter, 5 g of *L. cuneata* litter, 1 g of grass litter, or 5 g of grass litter. Grass litter does not contain tannins and so we include the two grass litter treatments to separate the shade effects of litter from the chemical effects. Every week for 12 weeks we will record the number of new *C. tripteris* seedlings. At the conclusion of the experiment, we will determine percent germination for each replicate and harvest, dry, and weigh seedlings to determine average seedling mass per replicate. If *L. cuneata* competes through interference competition, both treatments with the *L. cuneata* litter will suppress germination and the treatment with the most *L. cuneata* will have the lowest germination rates. If litter suppresses other species by blocking sunlight (resource competition), we predict that the *L. cuneata* and the grass treatments with the most litter will have equally poor germination, low levels of litter from *L. cuneata* and grass will have intermediate germination rates, and the control group will have the greatest germination. Studies such as this can contribute to the base understanding of how some invasive species suppress native plant species. This, in turn, can improve land management techniques to reduce the spread of invasive plant species.

ASSESSMENT OF LINK CARD RECIPIENTS ACCESS TO AND PERCEPTION OF THE DOWNTOWN BLOOMINGTON FARMER'S MARKET

Group Leader	Kirwan, Natalie Undergraduate, Health Sciences
Group Members	Teyhaynish Demilew, Undergraduate, Health Sciences. Brittany Hendricks, Undergraduate, Health Sciences. Tamesha Puckett, Undergraduate, Health Sciences
Mentor	Prof. Jacqueline Lanier
Authorship	Tehaynish Demilew; Brittany Hendricks; Natalie Kirwan; Tamesha Puckett

The purpose of this research is to identify the factors contributing to the lack of Link Card recipients at The Downtown Bloomington Farmer's Market in an effort to address the nutritional health inequality in Bloomington/ Normal and identify potential resources available to correct this disparity. From research done by our contact with The Downtown Bloomington Association it has been found that The Farmer's Market's Link Card sales have been going down in the last couple of years. The Farmer's Market provides citizens of Bloomington/Normal with local options for multiple types of food items. With rates of obesity rising all over the country, it is important that all citizens have access to local and nutritional foods. The main questions asked in this assessment are as follows: What are the eating habits of Link Card Recipients in Bloomington/Normal? Where do the Link Card Recipients do their grocery shopping? What transportation systems are available to Link Card Recipients? What are Link Card Recipients' views on The Farmer's Market and the items sold there? This research will be conducted through a short questionnaire distributed among local community centers as well as personal interviews with Link Card shoppers at the Farmer's Market and with the merchants at The Market.

DOES IT MATTER WHO PROVIDES SOCIAL-EMOTIONAL LEARNING CURRICULA?

Group Leader	Koppenhoefer, Sarah Graduate, Psychology
Group Member	Allison Curnock, Graduate, Psychology
Mentor	Prof. Renée Tobin
Co-Mentor(s)	Prof. W. Joel Schneider
Authorship	Sarah Koppenhoefer; Allison Curnock; W. Joel Schneider; Renée Tobin.

Are non-teachers as effective as teachers in promoting social-emotional learning (SEL)? This study investigates the relative effectiveness of different implementers of Second Step SEL Program (Committee for Children, 2011) on preschoolers' social-emotional knowledge. Content will include a discussion of SEL curricula, implementation, study results, and their implications. Participants will develop a better understanding of the role of teachers, other support personnel, and curricula in the promotion of children's SEL.

OBTAINING ENERGY INDEPENDENCE BY IMPLEMENTING OPTIMIZED SOLAR & WIND SYSTEMS WITHIN THE CITY OF GENESEO

Group Leader	Leshner, Ethan Undergraduate, Technology
Group Members	Oliver Ellen, Undergraduate, Technology. Luke Verplaeste, Undergraduate, Technology
Mentor	Prof. Jin Jo

