



# *Undergraduate Research Symposium*



Symposium for Undergraduate  
Research, Scholarly, and Creative Activity

THURSDAY, APRIL 15, 2010 // ABSTRACT BOOK





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## Abbreviations

<b>ACES</b>	College of Agricultural, Consumer, and Environmental Sciences	<b>DGS</b>	Division of General Studies
<b>AHS</b>	College of Applied Health Sciences	<b>LAS</b>	College of Liberal Arts and Sciences
<b>BUS</b>	College of Business	<b>MDIA</b>	College of Media
<b>EDU</b>	College of Education	<b>MED</b>	University of Illinois at Chicago College of Medicine at Urbana-Champaign
<b>ENG</b>	College of Engineering	<b>NURS</b>	University of Illinois at Chicago College of Nursing, Central Illinois Regional Program
<b>FAA</b>	College of Fine and Applied Arts		

## Welcome

**W**elcome to the third annual campus-wide Undergraduate Research Symposium. Once again this year, the great diversity and high quality of submissions have made for an excellent program. Showcased today are presentations and posters that remind us of how deeply Illinois students are involved in the university's mission to create and discover—and to do so on behalf of the larger public this institution serves.

If you choose to attend sessions and seek out posters on topics familiar to you, prepare to be surprised by innovation. I hope, too, that you will let yourself be drawn to topics about which you know very little. Challenge the presenters to help you understand why their work is relevant to you. You will be enlightened. And impressed, for I know you will sense, as I do, the passion that Illinois students feel for the research, scholarly, and creative activity in which they are engaged.

This passionate engagement in undergraduate research, broadly defined, is often supported by faculty, postdoctoral fellows, and advanced doctoral students. Browse the symposium's abstract book and you will find named the many mentors who guided this year's participants. I am most grateful for their effort.

To see a prime example of what happens when brilliant student researchers are generously mentored by faculty, please attend the symposium's featured session at the noon hour. Members of a student team affiliated with Engineers Without Borders will present on a research program that has resulted in safe drinking water for the people of Socorro, Guatemala. The team's mentors will be on hand to share their perspectives on how research opportunities can enhance the Illinois experience for undergraduates.

This year's symposium follows plans established by working groups that were convened by the Office of the Provost during the 2007–08 and 2008–09 academic years. Thanks once more to the faculty who led these groups: Professor Wojtek Chodzko-Zajko (Kinesiology and Community Health, AHS), Professor Jennifer Bernhard (Electrical and Computer Engineering, ENG), and Professor Wayne Pitard (Religion, LAS; and Spurlock Museum). This year, as in past years, an intern in the Office of the Provost provided invaluable support as plans for the symposium matured. Emily Pinheiro (Spanish, LAS; Chancellor's Scholar) deserves our warm appreciation.

The commitment to support undergraduate research is an important element of our *Campus Strategic Plan*. As part of that commitment, the Undergraduate Research Symposium has given increased visibility to longstanding collegiate and departmental investments in undergraduate research. It has also catalyzed interest in increasing access to undergraduate research opportunities where few existed before. Even as we face unprecedented challenges across campus, I trust that we will continue to recognize the value of inviting students to play significant roles in research, scholarly, and creative endeavors. The scope and quality of these endeavors distinguish Illinois as a world-class university, one where undergraduates are partners in receiving the education they will need to become leaders in the twenty-first century.

**Richard Wheeler**

*Vice Chancellor for Academic Affairs (Interim)*

# Oral Presentations

**A Sessions, 9:30-10:30 a.m.**

## **Session A.1: Life Sciences I (Illini Room A)**

### **Towards determination of a membrane protein structure using solid state NMR: expression and purification of Coq7, a quinone monooxygenase**

**Elliott Brea**, Senior, Biochemistry, LAS

**Lars Rikardsen**, Junior, Chemistry, LAS

**Aranee Sivananthan**, Sophomore, Biochemistry, LAS

#### **ABSTRACT**

Membrane proteins are extremely important as they are necessary for many cellular functions and are targeted by most modern drugs. The lack of information in this field is due to the difficulty of working with membrane proteins. The purification, and determination of the structure are much more difficult than soluble proteins. In this study, the protein Coq7 was chosen as a model protein for structure determination by Solid State Nuclear Magnetic Resonance (SSNMR). Coq7, a quinone monooxygenase with a diiron center, is a monotopic membrane protein involved in the biosynthesis of ubiquinone, an essential electron carrier in the electron transport chain. This protein is found in many higher order eukaryotes and some prokaryotes and is essential for cellular respiration. At present the structure of Coq7 has not been determined experimentally, and with a size of 24kDa, would serve as a good model to show the potential of using SSNMR for solving membrane protein structures. Here we describe the preparation of Coq7 for SSNMR. Previously, the Coq7 gene from *Pseudomonas aeruginosa* was cloned into *Escherichia coli* as a maltose binding protein (MBP)-Coq7 fusion. Here we describe the optimization of expression of Coq7 in isotopically labeled growth media. Membranes were isolated using both French press and sonication as methods for lysing the cellular extract, and then solubilized after screening optimal detergents and cost effectiveness. The Coq7 protein was purified using an amylose column to which MBP binds with high affinity. Since the determination of the Coq7 structure alone is desired, the MBP was cut off using a site-specific protease. After cleavage, the Coq7 can be isolated as a solid pellet, which can then be packed into a SSNMR rotor for the acquisition of spectra of Coq7. The next step will be the acquisition of a carbon-carbon 2D SSNMR spectrum.

## **The role of salinity in the evolution of reproductive isolation in the euryhaline killifish species *Lucania parva***

**Arthur Rudolph**, Senior, Integrative Biology, LAS

**Mentor:** Rebecca Fuller, Animal Biology, LAS

### **ABSTRACT**

The killifish species *Lucania parva* provides a useful model for examining ecological speciation due to its ability to survive along a broad environmental gradient. This research focuses on the effect that salinity has on reproductive isolation in *L. parva*. Previous work between *L. parva* and its sister species (*L. goodei*, a freshwater species) shows high levels of behavioral (prezygotic), extrinsic, and intrinsic genetic (postzygotic) isolation. Here, I targeted two populations of *L. parva*, one with a long-term history of high salinity (i.e., saltwater population from Florida) and another with a long-term history of low salinity (i.e., freshwater population from Texas). Heterospecific and conspecific crosses between individuals from freshwater and saltwater populations were created and examined for behavioral (prezygotic) isolation as well as for extrinsic and genetic (postzygotic) isolation. There was no evidence to indicate any development of prezygotic reproductive isolation. Animals readily mated with both conspecifics and heterospecifics. There was also little evidence to suggest that F1 hybrids had lower survival than either parental population for any of the life-history stages (egg survival, larval survival, survival to adulthood). In fact, survival to adulthood was higher for F1 hybrids than for the two conspecific crosses. Survival to adulthood was much lower in the high salinity treatment and this was particularly so for the conspecific freshwater crosses. These data suggest little reproductive isolation between the two populations, but does suggest that there has been local adaptation to salinity. Future work will investigate these life-history stages in the back-cross and F2 stages as a function of salinity.

## **N-cadherin deletion in POMC expressing cells leads to pituitary disorganization**

**Rachel Fiddler**, Senior, Biology, LAS

**Mentor:** Lori Raetzman, Molecular and Integrative Physiology, LAS

### **ABSTRACT**

Pituitary tumors are the fourth most common intracranial tumor in humans and can cause amenorrhea and infertility. Surprisingly, most of these tumors do not metastasize, indicating the pituitary tightly regulates its cell-cell interactions. Reduced expression of the cell adhesion molecule *N-cadherin* has been linked with the formation of pituitary tumors, but its role in normal pituitary gland physiology is unknown. We have recently uncovered that *N-cadherin* is expressed in the developing pituitary in a location that indicates it may play

a role in regulating movement of cells out of the proliferative zone into the anterior lobe, where they differentiate into hormone producing cells. In the adult, *N-cadherin* expression remains high in virtually all cells of the intermediate and anterior lobes. We hypothesize that *N-cadherin* acts as a critical link between pituitary cells, dictating not only pituitary shape, but also providing cell contact cues such as when to proliferate. By using a flox/cre system, we were able to selectively knock out the expression of *N-cadherin* in POMC expressing melanotrope and corticotrope cells of the intermediate and anterior lobes of the pituitary. We observe pituitary disorganization of the intermediate lobe of the pituitary by postnatal day 30 in the *N-cadherin* cKO mice. This disorganization of POMC positive cells in the intermediate lobe is accompanied by an increase in proliferation, as well as disorganization, of SOX2 positive stem cells. In the areas of *N-cadherin* loss,  $\alpha$ - and  $\beta$ -catenin are also significantly downregulated, which likely contribute to the changes in the morphology of the intermediate lobe that we observe. Taken together, our data reveal important roles of *N-cadherin* in pituitary cell movement and proliferation that are critical for pituitary organogenesis and homeostasis.

## **Wheel running exercise delays extinction of conditioned place preference for cocaine in male C57BL/6J mice in association with impaired exercise-induced adult hippocampal neurogenesis**

**Daniel Miller**, Junior, Psychology, LAS

**Mentor:** Justin Rhodes, Psychology, LAS

### **ABSTRACT**

The interaction between aerobic exercise and drug abuse is relatively unexplored. It deserves attention because recent data suggest that neuroadaptations from exercise promote learning in circuits that overlap with drug abuse. The hippocampus is an important point of intersection because it is a major locus for change from aerobic exercise and it plays a central role in contextual conditioning. Specifically, contextual cues paired with drugs trigger emotional responses related to craving and relapse. Growing evidence suggests that exercise can enhance plasticity in the hippocampus in part by growing new nerve cells in the dentate gyrus. This could promote brain health and could potentially be useful in treatment of drug abuse. On the other hand, drug exposure is known to decrease neurogenesis and the outcome when combined with exercise is not known. Male C57BL/6J mice (n=40), 7 weeks of age, were divided equally into two groups, treatment and control. Treatment animals received 10 cocaine place conditioning trials, 30 min each, immediately after intraperitoneal injections of 10 mg/kg cocaine or saline. Untreated control animals were similarly exposed to the place conditioning apparatus but did not receive injections. After conditioning, the animals were either left in their standard cages or were placed into cages with a running wheel for 30 days. The first 10 days animals received daily injections of bromodeoxyuridine (BrdU)



to label dividing cells. On day 25, animals received a final day of conditioning with cocaine or untreated for controls. On days 27-30 animals were tested for conditioned place preference, and then euthanized to measure adult hippocampal neurogenesis by immunohistochemical detection of BrdU and neuronal nuclear protein (NeuN). Running significantly delayed extinction of conditioned place preference for cocaine. Cocaine treated animals displayed similar levels of neurogenesis as compared to untreated animals in the sedentary condition but significantly reduced adult hippocampal neurogenesis in the runner condition. Results suggest that exercise can delay extinction of cocaine conditioned place preference and that this behavioral rigidity is associated with significantly reduced exercise-induced adult hippocampal neurogenesis in male C57BL/6J mice.