The City of Geneseo currently purchases energy from MISO to help offset their electrical demand. With growing costs of transmission, an economic burden is placed upon the city. Eliminating this dependence would increase Geneseo's energy portfolio independence while reducing future electrical costs. Implementing additional solar & wind systems would allow Geneseo to produce additional electricity on site without having to purchase electricity from MISO throughout the year. Furthermore, not purchasing electricity from MISO would eliminate transmission costs which contribute to a large financial burden of purchasing energy for the city. We have investigated the costs needed to implement additional solar & wind systems, optimized percentage required, and the environmental impacts that come from adding more sustainable energy to the City of Geneseo's energy portfolio. This was accomplished by evaluating the total land available, the solar & wind resources in the county, and using analytical software (SAM/Windographer) to evaluate the financial/environmental parameters. From the findings, Geneseo can greatly reduce their dependency from the MISO market with relatively little renewables added.

POST-OPERATIVE SURGICAL INFECTIONS

Group Leader	McThenia, Taylor Undergraduate, Health Sciences
Group Member	Lauren Formigoni, Undergraduate, Health Sciences
Mentor	Prof. Jennifer Peterson

Nationwide there is a movement towards improving the quality of care, thus resulting in a movement towards preventing and reducing the number of post-operative complications. The purpose of our research project is to identify the incidence of post-operative complications occurring within thirty days following surgical intervention at St. Anywhere Hospital. We focused specifically on complications involving surgical infections. To obtain medical data and related documentation regarding St. Anywhere Hospital's post-operative surgical infections, we used de-identified files to access the hospital medical records. We conducted an audit by randomly sampling a group of medical records, using data elements developed by our research team. Our data elements included: Attentive monitoring of patient vitals in the post-operative recovery room and for up to twenty-four hours, pre-operative History & Physical attained and documented appropriately, blood/lab work obtained before and after surgical intervention and administration of antibiotics/prophylactic medications in the thirty days following surgery. The outcomes from our audit of the medical record were recorded on data audit forms to document our findings. We conducted an audit on St. Anywhere Hospital to evaluate the following: first, to compare the rate of post-operative surgical infections at St. Anywhere Hospital with the national average using benchmarking practices; and secondly, to evaluate whether the hospital was carrying out the necessary steps before and after surgical intervention to aid in the prevention of post-operative surgical infections. We wanted to ensure that St. Anywhere Hospital was effectively working to prevent post-operative surgical infections by consistently following the previously stated data elements. While we did look at percentages in terms of the rates of surgical infections, the focus was on the quality measures being carried out regularly.

LOSS OF FUNCTION OF THE HERC-1 GENE IN C. ELEGANS AND ITS USE IN THE STUDY OF ANGELMAN SYNDROME

Group Leader	Megeff, Braidy Undergraduate, Biological Sciences
Group Member	Kayla Haines, Undergraduate, Biological Sciences
Mentor	Prof. Andrés Vidal-Gadea
Authorship	Braidy Megeff; Kayla Haines; Moe Khalil; Andres Vidal-Gadea

The Angelman Syndrome is a neurodevelopment disorder that affects 1 in every 15,000 newborns, and it leads to cognitive delays, developmental defects, impaired coordination, learning disabilities, and a happy demeanor. It is caused by the mutation in the Ube3a gene located on chromosome 15 in humans. When functioning properly, this E3 ubiquitin ligase plays a vital role in mediating the degradation of certain proteins in the body. The goal of the project is to explore the molecular and neuronal mechanisms of Angelman Syndrome in *C. elegans* and to use them to model this disease and perhaps discover strategies to use in the treatment of patients. The methods of exploring these mechanisms include crawling velocity and habituation assays. The Ube3a gene is expressed in muscles and neural tissue, so in order to assess muscular and neuronal function, locomotion and learning assays were conducted. The collected data from previous experiments provide evidence that the loss of function of the herc-1 gene in *C. elegans* impairs the learning and memory of these animals. From the gathered data, it is suspected that herc-1 is expressed in the neurons; however this hypothesis must be verified using PCR techniques to determine exactly where the herc-1 gene is expressed in *C. elegans*. The promotor region of each of the isoforms of herc-1 will be amplified and used in a PCR fusion reaction to drive expression of the green fluorescent protein: GFP. The ultimate goal of these findings will be to try and rescue herc-1 deficient worms and figure out genes that may be able to alleviate characteristic Angelman symptoms.