## **Session A.2: Negotiating Boundaries: Peace and Conflict (Illini Ballroom B)**

### **Ethnic conflict and resolution in South Tyrol, Italy**

**Megan Samelson**, Senior, International Studies, LAS

**Mentor:** John Vasquez, Political Science, LAS

#### **ABSTRACT**

This project focuses on the Italian region of South Tyrol and its ability to peacefully and efficiently resolve the problem of ethnic conflict in the twentieth century. Italy received South Tyrol from the United States after World War I for its support of the Allies. The region had previously been a part of Austria-Hungary, and was largely composed of ethnic Germans. The rise of Fascism and Benito Mussolini's partnership with Adolf Hitler implemented a harsh Italianization policy on South Tyroleans, and consequently, these German-speaking Austrians developed a grudge against ethnic Italians even after Mussolini's removal. Following the Second World War, the Austrians were granted special rights, but they remained a disadvantaged minority. This led to increased anti-Italian sentiment and terrorist attacks from the late 1950s throughout the 1980s. Ultimately, the pressure of terrorism caused the Italian central government to grant further privileges to the minority and, eventually, true autonomy in 1972. Given this context, the project will address the question of how this issue was resolved without any greater level of violence emerging, knowing that many cases of similar socio-cultural origins across the globe have led to war and wide-scale violence. Today, this territory constitutes one half of the region of Trentino-Alto Adige, which is now one of the most prosperous regions in Italy. This paper explores how it was possible for South Tyrol to avoid the danger of ethnic conflict and become so successful, analyzing the factors attributing to its independent status and drawing from the lessons of conflict resolution. Additionally, through a comparison of factors across other case studies of ethnic

conflict in recent world history, I draw conclusions from the mechanisms of successful conflict resolution as a means of generalizing this project and laying the groundwork for future research.

## **Territorial value in the Arab-Israeli conflict**

**Daniel Flesch**, Senior, Political Science and History

**Mentor:** John Vasquez, Political Science, LAS

### **ABSTRACT**

I look at the importance of the Sinai Peninsula within the Israel-Egypt dyad, Jerusalem within the Israel-Jordan dyad, and the Golan Heights within the Israel-Syria dyad. I begin with an understanding of conventional indicators of conflict. I then hone in on the concept of tangible and intangible territorial values, asking how are hostilities levels between countries conditioned by the kind of value they place on the disputed territory? My hypotheses focus on a country's perception of this value. Recognizing a territory's intangible benefit immediately infuses it with an indivisible quality. Intangible land cannot be partitioned. Another hypothesis recognizes that the territorial value can shift over time: what once started as a tangibly beneficial territory can be also acquire an intangible benefit. I hypothesize that if one or both antagonistic countries hold a territory to have intangible value, then conflict will be more severe and longer lasting. I analyze cases beginning in 1948 and ending in 2001, the latest date for the Correlates of Wars Militarized Interstate Dispute dataset. My three cases are across three dyads and each territory appears to hold different value than each other. Within the Arab-Israeli conflict, conflicts between Israel and Syria, Jordan and Egypt have always been over territory, thus making these case studies an ideal laboratory to test my hypotheses.

## **The Islamic State (Daulah Islamiyyah): Understanding the philosophy behind it in comparison to the western concept of nation-state**

**Mohd Shazani Masri**, Senior, Political Science and Economics, LAS

### **ABSTRACT**

Not too long ago, President Obama made a historic speech at one of the oldest and respected academic institution of learning in the Muslim World, the Al-Azhar University in Cairo, in his effort to reconcile the West and the Muslim World. As much as Obama's gleaming hope to reconcile the Muslim World and the West, the concept of an Islamic State or Daulah Islamiyyah, remains largely a mystery if not an antipathy to the West. What exactly is an Islamic State? What are the values and ideals behind it? From what sources do Muslim political thinkers draw their ideas and ideals in shaping the Islamic State? Is it just a political ideology or an ordained Divine creed? Are they variations of Islamic State? In what sense does an Islamic State similar or different than the Western concept of Nation-State? Are values and ideals envisaged in the Islamic State

incompatible with Western Democracy? This study attempts to shed some light in understanding the concept of an Islamic State and its philosophy by applying comparative analysis methodology between Islamic and Western political literature, both classical and modern. This study hypothesizes there are certain differences between Islamic and Western values and ideals regarding the nature, system, and functions of a State. However, this does not mean that ideological interchange and synergy between the two camps is impossible because there are similarities in universal values that can be a bridge to conciliate the two differing concepts. Perhaps by better understanding the concept of an Islamic State in comparison to the concept of a Nation-State, would provide a better understanding of how a "State" is defined and embraced in the Muslim World.

### **The insurgency paradox: Under what conditions do insurgencies end?**

**Kyle Farver**, Senior, Political Science, LAS, and Aerospace Engineering, ENG

**Mentor:** Paul Diehl, Political Science, LAS

#### **ABSTRACT**

Insurgencies are asymmetrical conflicts, which see an insurgent group engage in conflict against an incumbent government of a state within the territory of that state. While the incumbent government begins the conflict with significant advantages, the incumbent government does not always win, despite being much stronger than its opponent. The results of insurgencies are paradoxical. France was defeated by insurgents in Indochina and Algeria, while the United Kingdom defeated insurgents in Oman and Malaysia. To understand the internal dynamics which precipitate the outcomes of insurgencies, this study explored the question: under what conditions do insurgencies end? This study looked at the military capabilities of incumbent governments, external assistance provided to each side and the economic well being of the states population to determine how these variables correlated with insurgent victories, draws and incumbent government victories. Preliminary results show that incumbent government military strength is not as strong a predictor of insurgency outcomes as external assistance and economic well being. The results of this study have obvious policy implications for the United States ongoing wars in Iraq and Afghanistan.

## **Session A.3: The Sciences of Health (Illini Room C)**

### **Examining the predictors of alcohol and other drugs among adolescents**

**Domonique Malebranche**, Junior, Physiology, LAS

**Mentors:** Joshua Gulle, Psychology, LAS; Dorothy Espelage, Educational Psychology, EDU

## **ABSTRACT**

Adolescent substance use is an emergent public health problem. Substance use by American adolescents has proven to be a rapidly changing phenomenon, requiring frequent assessments and reassessments. A plethora of research has implicated a host of contextual influences (e.g., peers, family) on alcohol and other drug (AOD) use by adolescents. However, minimal research has examined these influences simultaneously. Furthermore, nominal emphasis has been placed on individual factors as a means of heightening vulnerability. This study addressed this gap by examining how familial settings and peers interact to predict AOD with a distinctive view on self-concept domains. Participants included 13,144 students (grades 9-12), consisting of 75% White (Non-Hispanic), with the remainder of Biracial, Asian, Black and Hispanic students from Dane County, Wisconsin. Participants completed the Dane County Youth Assessment 2005 including demographic variables and scales assessing parents, peers, self-concept, and AOD use. Students who gave their consent, and were not withdrawn from the study by their parents, completed the survey in a 40-minute session. We hypothesized that students with greater AOD use would be associated with less parental support and greater negative peer influence. Lower self-concept was also hypothesized to be associated with greater AOD. Self-concept was hypothesized to moderate the association between parental influences and AOD use. Study hypotheses examined analyses of variance and zero-order correlations.

## **An ecological analysis of food environments in the United States**

**Alyssa Morris**, Senior, Health Administration, AHS

**Beverly Allen**, Senior, Health Administration, AHS

**Eric Lorek**, Senior, Community Health, AHS

**Mentor:** Diana Grigsby-Toussaint, Kinesiology and Community Health, AHS

## **ABSTRACT**

**Background:** There is growing evidence that food environments influence dietary behaviors, and as a consequence, the risk of chronic conditions such as obesity. For example, some studies have found an association between increased risk for overweight and residence in neighborhoods with limited access to supermarkets. Few studies exploring food environments in the United States, however, explore both the availability of food stores and restaurants. In addition, utilization patterns of populations at high risk for diet-related conditions (e.g., individuals enrolled in food assistance programs), is rarely examined. **Purpose:** To explore a) the availability of food stores and restaurants across the United States, and to determine whether differences exist by region, and b) to explore the utilization patterns of individuals enrolled in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) across the United States, and to determine whether differences exist by region. **Methods:** Data from the United States Department of Agriculture (USDA) will

be used to explore characteristics of the food environment in the United States. Descriptive statistics (e.g., frequencies) will be used to describe the availability of grocery stores and fast food restaurants, as well as WIC utilization patterns across the United States and in the four census bureau designated regions (i.e., Northeast, Midwest, South, and West). Socio-demographic variables such as racial composition and income levels will also be summarized. Analyses will be conducted using the Statistical Package for the Social Sciences (SPSS) version 17.0. Public Health Implications: In order to design targeted interventions to improve the food environment in the United States, it is important to first identify areas that may make it difficult for individuals to eat healthfully.

## **Structural comparison of proteins from the H1N1 swine flu and other influenza strains**

**Tristesse Jones**, Senior, Crop Sciences, ACES

**Mentor:** Wayne Anderson, Molecular Pharmacology and Biological Chemistry, Northwestern University

### **ABSTRACT**

The 2009 outbreak of H1N1 Swine flu was declared a global pandemic by the World Health Organization. Furthermore, the molecular basis for the behavior of this strain still remains unresolved. Currently, there is little structural information available for the essential eight proteins encoded by the virus. The importance of variations in the genome of this novel H1N1 strain of influenza will be more understandable when viewed in the context of the three dimensional structures of the influenza proteins. This information can lead to expanding our knowledge of the peculiar characteristics of this H1N1 strain. A research comparison was conducted in examining the 2009 strain of H1N1 to two other influenza strains. In silico homology based models of majority of the proteins was conducted and examined. Only the nonstructural protein (NS1) protein model was compared to protein structures of previous strains, H5N1 and H3N2 due to a time constraint. We identified conserved and non-conserved regions in the proteins that can be related to its characteristics, the basis of its virulence and its propensity to drug resistance. Eight major amino acid differences were noted and out of those eight, seven were on the surface. Also, the differences identified in this research may have an effect on the protein function however, since there is little information available about this protein, the role of the residues that are important for the function of the cell cannot be predicted. In the future we plan to continue to examine the other proteins that were modeled and examine the results that were found. We are also planning to perform X-ray crystallography to obtain experimental data and results.

## **Development and optimization of consumer-friendly DNAzyme sensor kits for lead and uranium**

**Julia Willett**, Senior, Biochemistry and Human Nutrition, LAS

**Mentor:** Yi Lu, Chemistry, LAS

### **ABSTRACT**

When ingested, lead and uranium cations can be highly toxic and pose a serious threat to human health. While the use of lead pipes has been largely discontinued in the United States, leaching from soldering materials or brass pipes can raise the lead concentration in drinking water to an unsafe level. Uranium is a naturally-occurring radionuclide in the environment, but the enrichment of this element for nuclear power and weapons increases the potential for the accumulation of unsafe levels of uranium in environmental water sources. As a result, it is imperative to create accurate, affordable methods for testing the levels of lead and uranium in drinking water or other environmental samples. However, available techniques that can quantify the concentration of either metal are either too expensive or unreliable for practical use by the general public, so the development of an alternative detection system is paramount for both household and environmental testing. Using innovative DNAzyme catalytic beacon technology, we have developed testing kits for lead and uranium in liquid samples. These kits require minimal materials and can be performed with a hand-held fluorimeter, making them ideal for on-site analysis. Furthermore, the dynamic range of the tests can be tuned to match the maximum concentrations of lead and uranium as defined by the Environmental Protection Agency. DNAzyme-based testing kits for uranium and lead can be used for quick, reliable environmental detection of these toxic metal ions without the need for laboratory-scale equipment or lengthy diagnostic tests.

## **Session A.4: Human Behavior and Health Outcomes I (General Lounge, Room 210)**

### **Mapping the way to better healthcare**

**Nina Bryan**, Junior, Community Health, AHS

**Kevin Fritz**, Senior, Community Health, AHS

**Stephanie Shaw**, Senior, Community Health, AHS

**Faiza Yasin**, Senior, Molecular and Cellular Biology, LAS

**Mentor:** Stephen Notaro, Kinesiology and Community Health, AHS

### **ABSTRACT**

Mapping the Way to Better Healthcare is an analysis of the clients who use the Champaign County Christian Health Center. By looking at their visitation reasons, as well as other health indicators recorded in their medical records (patients

blood pressure and Body Mass Index), we can determine what the needs of this uninsured population are, and how to better serve them. Findings include a significantly high rate of depression and mental health issues in the Champaign area. The rates of cases of depression seen at the Champaign County Christian Health Center are much higher than what is seen at both the state and national levels. With this knowledge, partnered with the geographic location of the clients acquired through Geographic Information Systems (GIS), we aim to identify the areas in the community with the most need. The maps we have created show density of certain conditions throughout the community, as well as distance travelled by each client to the clinic. Mapping out certain health indicators along with community attributes, for example overweight patients shown in relation to local fast food restaurants, will allow us to show possible relations between the environment and health outcomes. Our analysis will lead to interventions to improve the health of the residents of Champaign County.

## **Session A.5: Climate and Conflict (Room 209)**

### **Climate and conflict?: An examination of climate change influence on societies through event based coding**

**Max Knierim**, Junior, Political Science and English, LAS

**Alex Sapone**, Senior, Economics, LAS

**Michael Slana**, Senior, Political Science, LAS

**Political Science 499A: Climate Change and Societal Stability**

**Mentor:** Ajay Singh, Political Science, LAS

#### **ABSTRACT**

The research examines the extent to which climate change affects societal stability. An evaluation of the literature in the field suggests limited empirical data on the impact of climactic events on societies. Most research in the area of climate change and societal stability relies heavily on prediction models and theoretical assumptions. While this information provides a detailed framework of understanding for academics, a more empirical analysis is needed to objectively show the relationship between climate change and societal stability. This approach involves a randomly generated, case-by-case analysis of the impact of climate change on the stability of a particular society. We use a comparative analysis to identify changes in intensity eighteen months before and after the climactic event. We measure intensity through indicators such as politically motivated attacks, political power reconfigurations, storms, floods, droughts, number of people killed and number of protestors amongst others. The data for this venture involves news articles from contemporary news sources such as the *New York Times* and the *Wall Street Journal*, in addition to the Summary

World Broadcast, a compilation of localized news sources. Unlike other research that relies heavily on computer generated coding, our approach uses humans to analyze the events contained within a particular news article. Human coders allow us to identify more detailed information on initiators, targets, context, and reactions to destabilizing acts that computer-based event analyses fail to capture. The project intends to show an empirically based picture of the role climate change plays on society.

## **B Sessions, 11:00 a.m.-Noon**

### **Session B.1: Life Sciences II (Illini Room A)**

#### **Towards improving bioenergy crops: A comparison of photosynthetic rates and cold tolerance in *Miscanthus***

**Adrienne Perkins**, Senior, Integrative Biology Honors, LAS

**Mentor:** Stephen Long, Plant Biology, LAS

#### **ABSTRACT**

In recent years the problem of global climate change has gained international attention due to the increase in atmospheric CO<sub>2</sub> caused by anthropogenic influences and the burning of fossil fuels. Since the 1970s, the potential of biomass energy as a carbon neutral and sustainable source of energy has been recognized. My research explores photosynthetic CO<sub>2</sub> fixation and cold tolerance as criteria for potential biomass productivity in *Miscanthus*, a biofuel crop. *Miscanthus x giganteus* is a sterile hybrid between *Miscanthus sinensis* and *Miscanthus sacchariflorus*. Perhaps the most important feature of *Miscanthus* is its high yield potential. *Miscanthus x giganteus* is highly productive, in part due to its C<sub>4</sub> photosynthetic pathway. However, most C<sub>4</sub> species including maize, sugarcane, and some species of *Miscanthus*, are native to the tropics, and are sensitive to low temperatures. Recent studies have is able to maintain high levels of photosynthesis at chilling temperatures because it can maintain and increase levels of pyruvate orthophosphate (Pi) dikinase (PPDK), a rate limiting enzyme in the C<sub>4</sub> pathway. Maize shows the opposite reaction. PPDK exponentially declines with exposure to chilling temperatures, effectively shortening its growing season. Nevertheless, as a sterile hybrid *Miscanthus x giganteus* cannot be improved through selective breeding. Therefore new sterile hybrids must be created. In this project, I compared photosynthetic rates with PPDK activity in nine *Miscanthus* germplasms to look for varieties that have concomitant photosynthetic capacity and cold tolerance. I took photosynthesis measurements (LI-6400) and assayed for PPDK concentration in both field grown plants and plants I grew at 25/20C and 14/12 C. The PPDK activities and photosynthetic rates are in the process of being compared and statistically analyzed to determine whether PPDK activity is relatable to photosynthetic rate.



The results will then be used to make suggestions about *Miscanthus* varieties as candidates for future breeding programs.

## **Forest soil sampling for soil organic carbon and charcoal**

**Caleb Brown**, Senior, Forest Science, ACES

**Mentor:** Jay C. Hayek, Natural Resources and Environmental Sciences, ACES

### **ABSTRACT**

Due to heightened interest in environmental change and global carbon cycles, researchers in the Department of Natural Resources and Environmental Sciences are examining the spatiotemporal distribution of soil organic carbon (SOC), charcoal (a recalcitrant form of SOC), and biomass in hardwood forests of southern Illinois. Various methods exist to measure, quantify, and provide scaled-up estimates of SOC across various land cover types and land use. Exactly how much SOC resides in our forests and the transient nature of this significant carbon pool is of particular interest to researchers and government agencies. This study attempts to measure SOC dynamics across aspect, topographic position, percent slope, forest composition, and site history. The study area is located in southern Illinois, Union County, on the 5,100-acre Trail of Tears State Forest. Our experimental design consisted of 20 randomly selected transects: 10 north-facing aspects and 10 south facing aspects. Four one-meter soil cores were extracted from five topographic positions along each transect: summit, shoulder, backslope, footslope, and toeslope. Site and vegetation data were collected using a TDS Nomad handheld PC with integrated GPS. Soil samples are being analyzed for total organic carbon, nitrogen, and charcoal; standard fertility including micronutrients; pH; and soil texture. In addition, <sup>14</sup>Carbon and <sup>137</sup>Cesium isotope analyses will be conducted to reconstruct a historic fire regime and to examine carbon redistribution phenomena due to erosion, respectively. The purpose of this study is multi-fold: (i) quantify SOC and charcoal at soil depths 0-100 cm, (ii) examine aspect, topographic position, and percent-slope effects on SOC distribution, (iii) examine redistribution of SOC via <sup>137</sup>Cesium analysis, (iv) carbon date the charcoal to reconstruct historic fire regimes in the forests of southern Illinois, (v) compare *in situ* field data to extrapolated data sets, and (vi) quantify above- and below-ground forest biomass.

## **The development of polymorphic simple sequence repeats (SSRs) for use in DNA fingerprinting of *Miscanthus***

**Arthur Rudolph**, Senior, Integrative Biology, LAS

### **ABSTRACT**

In recent years, there has been a surge of interest in the use of cellulosic feedstocks in biofuel production. Sugarcane (*Saccharum*), switchgrass (*Panicum virgatum*),

and *Miscanthus giganteus* are all of interest for this purpose. Sugarcane, already used for ethanol production because of its high sugar content, can only be grown in tropical regions, leaving *M. giganteus* as a leading candidate for cellulosic biofuel due to its incredible biomass production capabilities. *M. giganteus* is a naturally occurring sterile hybrid of the putative parents *Miscanthus sinensis* and *Miscanthus sacchariflorus*. *Sinensis* and *sacchariflorus* are commonly used as ornamentals in horticulture. It would be useful for biofuel production if this cross could be recreated, maintaining the biomass production capability while allowing for sexual reproduction. While there have been many cultivars of *M. sinensis* and *M. sacchariflorus* characterized, these characterizations are not sufficient to differentiate the genetic variation of these lineages. The goal of this research is to generate polymorphic simple sequence repeats (SSRs) for use in DNA fingerprinting of *Miscanthus*. Sugarcane and *Miscanthus* are closely related, which has allowed for the SSR markers used for the discovery of polymorphic SSRs in sugarcane to also be used in *Miscanthus*. The polymorphic markers generated can be used for the differentiation of *Miscanthus* lineages and may be used in the creation a genetic map of the *Miscanthus* genome, which would facilitate the creation of a fertile *M. giganteus*.