RECYCLED GLASS IN CONSTRUCTION AND PAVING MATERIALS

Group Leader	Mueting, John Undergraduate, Health Sciences
Group Members	Anam Sultana Hussain, Graduate, Business Administration
Mentor	Prof. Thomas Bierma
Co-Mentor(s)	Prof. Pranshoo Solanki, Prof. Guang Jin
Authorship	John Mueting; Anam Sultana Hussain; Thomas Bierma; Pranshoo Solanki; Guang Jin

Glass is often a byproduct of many municipal recycling programs. However, glass collected through the local single-stream recycling system represents a significant financial burden on the program due to lack of a market for mixed glass. Recycling centers must ship the mixed glass to sorting facilities where it is cleaned and separated by color. The high cost of transport and sorting fees affect recycling centers, resulting in numerous centers no longer accepting glass. According to Environmental Protection Agency (EPA), 11,500,000 tons of glass waste was generated in the US in 2010 and only 27% was recycled. At local level, recycling generates approximately 360 tons per month of mixed glass debris. Out of 360 tons, approximately 60 tons is trash and approximately 300 tons is glass of various colors. Therefore, the primary objective of this study is to determine the extent (technically, economically and legally) to which glass could be used in local construction projects. Previous studies show that glass has been used as an aggregate replacement (subgrade for roadwork, structural fill, pipe bedding, and concrete admixtures) or cement replacement or both. However, using glass as an alternative to traditional construction methods could affect the performance of the product. To be a suitable substitute for traditional construction materials, the glass must be

cost-effective alternative than the original material and should meet performance criteria per municipal law. As a pavement material, recycled glass need to meet city and Illinois Department of Transportation requirements. In this on-going study, Illinois State University's Innovation Consulting Community (ICC) has partnered with a recycling center to research promising potential markets for the mixed glass in construction applications. The mixed glass is heavily polluted with shredded paper, glue residue and other materials. Methods for cleaning and sizing the glass to meet the requirements of the specific construction application will be recommended. It is expected that this study will address the potential uses for mixed glass in building products and road construction.

EXAMINING HOW A WIND TURBINE'S HUB HEIGHT AND ROTOR DIAMETER AFFECT ELECTRICAL GENERATION IN AREAS WITH LOW WIND RESOURCES

Group Leader	Nibungco, Nick Undergraduate, Technology
Group Members	Michael Avila, Undergraduate, Technology. DJ Strohl, Undergraduate, Technology
Mentor	Prof. Jin Jo
Authorship	Nick Nibungco; Michael Avila; D.J. Strohl

Illinois' current goal is to generate 25% of their electricity from renewable resources by 2025, 75% of which will come from wind energy. In order to meet this goal, wind power would need to be expanded into areas with less than ideal wind conditions. By analyzing wind data from four counties in Illinois with varying wind resources, we were able to compare power output of wind turbines at different hub heights and rotor diameters. We found that by increasing either the hub height or rotor diameter, we were able to effectively generate power at lower wind-speeds which rivaled the output in higher wind-speed areas. By determining the optimal hub height for turbines in low-wind speed areas, we are able to determine the capabilities of these areas to generate power at a rate consistent with higher average wind-speed areas.

UNDERSTANDING EMOTIONAL AND MENTAL HEALTH NEEDS OF EMPLOYEES THROUGH EMPLOYEE WELLNESS PROVIDER

Group Leader	Noe, Jeremy Undergraduate, Health Sciences
Group Members	Sam Buck, Undergraduate, Health Sciences. Shelby Hunter, Undergraduate, Health Sciences. Kirsten Kowalczyk, Undergraduate, Health Sciences
Mentor	Prof. Jacqueline Lanier
Authorship	Jeremy Noe; Sam Buck; Shelby Hunter; Kirsten Kowalczyk

The purpose of this needs assessment was to gain a better understanding of emotional and mental health needs of employees at employee wellness provider. This was accomplished through interviews, observations, and surveys. A few key questions we asked are what is corporate wellness, what kind of barriers do employees face to receive proper treatment, how often do employees use "sick" days to have a mental-break day, and is there a break in the day when you can take 5 minutes to have a mental break. Our target population are men and women employees of an employee wellness provider. The population will be divided into male and female categories and how many of each are in the company. The methods we used to gather data are multiple interviews, surveys and observations at our employee wellness provider.