## **Session B.2: Engineering Sciences I (Illini Room B)**

### **Plasma metastable density measurements: Plasma assisted cleaning by metastable atom neutralization (PACMAN)**

**Ivory Hill**, Junior, Nuclear, Plasma and Radiological Engineering, ENG

**Mentor:** Wayne Lytle, Nuclear, Plasma, and Radiological Engineering, ENG

#### **ABSTRACT**

As the use of extreme ultraviolet lithography (EUVL) in integrated circuit (IC) manufacturing progresses, the issue of cleanliness of the photomask used to print the chips is a remaining critical issue. Current methods of cleaning the photomasks include using wet cleaning processes such as standard clean 2 (SC2) and sulfuric acid-hydrogen peroxide mixture (SPMs). These techniques are unknown in their effectiveness of cleaning contaminants on the order of 30nm and take a significant amount of time to perform. Plasma Assisted Cleaning by Metastable Atom Neutralization (PACMAN) research, at the Center for Plasma-Material Interactions (CPMI) at the University of Illinois at Urbana-Champaign has shown great progress in removing 30nm-500nm nanoparticles with helium plasma and helium metastables. PACMAN is also less time intensive compared to SC2 and SPMs methods since it is a dry-plasma based method. Also, the PACMAN process is ideal in that the lithographic mask would not have to be taken out of vacuum and exposed to further contamination to be cleaned as it

would with SC2 and SPMs cleaning. Because PACMAN uses helium plasma and helium metastables to clean the nanoparticles, the density of helium metastables in helium plasma must be measured because the metastables present do the actual cleaning of the nanoparticles. To measure the density of metastables in plasma, the CPMI has designed a metastable density probe. By applying a positive and negative bias and having a shadow-casting shield on the probe, electrons, protons, and high energy photons will be repelled from the probe leaving only the metastables to be measured because they are neutral (have no charge). With the use of this probe and measuring of the metastable density during experimentation, the PACMAN cleaning technique can progress in its ability to clean nanoparticles with the knowledge of how many metastables are present in different types of plasma. The research on the metastable density probe at the CPMI is still in progress and is highly anticipated to further improve PACMAN cleaning and research upon its completion.

## **Electrode surface conditions and coatings affecting vacuum breakdown**

**John Kionka**, Junior, Political Science, LAS

**Mentor:** Randolph Flauta, Nuclear, Plasma and Radiological Engineering, ENG

### **ABSTRACT**

The conditions affecting the breakdown behavior of electrodes under vacuum has been investigated. Initially, using a uniform-field broad area Cu electrodes, damage to electrode surface were evident caused by the uncontrolled arcs that occurred during breakdown with energies that ranged from 0.5 to 15.62 kJ. Breakdown marks are characterized by melted features which in some cases originate from the grain boundaries but did not exhibit consistent feature, sizes and location. The breakdown fields also showed unpredictable patterns with electric fields varying from as low as 8.53 to 172 MV/m even if the electrodes were prepared similarly and the vacuum processing conditions were kept constant. Varying the macroscopic surface roughness with a non-uniform field (different-shaped electrodes) did not indicate discernable breakdown pattern as the electric field values ranged from 19-80 MV/m although the electrode damage was seen to be mostly concentrated on the central area of the electrode. Using a hemispherical Cu cathode and flat Al anode and replicated with the same operating vacuum process conditions prior to breakdown, the electric field values ranged from 15-70 MV/m. The induced initial current oscillation lasted for 1-1.5 s with a maximum current emission of up to 400 A. Subsequent results from Ta-coated Cu electrodes by sputtering, however, revealed more consistent breakdown behavior with lower emission current ~ 100 A and higher electric field average of 63 8.5 MV/m than with uncoated Cu with electric field average of 41.7 19.0 MV/m.

## **Leveraging social networks for creative design**

**Christina Poon**, Senior, Electrical Engineering, ENG

**Aarti Israni**, Junior, General Engineering, ENG

**Mentor:** Scarlett Herring, Industrial and Enterprise Systems Engineering, ENG

### **ABSTRACT**

Creative design, although oftentimes regarded as an enigmatic artistic endeavor, can be investigated with a technical lens. Previous studies demonstrate that the design process entails a specific set of stages that result in an end-user product. Ideation, or idea generation, is a pivotal stage in this process. Design examples are often utilized during the ideation process. The term example means any material, product, prototype, or artifact that contributes directly or indirectly to a design. In our previous study we learned that designers use examples to re-appropriate aspects as well as to draw associations, discover trends, and understand different perspectives. The best examples induce divergent thought which improves the creativity of the end product. Although examples are readily available via the internet, designers often employ the help of friends and colleagues to provide examples and feedback. The goal of our current study is to understand how, and to what extent, this collaboration aids in ideation. Collaboration is defined as working with another individual to actively generate ideas. We believe this collective generation of ideas produces higher quality designs by reducing the creativity-limiting effects of fixation. We conducted a survey of industrial designers to understand specific collaborative points. By analyzing current example-requesting procedures (who, why, etc.), we were able to understand the utility of social networks in finding effective examples and draw comparisons to the individual search process. In studying creative professionals, we can better assess the bottlenecks designers face in the design process. The end goal of this project is to outline ways in which design tools can be adapted or created to better support this process. We hope our research will inspire future work in creating computer-based tools that better aid the creative process.

## **Free radical initiated self-healing materials**

**Patrick McIntire**, Senior, Economics, LAS

**Mentor:** Jeffrey S. Moore, Chemistry, LAS

### **ABSTRACT**

The goal of our research is to create a self-healing material that can restore the original mechanical properties to materials that have been damaged. Vinyl polymers such as poly(methyl methacrylate) or PMMA and epoxy vinyl ester (EVE) are common polymers and have been extensively studied for use in bone cement and coatings, respectively. These materials are polymerized via a free radical mechanism that will be initiated in the presence of three components: monomers with acrylate/vinyl functionality, a free radical initiator (commonly peroxides), and an accelerant with tertiary amine functionality. A variety of

monomers, initiators, and accelerants were screened. A free radical initiated, self-healing polymer requires the three components to be compartmentalized in urea-formaldehyde microcapsules and incorporated into the resin prior to matrix polymerization. After initiation of mechanical damage to the polymer matrix, the microcapsules rupture to release healing solution into the crack plane. After subsequent polymerization of solution, the new polymer bonds cracked faces of the damaged area, restoring toughness to the material. We developed a two capsule system for EVE polymers, in which one capsule contains the initiator in solvent, and the other is composed of a mixture of acrylate monomers and the accelerant in solvent. Healing efficiencies of up to 69% (recovery of fracture toughness) have been reported to date.

## **Physical and chemical erosion studies of lithiated ATJ graphite**

**David Burns**, Senior, Nuclear, Plasma, and Radiological Engineering, ENG

**Mentor:** David Ruzic, Nuclear, Plasma, and Radiological Engineering, ENG

### **ABSTRACT**

Lithium evaporation treatments for ATJ graphite tiles of diverter regions in the National Spherical Torus Experiment (NSTX) have shown dramatic improvements in plasma performance increasing the viability of Lithium as Plasma facing Component (PFC) material. ATJ graphite tiles are used in NSTX, and the addition of Li makes the issues of physical and chemical erosion mechanisms complex. In support of the NSTX mission and to understand the complex behavior of lithiated ATJ graphite, studies of physical and chemical erosion and thermal evaporation of plain and lithiated ATJ graphite are conducted in the Ion Surface InterAction eXperiment (IIAX) facility at the University of Illinois at Urbana-Champaign. The physical erosion due to sputtering is measured using a Quartz Crystal Microbalance (QCM), which records the rate of sputtered material when the graphite target is bombarded by Li ions with energies ranging from 700 eV-2000 eV. The typical flux of the Li ion beam obtained is  $\sim 4 \times 10^{13}$  ions/( $\text{cm}^2\text{-s}$ ). Since Li is known to sputter as ions, ionization fraction measurements were performed. For 2000 eV Li ion beam sputtering of lithiated graphite, the ionization fraction was found to be  $30\% \pm 6\%$ . In addition, graphite is known to erode chemically and the effect of adding lithium to graphite is being investigated. For this, lithium is evaporated in-situ onto ATJ graphite and chemical erosion measurements are performed using a Residual Gas Analyzer (RGA) in order to detect carbon contaminated species. Also, in IIAX, the target is mounted on a substrate heater and temperature-dependent measurements are taken, including the thermal evaporation rates of plain and lithiated ATJ graphite. This characteristic is measured using the QCM as the graphite target is heated to temperatures up to 500°C. (D. Burns, V. Surla, M. J. Neumann, and D. N. Ruzic. Center for Plasma-Material Interactions, Department of Nuclear, Plasma, and Radiological Engineering, University of Illinois at Urbana-Champaign, Urbana, IL 61801, USA.)