EVALUATING THE IMPACTS OF IMPLEMENTING A PHOTOVOLTAIC SYSTEM TO PRODUCE ENERGY FOR THE NEW DESTIHL BREWERY BEING BUILT IN EAST NORMAL

Group Leader	O'Brien, Will Undergraduate, Technology
Group Members	Jacob LePretre, Undergraduate, Technology. Kevin Dematteo, Undergraduate, Technology
Mentor	Prof. Jin Jo
Authorship	William O'Brien; Jacob LePretre; Kevin Dematteo

Craft beer breweries hold an innovative segment of the greater brewing industry in today's market. It is truly no surprise that many craft beer breweries in the U.S. and around the world have turned to innovative solutions for energy efficiency and reduction of greenhouse gases to seize cost-savings opportunities at their facilities while still promoting sustainable business standards in this industry. Considering the rising energy costs that exist today, reducing energy usage should be a high priority at all breweries. The focus of our project proposal is to evaluate the numerous positive impacts of implementing a solar photovoltaic system on the property of the new Destihl Brewery. Aside from the opportunity to reduce costs of the production processes of brewing their beer, having on-site energy generation from photovoltaics at a brewery can assist the facility in reducing their typically high-level carbon footprint. By using on-site power generation, we aim to offset the costs of some of the energy-intensive machinery that will be used during the manufacturing process in the new Destihl Brewery. Breweries are massive consumers of energy, having large amounts of heating and cooling processes that take place for long periods of time, using large amounts of energy compared to other buildings of similar size. Aside from standard lighting and heating, breweries use large-scale refrigerators, fermentors, brew kettles, mash/lauter tuns, temperature gauges, hoses, pumps, pressurizers and many more examples of high-consuming machinery and manufacturing parts. Aside from cost-savings benefits for a brewery, we believe that a green initiative such as this project will improve the reputation of any company and move them towards the top of the list for meeting green business practices and industry standards.

INFLUENCE OF CONSPECIFIC PRESENCE ON FEEDING BEHAVIOR OF A COSTA RICAN WOLF SPIDER

Group Leader	Rhodes, Christina Undergraduate, Biological Sciences
Group Member	Kristin Duffield, Graduate, Biological Sciences
Mentor	Prof. Ben Sadd
Co-Mentor(s)	Prof. Steven Juliano
Authorship	Christina Rhodes; Kristin Duffield; Steven Juliano; Ben Sadd

While feeding is a ubiquitous necessity for animals, feeding behavior in animals varies with environmental conditions. Feeding behavior may change in the presence of other members of the same species (conspecifics). Intraspecific competition between individuals of a predator species could alter behavior towards prey items. The mechanism underlying competition can lead to two opposing predictions. When intraspecific competition occurs via direct territorial interactions between individuals (interference competition), conspecific presence may elicit aggressive behavior from a focal individual, associated with reduced feeding effort. Alternatively, if competition occurs indirectly via consumption of prey as a resource (exploitation competition), a focal individual may more

readily attack a potential prey item when a competitor is present. Using wolf spiders as a study organism, I hypothesize that exploitation competition is predominant, and therefore predict that wolf spiders will respond to conspecific presence by increasing foraging, resulting in a greater proportion of individuals attacking a prey item when a conspecific is present rather than absent. Alternatively, if interference competition is predominant, wolf spiders will respond to conspecific presence by increasing territory defense behavior, resulting in a lower proportion of individuals attacking prey when a conspecific is present. Additionally, due to greater resource needs of females compared to males, I predict females will attack prey more readily than males. Wolf spiders were collected at La Selva Biological Research Station, Costa Rica. They were housed and fed at regular intervals for two days, then allowed to acclimate to trial arenas prior to experimental trials. Trials assessed feeding behavior in the presence or absence of a conspecific. In the conspecific-present treatment, a wolf spider (both size- and sex-matched) was introduced to the arena, but could not directly contact with the focal individual. A prey item was provided to the focal spider, and behavior and the time it took the spider to attack the prey was recorded. A significantly greater proportion of individuals attacked prey items when a conspecific was present. Attack times for male and female spiders did not differ. The results show conspecific presence influences foraging behavior in wolf spiders, and suggest that exploitation competition is predominant in this population.

DEFLATING THE COSTS OF SOLAR: DETERMINING THE IDEAL FINANCIAL STRUCTURE TO ENCOURAGE PV GROWTH IN THE UNITED STATES

Group Leader	Robinson, Tyler Undergraduate, Technology
Group Members	Jacob Walter, Undergraduate, Technology. Patrick Smith, Undergraduate, Technology
Mentor	Prof. Jin Jo

For many years, the number of solar panel installations has dramatically increased for residential and commercial applications. There are two main reasons why people want to make the move to solar panels, such as reducing their electricity bills and reducing their reliance on fossil fuels. Affordable solar Photovoltaic systems would solve both pertinent issues. According to the newest installment of Lawrence Berkley National Laboratory's Tracking the Sun, the United States pays more per watt installed for photovoltaic systems while countries such as Germany and Japan, who have similar standards of living, pay almost half as much per watt. This raises the question, would overhauling incentives across the United States (similar to Japan or Germany) better incentivize citizens to shop for and install solar photovoltaic systems? Would this in turn would enlarge the industry and drive prices down. For example, after Fukushima Japan introduced feed in tariffs for renewable energy production and was able to reduce their costs by nearly 50% in a two year span. Using SAM modeling tools, developed by the National Renewable Energy Laboratory, the focus on this report will be to determine how feed in tariffs would change the pricing of solar photovoltaic systems across the United States.

A NEW APPROACH TO SCATTERING AMPLITUDES

Group Leader	Russ, Cory Undergraduate, Physics
Group Members	Santiago Pinto, Undergraduate, Physics. Joshua Henderson, Undergraduate, Physics
Mentor	Prof. Neil Christensen
Authorship	Neil Christensen; Cory Russ; Santiago Pinto; Joshua Henderson

This research is in the field of high energy physics. Specifically, we considered the recently-discovered Higgs Boson Field. To do this we studied the Hamiltonian, which describes the Higgs field, as a matrix. This made it possible to solve for the energy of different particle states. We also compare our results to perturbation theory, which is

currently the most widely known and used method in this field. This poster will describe the mathematics behind the Hamiltonian matrix. It will also cover the computational code for calculating and diagonalizing the Hamiltonian matrix. Finally we will show some of our preliminary results and their comparison to perturbation theory.

FAMILY EXPERIENCES IN EXITING EARLY INTERVENTION

Group Leader	Smyers, Mary Undergraduate, Communication Sciences and Disorders
Group Members	Anamaria Woods, Undergraduate, Communication Sciences and Disorders. Hannah Powers, Undergraduate, Communication Sciences and Disorders. Anna Wirth, Undergraduate, Communication Sciences and Disorders
Mentor	Prof. Jaime Smith

Purpose: This project was designed to investigate families' experiences with exiting the Illinois early intervention system. **Method:** Families with children receiving early intervention services completed telephone interviews describing their experiences. To supplement the phone interviews, quantitative data on the children's performance in a small-group transition class was collected from the participants' case files. **Results:** Analysis of the qualitative data indicated an overwhelmingly positive response to the transition services received. Parents reported feeling prepared for entry into early childhood education once the children reached the age of three. The quantitative data showed significant changes over the course of the children's participation in transition class. **Discussion:** While parents were hesitant about initiating early intervention services, their expectations were surpassed and they reported satisfaction regarding their child's developmental progress.