## **Session B.3: Health and Wellness (Illini Room C)**

### **Vicious cycle of disease and disability: Protein-energy malnutrition and its association with physical function, bone health, and quality of life in hemodialysis patients**

**Stephanie Chirillo**, Senior, Kinesiology, AHS

**Mentor:** Emily Tomayko, Food Science and Human Nutrition

**Mentor:** Kenneth Wilund, Kinesiology and Community Health

#### **ABSTRACT**

Chronic kidney disease (CKD) patients receiving hemodialysis treatment suffer from a variety of co-morbid diseases, many of which may be mechanistically linked. Protein-energy malnutrition is commonly observed in hemodialysis patients, for reasons including poor nutrient intake, physical illnesses affecting gastrointestinal function, protein losses during dialysis, and elevated whole body and skeletal muscle protein catabolism that occurs during dialysis treatment. Protein malnutrition is associated with a loss of lean mass and declines in physical function in hemodialysis patients. These functional declines reduce physical activity levels, which exacerbates the development of co-morbidities such as bone disorders and cardiovascular disease. This cycle of disease and disability greatly reduces the quality of life (QOL) and increases mortality rates in hemodialysis patients. The relationship between protein-energy intake, body composition, physical functioning and QOL in dialysis patients is unclear. Using correlation analysis, this study will examine the relationship between protein intake, energy intake, physical functioning, QOL, and bone health in 10 individuals undergoing hemodialysis treatment. Protein-energy intake on dialysis treatment days will be compared to non-dialysis treatment days and evaluated. Dietary intake will be assessed by 24-hour dietary recall on both dialysis and non-dialysis days, collected using the USDA 5-pass method, and analyzed with Nutritionist Pro. Body composition, specifically total fat mass, lean mass, and bone mineral density (BMD), will be measured by dual X-ray absorptiometry, physical functioning by a battery of functional fitness tests, and QOL by validated questionnaires. This study will help identify factors that may contribute to the co-morbidities in CKD patients.

### **An undergraduate student-run mobile screening clinic for the uninsured in Champaign County, Illinois**

**Grant Reed**, Senior, Molecular and Cellular Biology, LAS

**Kunal Patel**, BS Dec. '09, Molecular and Cellular Biology, LAS

**Mentor:** Stephen Notaro, Kinesiology and Community Health, AHS

## **ABSTRACT**

It has been shown that student-run health services can be beneficial to community health and wellness. However, there is a dearth of articles that describe these student health organizations in detail, especially at the undergraduate level. Therefore, this retrospective study will provide a detailed example of such an organization called the Illini Medical Screening Society (IMSS), a registered student organization at the University of Illinois at Urbana-Champaign. IMSS is a student-run mobile health clinic that provides a free medical screening service to the uninsured and low-income citizens of Champaign County. Established in July of 2008, IMSS has evaluated 257 individuals for hypertension, diabetes, and hyperlipidemia through basic fingerstick lab tests. Each screening event was established and operated by undergraduate pre-health students, funded by a local non-profit hospital, and supervised by licensed healthcare professionals. This study will present the founding and operational aspects of IMSS as well as develop a model for a student-run screening organization at the undergraduate level. An analysis of IMSS's client demographics will be provided to assess the organization's ability to identify a population which is at higher risk for major silent diseases. Clientele data was recorded from voluntary, non-identifiable survey responses during IMSS screening events from November 2008 to February 2010. Ultimately, the results of this study will support the role of undergraduate volunteers in assisting an underserved, low-income, or uninsured community. However, the study may also be used as a model for a sustainable, low-budget, student-run screening service so that other university student groups may replicate a similar service in their geographic area.

## **School performance and wellness analysis of orphans and vulnerable children in Nyando District of Kenya**

**Daniel Brencic**, Senior, Community Health, AHS

**Mentor:** Stephen Notaro, Kinesiology and Community Health, AHS

## **ABSTRACT**

School Performance and Wellness Analysis of Orphans and Vulnerable Children in Nyando District of Kenya is an analysis of orphans and vulnerable children in a rural community in western Kenya. Over the course of two months, the height and weight of the children were measured to calculate Body Mass Index in order to determine if the children were underweight or malnourished. The research sought to evaluate whether children were benefiting from the school feeding center by gaining weight compared to the children in the control group who were receiving no assistance. Qualitative data was acquired to assess academic performance and school attendance of the children in the two groups. The research sought to analyze if the feeding center was having a positive impact on the school attendance rates and subsequently school performance. In conjunction with this research, household surveys were also conducted with the guardians of the children to ascertain levels of health literacy and overall living situation. The household surveys were conducted with the assistance of community health

workers in the preferred language of the guardian; English or Dholuo, the local tribal language. In this region where the HIV prevalence is approximately 30%, results of the survey show that more than half of the guardians with children in the feeding center were unaware of their HIV status. Findings indicate that initiatives have only been minimally effective in accurately educating people about HIV transmission. Common responses illustrated beliefs about curses, myths and the stigma associated with HIV/AIDS. Another concern addressed was that less than 1/3 of the families surveyed in this malaria endemic region regularly use mosquito nets. This research depicts the challenges of life in a developing country and evaluates the efficacy of programs to alleviate poverty.

## **Estimating the cost of emergency department overutilization by the uninsured**

**Glenn Dickey**, Senior, Economics, LAS

**Mentor:** Stephen Notaro, Kinesiology and Community Health, AHS

### **ABSTRACT**

The debate surrounding 46 million Americans' lack of access to health insurance has been a major force shaping the current political landscape. Its significance is warranted. Without health insurance, the majority of these uninsured are left without a means of attaining primary care. Out of necessity, they turn to hospital emergency departments for the provision of non-urgent care due to requirements that these departments treat all patients who present. The results are staggering; uninsured patients utilize hospital emergency departments far more (3 to 4 times more) than an insured comparison group, for care that tends to be best suited for a primary care provider. The excess provision of this non-urgent care, along with a tendency for uninsured patients to present a more advanced form of disease, puts a significant financial strain on emergency departments. A visit-to-visit comparison of emergency department charges for the uninsured and insured populations fails to illustrate the significance of excess costs. When this study is able to take into account the usage differences between these populations, it observes excess costs that begin to reach into the tens of billions of dollars each year. This is a potential savings with the ability to be captured if the utilization and charges for these populations could be equated. More importantly, it is an impact that is significant enough to warrant a closer look at how care is provided to America's uninsured population.



## **Session B.4: Communication and Media Studies (General Lounge, Room 210)**

### **I want to be a princess, too: Exploring the blackout of Disney's princesses and controversies surrounding *The Princess and the Frog* and its effects on African American girls**

**Lena Foote**, Senior, Media Studies, MDIA

**Mentor:** Ruth Nicole Brown, Gender and Women's Studies, LAS

#### **ABSTRACT**

Disney's impact on children's lives is a critical issue in Media Studies and Sociology. Children of color, especially African American girls and darker-toned girls, cannot racially identify with Cinderella, Snow White, Belle, Princess Aurora, and Ariel because these princesses are not African American; therefore, when these girls see their reflection in the mirror, they do not see a white princess, but someone of color. Although children are able to relate cross-culturally with the white princesses and princesses of color (i.e., Pocahontas and Princess Jasmine), it is necessary for African American girls to have a princess that resembles them physically. In general, the media plays a huge part in how girls view themselves; therefore, if African American girls are not represented within the Disney Princesses, it affects their level of self-worth and importance. In December 2009, Disney released the highly anticipated movie, *The Princess and the Frog*, featuring Disney's first African American princess. However, there have been multiple discussions regarding the controversies about the ways race, gender, and class dynamics are represented in the movie. In this research paper, the following characters are analyzed: Esmeralda from *The Hunchback of Notre Dame*, the girls from *The Cheetah Girls*, and the muses from *Hercules* in order to explore how Disney has previously portrayed African American females and darker-toned females in their films. This is done in order to frame the analysis of the discussion of race and gender in *The Princess and the Frog*. My findings strongly suggest that the portrayal of racist and sexist stereotypes is still an issue for the Disney Corporation despite the social advances African Americans have had since Disney's first movie, *Snow White*, was released in 1937. More practically, this analysis suggests that African American girls and darker-toned girls deserve to have a Disney princess that they recognize as meaningful and significant.

### **Framing mama: The representation of African American mothers in TV comedies from *Good Times* to *The House of Payne***

**Ashley Stone**, Junior, Communications, LAS

**Mentor:** William E. Berry, Advertising, MDIA

## **ABSTRACT**

This study examines the representation of African American mothers in television comedies from 1969 to 2009. By analyzing general audience television shows such as *Julia*, *Good Times*, *The Fresh Prince of Bel-Air*, *Everybody Hates Chris*, and *The House of Payne*, this research documents the progression of the presentation, representation, and, as some scholars have contended, the misrepresentation of Black mothers in the entertainment media. The study found that while earlier shows depicted mothers primarily, prominently and significantly as domestic homemakers, later shows should represent them in diverse depictions, including as career and professional women. The research also illuminated the influence of economic and social class as factors in the representation and framing of the African American mother.

## **If hip hop had a daughter: African American girls' everyday use of hip hop imagery and flow storytelling**

**Porshe Garner**, Senior, Psychology, LAS

**Mentor:** Ruth Nicole Brown, Gender and Women's Studies, LAS

## **ABSTRACT**

To determine how African American girls read and interpret hip-hop, I conducted an ethnography of Saving Our Lives, Hear Our Truths (SOLHOT) Summer. SOLHOT is a space where Black girls and women (ages 10-42) come together to celebrate who they are and takes place in a Midwestern university community. As a participant observer in SOLHOT, I constructed three specific interactive prompts that enabled a discussion about popular hip-hop imagery, representations, and rap lyrics. Documenting prompts in context of SOLHOT and analyzing the responses of 17 participants to the prompts, several key insights emerged. My findings suggest that Black girls think about hip hop in complicated ways, resist unidimensional characterizations of Black womanhood and girlhood in commercial hip-hop, and articulate alternative readings of hip hop imagery that too often remain out of academic and popular hip-hop discourse. In their everyday lives, Black girls do not just consume hip-hop. They do hip hop as characterized in the concept I name Flow Storytelling that defines and explains the specific ways Black girls tell stories, evaluate images, and create new images in their own words.

## **Session B.5: Health Behavior and Health Outcomes II (Room 209)**

### **Healthcare without a home**

**Megan Eiten**, Senior, Community Health, AHS

**Michelle Hochwert**, Senior, Community Health, AHS

**Raahat Ansari**, Senior, Community Health, AHS

## **ABSTRACT**

Healthcare without a home is an analysis of the clients at the Champaign County Christian Health Center who have been identified through their reported addresses as homeless. This consists of people listing such places as the Times Center, the Salvation Army, and various churches in the area as their home address. The analysis consists of health indicators of the homeless clients, such as client blood pressure and Body Mass Index, as compared to the average numbers seen in all of the other clients in the clinic. All of the clients who use the Champaign County Christian Health Center must be uninsured to qualify, but this analysis aims to determine what effect the extra stress of being homeless has on health outcomes. Also in this presentation is an analysis of the social service needs of all of the clients at the clinic. The most requested needs within the community have been put on a map using Geographic Information Systems (GIS) to spatially analyze where the reported needs are, and if and where these people have access to support. By utilizing GIS software, we can determine where unmet needs are and propose interventions within the community. The goal of this analysis is to locate and propose a way to meet the needs of the clients. By doing so, we hope to eliminate stress in their lives, and ultimately improve their health conditions.

## **Featured Session (Illini Room B)**

### **Optimization of virus removal through the use of iron-amended biosand filters for use in Socorro, Guatemala**

Presentation by

**Alicia Chuchro**, Freshman, Civil and Environmental Engineering, ENG

**Saichaitanya Kalidindi**, Freshman, Mechanical Engineering, ENG

**Sheila D. Markazi**, Senior, Civil and Environmental Engineering, ENG

**Kimberly Parker**, Junior, Civil and Environmental Engineering, ENG

**Anjali Patel**, Junior, Civil and Environmental Engineering, ENG

**Anthony Straub**, Junior, Civil and Environmental Engineering, ENG

**Vijesh Tanna**, Freshman, Materials Science and Engineering, ENG

**Mentor:** T. H. Nguyen, Civil and Environmental Engineering, ENG

## **ABSTRACT**

In 2007, the community of Socorro, Guatemala, approached the UIUC chapter of Engineers Without Borders (EWB-UIUC) with a request for a water treatment system. After multiple visits to the community, it was determined that a point-of-use treatment system would best serve the community. With the assistance of EWB-UIUC, the community of Socorro is currently implementing approximately 150 biosand filters. Of the 300,000 biosand filters in the world, which demonstrate effective removal of bacteria and helminthes, none provide acceptable virus removal. To remedy this, the addition of zero-valent iron into

the sand media of the filter has been proposed as an effective, sustainable solution. The EWB-UIUC Guatemala Water Project focuses on the development of iron-amended biosand filters, with the goal of increasing efficacy of virus removal in a practical manner. Initial results on small-scale columns indicate that sand columns yielded about 70% removal, whereas iron-amended columns yielded about 99.999-99.9999% removal. Presently, full-scale testing is being conducted to determine the effect of zero-valent iron on the removal of bacteria and viruses. Additionally, research is underway on practical materials (such as nails, steel wool, and iron fillings), in the form of cartridges as a final form of filtration added to the end of the filter. Water quality parameters, including pH, oxygen content, and turbidity, are closely monitored to insure that the iron does not leach into the effluent. Further research areas include alternative designs of biosand filters, variations in frequency of use, and other additions to the filter media. This is the first comprehensive study of iron-amended biosand filters: from small-scale columns to full-scale filters. The results of this research will allow for the improvements of biosand filters worldwide, and will encourage the implementation of biosand filters in areas of the world where viruses are seen as a serious and daily threat.

**C Sessions, 1:30-2:30 p.m.**

## **Session C.1: Interpreting Identity, Activism, and Change (Illini Room A)**

### **Then and now: Latino Greeks assess their social activism**

**Daissy Dominguez**, Senior, Political Science, LAS

**Mentors:** Alicia Rodriguez, Latino/Latina Studies, LAS; Veronica Kann, Inclusion and Intercultural Relations, Student Affairs

#### **ABSTRACT**

This research is focused on analyzing Latino Greeks on campus throughout history and assessing their social activism. I analyzed: (a) why Latino/as sought out the structure of the Greek system; (b) the struggle within Latino/a Greek organizations to either be social or political; (c) the purpose Latino/a Greek organizations serve on this campus and whether they are fulfilling their purpose. I also analyzed perceptions about Latino Greeks on this campus. After analyzing Latino/a Greeks for an entire year I have assessed that Latino Greeks throughout time have had difficulties expressing their full potential but, nonetheless, as individuals and as organizations have made contributions to the students at the University of Illinois. But there is still much room for improvement, so the questions now are many. What now? What are the next steps for Latino

Greeks? How do we continue to progress? We must first critically analyze our own organization. The next step after strengthening chapters and enhancing the quality of activism is to build unity within all Latino Greeks. After building a unified Latino Greek system, we must bridge the gaps between Latino Greeks and non-Greek Latino organizations. My intentions for this research are: to first help educate the campus about the history behind Latino Greeks; to provide an assessment of the benefits that Latino Greeks have provided and continue to provide to students at this institution; to encourage Latino Greeks to critically assess themselves and promote growth among Latino Greeks; and to build unity among Latinos on campus that will create a stronger voice and force that will better serve students and our communities. Through my research I hope to create more awareness about Latino Greeks and help student understand Latino/a Greeks but also encourage Latino/a Greeks to critically assess themselves and continue to provide service to our campus.

## **Sisterhood shaping adulthood: How sororities influence girls' adult life**

**Rosie Mellor**, Junior, Anthropology, LAS

**Mentor:** Alma Gottlieb, Anthropology

### **ABSTRACT**

In this presentation I discuss research I conducted on the values and behaviors that college sororities teach and encourage in young women. I hypothesized that sororities significantly influence young women's behavior and values, both while they are active members in college and as they embark on adult life after graduation. Following this hypothesis, my research posed two questions: 1) (How) do sororities influence young women's values and behaviors while they are college students? and 2) (How) do these values and behaviors continue to influence a woman's adult life? My findings indicate that age plays a substantial role in determining the values that young women learn through a sorority insofar as new members keenly observe the behavior of older members. In interviews, younger members often stated that they had no idea what behaviors their sisters expected of them, whereas older members were fully aware of the sororities expected values, including respect, and educational and financial responsibility. The two main expected behaviors that older members highlighted are philanthropy work and social activities; the latter almost always included alcohol consumption. Thus I explored how alcohol plays a large part in sorority life, significantly outweighing philanthropic events. I then studied the extent to which these college behaviors and values continued to shape sorority members adult lives, exploring the extent to which these behaviors feature in life after college. For comparative purposes, I also contacted young women who dropped out of sororities after they did not feel accepted, or felt judged and out of place. I interviewed these young women to discover why their experiences were so drastically different from those of active sorority members. I believe there is a connection between the experiences of students during and

after college; my research shows a definite link between sorority-taught values and behaviors, and sorority members' adult lives.

## **The evolution of identity in the digital era**

**Joshua Hawthorne**, Senior, Communication, LAS

### **ABSTRACT**

The proliferation of the world wide web has given many new forms of expression to users. How have these new forms changed how users perceive themselves and how they perceive other users? Such changes in the perception of identity in an online virtual environment can have ramifications within the virtual and other environments. These ramifications will directly affect how people engage with the most primary of introspective questions: Who am I? As such, an understanding of the expression of one's identity is incredibly important, if only so that better solutions can be implemented in the future. Through an analysis of the current forms of expression of identity available to users as well as surveys regarding use of such forms I hope to gain a better understanding of how users currently use and engage with perceptions of their own identity and that of others.

## **Got health behavior change?: An exploratory study of the processes and outcomes of exposure to an interactive game about drinking milk**

**Angeline Sangalang**, Junior, Communication, LAS

**Kate Ciancio**, Junior, Psychology, LAS

**Amy Lindgren**, Senior, Communication, LAS

**Mentors:** Jessie Quintero Johnson, Communication, LAS; David Tewksbury, Communication, LAS

### **ABSTRACT**

Health practitioners are constantly looking for ways to reach audiences that are not normally receptive to traditional health campaign messages (e.g., public service announcements). One health promotion strategy involves using interactive media messages, like online games. Because interactive messages can be tailored to meet individual needs, they have the capacity to enhance audience attention and subsequently, health-related message outcomes. Another strategy, entertainment-education, involves intentionally placing health messages in entertainment media formats such as television and radio. Through mechanisms like narrative engagement, entertainment-education messages minimize the tendency for audiences to engage in critical scrutiny of the persuasive subtexts in health-related messages. Applying entertainment-education theory to interactive games is one way to explore the impact of narrative involvement on health outcomes. To investigate this, we evaluated participants' responses to *Get the Glass*, an interactive online game released as part of the *got milk?* initiative. The objective of the game was for participants

to help an animated family with milk-related deficiencies in their quest to find the last glass of milk on Earth. We found that exposure to the game improved the participants' beliefs, attitudes, and behavioral intentions about drinking milk. We also found involvement with the game led to higher evaluations of the game and that frustration, distraction, and personal relevance influenced involvement. Using a theory of reasoned action framework, beliefs, attitudes, and behavioral intentions may indicate future behaviors. Results from this study display the potential for games that entertain and educate to improve health behavior. Future research should explore the efficacy of combining entertainment-education with interactive media, as well as the mechanisms that enhance the extent to which health messages in these contexts are processed. Understanding how and why interactive messages can influence health outcomes may be the key to providing health information to audiences not receptive to traditional persuasive formats.

## **Session C.2: Life Sciences III (Illini Room B)**

### **Viruses need love, too: An investigation of the effects of rapamycin on myxoma virus replication in established brain tumors**

**Tiffani Berkel**, Junior, Molecular and Cellular Biology, LAS

**Mentor:** Edward J. Roy, Pathology, MED

#### **ABSTRACT**

In 2009, brain tumors were the second leading cause of cancer-related deaths in children, women under 20, and men under 39. Less than one-third of Americans diagnosed with a brain tumor survive for more than 5 years after diagnosis. To encourage survival, the most commonly used treatment options are surgery, radiation therapy, and chemotherapy. While surgery has become very fine-tuned, it is not always an option. Radiation and chemotherapy lack specificity, and therefore frequently cause severe side effects and damage healthy tissue. One method of countering this issue involves creating and utilizing biological tools that specifically target tumor cells. Ideally, they can either be modified to deliver a toxic substance or be able to kill the cells independently. Myxoma virus is one such tool. While it is known to infect healthy tissue in rabbits and hares, the virus has been shown to infect and kill tumor cells in mice and humans while avoiding nearby healthy tissue. To encourage the replication and spread of the oncolytic virus through brain tumors, our lab will explore the *in vivo* effects of rapamycin, which has recently been shown to enhance viral replication in cancer cells. The spread of the virus in mice with established brain tumors that have been treated with rapamycin will be monitored by using a recombinant form of myxoma virus that expresses a red fluorescent protein.