COMMUNITY SOLAR VIA VIRTUAL NET METERING: BRINGING PHOTOVOLTAICS TO ILLINOIS STATE UNIVERSITY

Group Leader	Stetter, Andrew Undergraduate, Technology
Group Members	Conner Waters, Undergraduate, Technology. Chris Budde, Undergraduate, Technology
Mentor	Prof. Jin Jo

In 2016, Illinois had a total photovoltaic (PV) installed capacity of sixty-six Megawatts. Over the next 5 years it is projected that the state will add two hundred and forty Megawatts of PV to its portfolio. The state of IL has new requirements on community solar additions which makes our analysis of community solar models increasingly relevant. We chose to showcase the Illinois State University proposal for community solar array created by the "Solar Pathways Project", to model the substantial cost benefits that virtual net metering (VNM) will introduce, when it becomes available in 2018. We also examine the nationwide efforts in other community solar friendly states to more accurately forecast how lucrative the proposed system might be. Our project hypothesizes that VNM will make the proposed array a superior investment for the University and the local community. Our project depicts the important features of a virtually net metered community solar system in regards to design and functionality. This will hopefully serve as a replicable model that will be permeated across our society.

A COMPARATIVE EVALUATION OF NORMAL'S ENERGY PLAN; EXPANDING WITH PV AND BATTERY STORAGE

Group Leader	Suchsland, Ryan Undergraduate, Technology
Group Members	Zack Biel, Undergraduate, Technology. Gary Meyer, Undergraduate, Technology. Andy Gasper, Undergraduate, Technology
Mentor	Prof. Jin Jo
Authorship	Ryan Suchsland; Zack Biel; Andy Gasper; Gary Meyer

The implementation of a battery backup system for critical government assets is essential. This study shows a large scale energy storage system along with the addition of photovoltaics for use in critical government buildings within the Town of Normal and their viability. We have compiled information from the Town of Normal's database and reviewed the town's energy usage. This study shows which battery systems and PV systems would be the most cost effective for use in Normal. We have compared the two systems along with the government's already published energy management plan, showing how our implementation of solar PV can further the town's commitment to reducing energy usage and provide clean energy for a number of buildings. During our research we also evaluated the financial feasibility of installing photovoltaics along with battery storage and attempted to quantify the emergency response capabilities that this battery backup system can provide, in comparison to a conventional diesel generator.

SHIFTING TEMPERATURES AND INFECTION OUTCOMES IN A BUMBLEBEE TRYPANOSOME PARASITE SYSTEM

Group Leader	Tobin, Kerrigan Graduate, Biological Sciences
Group Member	Austin Calhoun, Undergraduate, Biological Sciences
Mentor	Prof. Ben Sadd
Authorship	Kerrigan Tobin; Austin Calhoun; Ben Sadd

The outcomes of interactions between organisms may be dependent on the environmental temperature. Current evidence supports an ongoing warming trend of the climate, and in addition it is predicted that drastic temperature shifts will become more frequent. These shifts will impose physiological stress, and may increase susceptibility to other extrinsic factors, such as disease. It is known the interactions between bumblebees and their coevolved parasites can be mediated by the abiotic environment. Temperature has been implied as a stressor leading to bumblebee population decline, but the effects of temperature and abrupt temperature shifts on host-parasite interactions have not been explored. In this study, bumblebees (*Bombus impatiens*) were acclimated at low, intermediate, or high temperatures, subsequently exposed to an experimental dose of the trypanosome parasite, *Crithidia bombi*, and then placed at the low, intermediate, or high temperatures to create all combinations of acclimation and post-exposure temperature. Transmission of the gut-infecting parasite was monitored via feces every two days. At eight days post-infection, bumblebees were frozen and quantitative PCR used to quantify parasite infection loads in the gut. Data analysis is still in progress, but the results show a trend towards higher infection loads in bumblebees kept at a different temperature post-infection. The results will inform how temperature changes, including potentially stressful abrupt shifts, influence important host-parasite interactions, with ramifications for epidemiology and host-parasite coevolution.