## Antibiotic synthesis and trial

**Grant Zimmerman**, Junior, Specialized Curriculum in Biochemistry, LAS

**Mentors:** Anne Baranger, Chemistry, LAS; Stacie Richardson, Chemistry, LAS

### ABSTRACT

Oxazolidinones are a synthetic class of antibiotics currently used in hospitals as a last resort. Linezolid (Zyvox®) is the only approved antibiotic of this class. Recently, resistant strains have been found, and concerns about its toxicity to human cells have also magnified the need for new antibiotics. Modifications have been proposed in numerous papers, and a new family of antibiotics based on linezolid has recently been undergoing clinical testing. Working towards a novel modification of the linezolid core, I synthesized linezolid as a standard against which to test the proposed antibiotic. Recently, the proposed antibiotic was synthesized in our lab, and preliminary testing shows it to be less effective than the linezolid core. However, testing linezolid and other antibiotics as standards against a gram-positive species, *Staphylococcus epidermidus*, and a gram-negative species, *Escherichia coli*, has given our group standard data against which to test any additional derivatives. The macro-dilution method of bacterial susceptibility testing was first carried out to obtain compound minimum inhibitory concentration (MIC) data. The data was then graphically compared to MIC's obtained using 96-well plates. These data correlated well, and investigation went forward on the 96-well plates, due to the ease of collecting multiple trials. Data were then compared to data found in the literature, and a table of MIC's was compiled for quick use to evaluate antibiotics.

## Session C.3: Engineering Sciences II (Illini Room C)

### Molecular dynamics study of nanopore sequencing with MspA protein pore

**Hung Yu Ho**, Junior, Engineering Physics, ENG

**Mentor:** Aleksei Aksimentiev, Physics, ENG

### ABSTRACT

Nanopore sequencing is a new approach to high-speed and inexpensive DNA sequencing which could have a revolutionary impact on biological and medical sciences. In a typical nanopore setup, a voltage is applied to electrophoretically drive a single-stranded DNA through a nanopore embedded in a membrane. In principle, the identities of the nucleotides can be determined by measuring the ionic current blockage when the nucleotides pass through the pore. The protein pore MspA of *Mycobacterium smegmatis* is found to be ideally suitable for nanopore sequencing because of its pore geometry and stability against environmental stresses. Previous experimental studies have shown



that mutated MspA pores are capable of detecting and characterizing single molecules of single-stranded DNA. However, the molecular mechanism of DNA transport and current modulation has to be understood in order to achieve single-nucleotide resolution. We used molecular dynamics simulation as a computational microscope to understand how DNA interacts with MspA and to optimize MspA for nanopore sequencing. Here we present the progress of the project.

## **Thin film deposition of Ta using a 200mm high power hollow cathode magnetron (HCM)**

**Robert Looby**, Junior, Engineering Physics, ENG

**Paul Mikols**, Junior, Electrical Engineering, ENG

**Mentor:** Liang Meng, Nuclear Engineering

### **ABSTRACT**

Ionized physical vapor deposition (iPVD) is currently employed in integrated circuit production to form the barrier/seed layers. Despite the intrinsic limitations of physical vapor deposition in trench/via filling, more conformal coverage has been achieved by iPVD due to its high ionization fraction and now great efforts are devoted to pushing it to the limit of higher aspect ratio trench filling. The hollow cathode magnetron (HCM) is one type of high density plasma tool developed for iPVD. It is desirable to understand the fundamental mechanisms of the HCM, and consequently obtain more precise control of the deposition to ensure a conformal and high quality film. In this study, a commercial 200mm HCM module with a 36 kW power source was used to investigate Ta film deposition in correlation with the plasma diagnostics at varied power, pressure, and deposition time as well as other parameters. The deposition rates were measured on planar Si substrates and the film morphology and microstructure were characterized by scanning electron microscopy (SEM), atomic force microscopy (AFM) and X-ray diffraction (XRD). It was revealed that higher power reduces the surface roughness and facilitates the phase change from fine grains to certain crystalline structures. XRD confirmed that (002) and (004) -Ta was formed at higher power. Ta thin films were also blanket deposited in trenches of varying aspect ratios to study the effects of different process parameters. Conditions with higher ionization fractions were selected based on the earlier plasma diagnostics results, and reduced overhangs and improved step coverage were achieved due to a larger number of collimated ions. Lower pressure is also favorable since the neutral flux becomes more directional with less scattering.

## **Analysis of effects to aluminum from rapid exposure to extreme ultraviolet light**

**Daniel Organ**, Junior, Electrical Engineering, ENG

**Mentor:** John Sporre, Nuclear, Plasma, and Radiological Engineering, ENG

## **ABSTRACT**

At the Center for Plasma-Material Interactions at the University of Illinois at Urbana-Champaign, there exists an XTS 13-35 Extreme Ultraviolet producing light source. This source operates using high currents and voltages to condense plasma and make it very hot. Although this source was initially developed for the production of next generation computer chips, this hot (20-100eV) relatively short lived (~10 ns) plasma is capable of rapidly altering surfaces of various materials, including aluminum. Conceptually, a surface of aluminum is exposed to the dense plasma where it is heated up very rapidly, and consequently cooled very rapidly as well. In the process of cooling down, the grain structure of the surface of the aluminum is restructured so that the grain sizes are reduced from those seen in unaltered aluminum samples. The alteration of materials, using this process, poses great possibilities in the development of stronger and more tailored materials. In the case of aluminum, changing the grain structure increases the durability of the surface material (not necessarily the bulk material) and allows it to be used in various abrasive situations such as the hull of a ship where normal aluminum would not be an effective material for the task at hand. In this paper, the process of aluminum modification using a dense plasma focus will be discussed, and the implications of such a process will be explored.

## **Lasers and plasmas: The push for faster computing through debris measurement at the intermediate focus**

**Piyum Zonooz**, Junior, Nuclear, Plasma, and Radiological Engineering, ENG

**Mentor:** John Sporre, Nuclear, Plasma, and Radiological Engineering, ENG

## **ABSTRACT**

The goal of making extreme ultraviolet light lithography (EUVL) viable within the next few years relies on the ability to produce clean photons at the intermediate focus (IF). Creating enough EUV power does not deliver an appreciable cost of ownership (CoO) if all devices down field of the source require replacement due to degradation by an energetic flux. In order to investigate debris emanating from intermediate focus locations, the Center for Plasma-Material Interactions (CPMI) at the University of Illinois at Urbana-Champaign (UIUC) has developed a Sn Intermediate Focus Flux Emission Detector (SNIFFED). This detector consists of the following five detectors: dual quartz crystal microbalance (QCM), Faraday cup (FC), Si witness plates, microchannel plates (MCPs) with charged species mitigation capabilities, as well as a residual gas analyzer (RGA). With these five detectors, one is able to measure the presence of charged and neutral flux coming from the IF. The use of the dual QCM allows for the detection of deposition or erosion, and lends a second look as to what is observed on the Si witness plates. Lastly, the utilization of an RGA allows for the diagnosis of what species are transferred from the source chamber to the chambers beyond the IF. In conjunction with the SNIFFED apparatus, CPMI has added a mock-up collector optic to the laser assisted discharge produced plasma (LADPP) located on site. Although it is simply a stainless steel two shell, one bounce setup, this

mock-up collector optic simulates how debris is transported in true collector optics. Utilizing the mock-up collector optic, the SNIFFED apparatus, as well as the LADPP, CPMI has investigated IF debris of a simulated LADPP setup.

## **Wafer scale alignment of single walled carbon nanotubes**

**Vineet Nazareth**, Senior, Electrical and Computer Engineering, ENG

**Mentor:** Joseph W. Lyding, Electrical and Computer Engineering, ENG

### **ABSTRACT**

Single walled carbon nanotubes (SWCNTs) consists of a two dimensional sheet of graphite rolled up into a hollow cylinder with nanometer diameters and micrometer lengths. The exceptional electrical and mechanical properties of these nanostructures enable them to be used in fabricating high performance thin film transistors and other nanoelectronic devices. Some of the challenges that need to be overcome in order to integrate SWCNTs into modern nanoelectronics are: (i) controlling their chirality and length, (ii) difficulty in positioning and aligning SWCNTs on a wafer scale, and (iii) forming good ohmic contacts. In our research we develop a technique to control the alignment and placement of chirally pure semiconducting SWCNTs on various substrates by mechanical meniscus action. We form a meniscus between two surfaces with surfactant coated, suspended SWCNTs in glass capillary tubes. As we mechanically drag the meniscus across a substrate, the SWCNTs pin to the surface and are aligned by the mechanical torque. We characterize the alignment of SWCNTs on various substrates like Si(100), Si(111), H-Si(100), H-Si(111), SiO<sub>2</sub>, Si<sub>3</sub>N<sub>4</sub> and Al<sub>2</sub>O<sub>3</sub> with alignment dependent on meniscus velocity and meniscus pass number. On hydrophilic substrates, the SWCNTs align parallel to the drag direction, with lower meniscus velocities promoting better alignment. Conversely, on hydrophobic substrates, longer SWCNTs (>800nm) align perpendicular to the drag direction. This technique also gives us control over the SWCNTs density deposited on the substrate with an exponential density dependence on meniscus pass number. Thus, we can scale aligned SWCNT depositions to high densities to drive substantial transistor currents, a necessary step for making high performance SWCNT nanoelectronic devices.

## **Session C.4: English Studies Roundtable (General Lounge, Room 210)**

### **Negotiating the value of female sexuality in early 20th-century America**

**Stephanie Sadler**, Senior, English, LAS

**Mentor:** Dale Bauer, LAS

### **ABSTRACT**

My thesis will focus on women in early 20th-century, working-class America who find themselves caught between a lingering, idealized, Victorian image of female sexuality and a rising notion of female independence. The characters of the novels I discuss will be women struggling to survive on their own in a society that openly denies them financial stability if they are fungible factory women by allowing them extreme minimum wages, yet secretly pays them great amounts for the “immoral” distribution of their sexuality. I question the value placed upon female sexuality, both by women themselves and those who chose to allot and use women as sexualized beings.

## **Hergesheimer and the twenties**

**Miles Lincoln**, Senior, English, LAS

**Mentor:** Dale Bauer, English, LAS

### **ABSTRACT**

Throughout the 1920s, Joseph Hergesheimer was one of the most-read novelists along with F. Scott Fitzgerald. In the next decade his popularity declined, and today he is virtually unknown. How did Hergesheimer once manage to captivate an audience and what occurred to make him lose it completely?