COMPETENCE AND ROLE AMBIGUITY AS PREDICTORS OF NEGATIVE WORK ATTITUDES

Group Leader	VanCleave, Morgan Undergraduate, Psychology
Group Member	Bria Hesse, Undergraduate, Psychology
Mentor	Prof. Kimberly Schneider
Authorship	Morgan VanCleave; Bria Hesse

The occurrence of negative work attitudes, such as burnout and intention to quit, are problematic to any organization. The causes of these work attitudes are often multidimensional. Self-perceptions, including competence, and organizational conditions, such as role ambiguity, can potentially impact work attitudes. Recent research has explored the relationships between employees' role ambiguity and work-related outcomes such as burnout and intentions to quit (Gila, 2004; Olivares-Faundez et al, 2014). The present study examines whether role ambiguity and competence are significant predictors of burnout and intention to quit among a sample of organizational volunteers. We predicted that, because role ambiguity often results from poor instructions or unclear job descriptions it serves as a job stressor and would be positively related to intentions to quit and burnout. Additionally, we predicted that competence, derived from volunteers' experience in the performance domain, would be negatively related to burnout and intention to quit. With greater competence, work-tasks may become less taxing, leading to less intention to quit and burnout. The current research aims to identify if either role ambiguity or competence are predictors of negative work outcomes. Two hundred forty-eight volunteers from three nonprofit volunteer agencies (animal shelters in the Pacific Northwest) participated. Volunteers completed an anonymous online survey that assessed many dimensions of work experiences, including their perceived competencies, role ambiguity, burnout, and intentions to quit. All scales included multiple items and had acceptable reliability (all above .85). The agencies' volunteer coordinators sent all volunteers who had been active within the past year an email with a link to the survey and participants completed the survey on their own time. A correlation analysis revealed that role ambiguity is positively related to burnout ($r = .284, p < .05$) and intention to quit ($r = .472, p < .05$), whereas competence was negatively related to intention to quit ($r = -.175, p = .007$). Competence did not correlate with burnout but this correlation was not statistically significant ($r = -.122, p = .062$). Our results have implications for volunteer agencies with high turnover among volunteers in that it would be beneficial to focus on improving volunteers' feelings of competency and reducing role ambiguity. This may involve creating new training programs for volunteers who self-report low competence and volunteer coordinators may need to clarify ambiguous job descriptions, procedures, and instructions when their volunteers indicate high role ambiguity. With these changes, turnover may be reduced.

THE DESIGN, INSTALLATION, AND MAINTENANCE OF A COMMUNITY OFF GRID SOLAR PV SYSTEM FOR ADENIJI VILLAGE NIGERIA

Group Leader	Williams, Michael Undergraduate, Technology
Group Members	Tyler Brown, Undergraduate, Technology. Wasiu Adetomiwa, Undergraduate, Technology
Mentor	Prof. Jin Jo
Authorship	Mike Williams; Tyler Brown; Wasiu Adetomiwa

Most energy used by rural Nigeria is currently coming from biomass and organic waste combustion. The demand for electricity in Nigeria far outweighs available capacity, and currently has 4.6 gigawatts (GW) for a

population of over 170 million. The Nigerian government set a goal of achieving 40 GW of capacity by 2020, a goal that now seems out of reach. The installation of community off grid power can bring the country close to their goal. According to a study by many organizations including U S African development foundation, it is clear that centralized grid access is not visible for sparsely village settlements in Nigeria, so the obvious solutions includes off grid and small scale energy projects. This project can bring electricity to these rural areas by providing renewable energy sources which can have a significant impact on livelihoods and productivity in the village. Adeniji village, a small community situated in Oyo state, Nigeria. The nearest city is Oyo town which is about 30miles away. There are about 80 people and around 30 homes with a church, an elementary school and small health facility without any form of electricity. The village is situated on the high plain with high wind speed, which makes it suitable for wind turbines. Because it is sunny most of the season in western Nigeria, solar PV is a great option in the area. The project's aim is installing, operating and maintaining renewable off grid solar PV and a small scale wind turbine in Nigeria's village. This would operate an electricity mini grid to distribute solar and wind powered electricity. The mini grid will supply power to all buildings in the village, including small shops, a primary school, a small health care for basic sickness and a church. Many organizations and countries are committed for the electrification of Africa and many of these organizations are currently funding projects like this in other parts of Africa. We want to take the opportunity provided by those organizations and Nations to install off grid solar PV and wind turbine for the Adeniji village in Nigeria.