## **Illegal or immoral: Abortion and its discontents in early 20th-century literature**

**Maggie Carrigan**, Senior, English, LAS

**Mentor:** Dale Bauer, English, LAS

### **ABSTRACT**

Abortion was a pressing issue at the beginning of the twentieth century, provoking moral criticism and legal action. I am researching not only the medical, legal, and moral issues surrounding the controversial practice, but also the impact it had on the individual lives as well as the collective culture it affected through the period’s contemporary literature.

## **Invented languages**

**Jeff Girtten**, Senior, English, LAS

**Mentor:** Vicki Mahaffey, English, LAS

### **ABSTRACT**

I examine how authors communicate with their readers when the language being communicated is intentionally altered. Primarily, I’m looking at *Gulliver’s Travels* by Jonathan Swift, *Finnegans Wake* by James Joyce, and *A Clockwork Orange* by Anthony Burgess. I explain how these authors manage to communicate with their readers despite the altered language.

## **Disability in *Harry Potter***

**Amelia Wallrich**, Senior, English, LAS

**Mentor:** Renée Trilling, English, LAS

### **ABSTRACT**

My thesis examines how the category of disability fits into the social hierarchy of the wizarding world presented in the *Harry Potter* series. More specifically, it questions how disability is constructed and defined within the series, and how disability is subsequently treated. The goal is to use the series to contribute to the wider conversation on the cultural construction of disability in our own society.

## **Oscar Wilde and boy life**

**Rebecca Finkel**, Senior, English, LAS

**Mentor:** Vicki Mahaffey, English, LAS

### **ABSTRACT**

I focus on Oscar Wilde's relationship to children, specifically young boys, and I will divide my research into three areas. First, I want to explore the history of the pedagogical relationship of male scholars to young boys focusing on the parallel between Socratic pedagogical practices and Wilde's pedagogical relationship to young boys. The second portion of my paper will focus on the Victorian period Wilde wrote during, and I will work with the manuscripts of his trial in which his young lovers were questioned, and additionally Wilde's own speech at his trial. Finally, I will devote the third portion of my thesis to Wilde's fairy tales as the literary embodiment of his fascination with children.

## **"I account all the rest either dreaming or madness": James Hogg's *Justified Sinner* as parody of reasoning through systems**

**Stephanie Luke**, Senior, English LAS

**Mentor:** Dale Bauer, English, LAS

### **ABSTRACT**

I argue that it was James Hogg's intention for *The Private Memoirs and Confessions of a Justified Sinner* to be read as a parody of the folly of attempting to impose systematic thought on the illogicality of reality. Hogg employs the Romantic constructs of Scottish historical novels of his contemporaries Sir Walter Scott and John Galt to encourage readers' expectations of receiving answers from the text. Through the narratives that compose *Justified Sinner*, Hogg seeks to expose the limitations of systems that seek, through manufactured constructs, to lend an interpretation of comprehensibility to inscrutable events.

## **Session C.5: Staging and Structuring Experience (Room 209)**

### **Taking the lead: Dramatherapy in group treatment**

**Alissa Norby**, Junior, Theatre Studies, FAA

**Mentor:** J. W. Morrisette, Theatre, FAA

#### **ABSTRACT**

Dramatherapy serves as an increasingly integrated and effective form of adolescent psychotherapy. Employing techniques such as role-play, bibliotherapy, and play therapy, the practice and its methods have been substantiated by empirical research findings to address and prevent the incidence of anti-social behaviorism among adolescent participants. Based on the latest research pertaining to both dramatherapeutic techniques and instructional facilitation within the group setting, the presentation will provide attendees with a holistic overview of the arts therapy field and its effective amalgamation within the human service setting. The presenter, author of both "Girls in the Lead: Dramatherapy in the Group Context" and the forthcoming "Bullies, Buddies, and BFFs: The Art of Violence Prevention" (based on her work as a Violence Prevention Coordinator with the Chicago Public Schools) will present both experiential and empirical findings with regard to this rising field of alternative therapies. Participants will be provided with field overview, relevant data analysis, and hands-on tactics for facilitation of the practice.

### **Futurist and dadaist theatre: *The First Celestial Adventure of Mr. Antipyrine***

**Maxwell Goldberg**, Senior, Theatre, FAA

**Mentor:** J. W. Morrisette, Theatre, FAA

#### **ABSTRACT**

It is easy to find similarities between Futurism and Dadaism, and journals, magazines, and newspapers often did this in the early 20th century (to the displeasure of artists in both avant-garde movements). Both groups put on public exhibitions of works in various artistic media, including paintings, sculptures, theatrical works, and manifestos, and these exhibitions were often meant to shock and anger the viewing public. Futurist and Dadaist theatre utilize nonsense dialogue and abstract character, costumes, and sets, and both attack traditional theatrical forms through parody. But in spite of these similarities, it is interesting to note that these groups were opposed to each other in terms of their aims and worldviews. The Futurists, especially in Italy, were fervent nationalists who detested the past instead glorifying speed, new technology, and warfare in the hope that human progress could be augmented through integration with machinery. The Dadaists, reacting against the horrors

of World War I, believed that rational thought was largely responsible for the war and that humanity's only hope was to find a new way of life in unreason and spontaneity. When I directed a collection of Futurist and Dadaist plays in the Armory Free Theatre last November, my key aim was to explore the differing worldviews of these groups and to examine how these worldviews influenced the theatrical productions of each group. In this presentation, I will discuss how I achieved this aim. In addition, I will discuss my methods for choosing pieces to perform and for deciding the order of these pieces, and staging techniques that I used in order to make nonsense dialogue dramatically compelling.

## **Architecture and the landscape: Entering the discourse**

**Colby Suter**, Junior, Architectural Studies, FAA

**Mentor:** Allison Newmeyer, Architecture, FAA

### **ABSTRACT**

To an undergraduate in Architectural Studies, "research" is an ill-defined term. To seek precedence, inspiration, and ongoing discourse is a necessary component within the design studio, but these efforts are rarely the primary focus of an architectural project and are often left behind without any physical manifestation. When confronted with the notion of "Architecture and the Landscape" as the focus of design studio, I was given the opportunity to investigate architectural discourses through research as well as exploratory design in the development of an enlightened point of view regarding this broad topic. Taking advantage of this opportunity, I have chosen to explore further the dialogues to which we were introduced, and using my own projects as an illustration, enter this ongoing narrative. Given the opportunity to present this undertaking, I explore fresh means of visual communication beyond those of a typical oral presentation in response to the ill-defined nature of this undertaking. I do not wish to merely as that I take advantage of this forum as a new platform for presenting my coursework, but rather to use this opportunity to give physical identity to the typically voiceless endeavor of *architectural research* as I respond to this rare opportunity for the visual communication of ideas.

## **The mass-production of individual experience at the Great Exhibition of 1851**

**Dana Szafranski**, Senior, Art History, FAA

**Mentor:** Irene Small, Art History, FAA

### **ABSTRACT**

The Great Exhibition of 1851 was the first exhibition of its kind to pay tribute to industrialization on an international level. Although this event was created to celebrate mass-reproduced goods, in this paper I explore how the Great Exhibition attempted to mass-produce individual experience for its visitors. In order to historically examine this claim, I consider the influence of social unrest within nineteenth-century England, especially as it relates to industrial

culture and class anxieties. I analyze these historical dynamics in relation to printed ephemera associated with the Exhibition, historical documentation of events, and firsthand accounts of visitors to the Crystal Palace, along with the structure of the Exhibition and products displayed. I also examine the impact of the architecture of the Crystal Palace in creating a reproducible, rather than unique, experience for the visitor. This includes the function of the building at its original location in Hyde Park, London, but also the consequences of its afterlife at Sydenham after the Great Exhibition had closed in October of 1851. My paper concludes that the Great Exhibition of 1851 manufactured a unified, reproducible experience for the masses in order to imply a social unity which was not present within nineteenth-century England. My paper draws from theoretical texts, including Walter Benjamin's essay, "The Work of Art in the Age of Mechanical Reproduction," as well as primary research, including materials from the University of Illinois Rare Book and Manuscript Library.

**D Sessions, 3:00-4:00 p.m.**

## **Session D.1: Doing Things with Numbers: Theory and Application (Illini Room A)**

**It's not about what you know, it's about what you can prove: An investigation of the relationship between the Bernoulli numbers and the Kummer Congruences**

**Robert Walker**, Mathematics, LAS

**Mentor:** Bruce Reznick, Mathematics, LAS, and Matthew Ando, Mathematics, LAS

### **ABSTRACT**

The classical Bernoulli numbers are a sequence of rational numbers that has had several applications within mathematical research since the 17th Century. Arguably, their most significant application is within the Euler-MacLaurin Formula, a formula that Leonard Euler used to solve the Basel Problem in 1735. However, we investigate a different application of the Bernoulli numbers: the sequence is used to define a pair of objects called the Kummer Congruences, which Ernst Kummer constructed in 1844. In 2006, mathematicians Matthew Ando, Charles Rezk, and M. J. Hopkins were able to prove that sequences satisfying the Kummer Congruences characterize spin orientations on elliptical operators in K-theory, an area of focus within algebraic topology; ergo, one spin orientation has been shown to exist, since the Bernoulli numbers are such a sequence. However, it is not known that another such sequence exists, and therefore, the Kummer Congruences were studied in the hopes of discerning what properties of the Bernoulli numbers allowed the former objects to work.



In order to do so, the statement of the Kummer Congruences was tested using three methods for upwards of 200 cases. The first method was to verify individual cases of the Kummer Congruences by brute-force calculation, an approach that would only be reasonable for cases involving small, manageable numbers. The second method was to construct a function `Kummertest` in Mathematica, in order that cases involving very large numbers could be verified efficiently. The third, and most preferred, method of verification involved constructing an algorithm that a person could execute by hand. Finally, in order that we would be justified in using this last method, a proof verifying that the algorithm is correct was constructed with care, a proof combining together several results known about the Bernoulli numbers, such as Kellner's Formula for Divided, Even-Index Bernoulli Numbers.

## **Arithmetic progression-free sequences created by a greedy algorithm**

**Richard Moy**, Senior, Mathematics, LAS

**Mentor:** Bruce Reznick, Mathematics, LAS

### **ABSTRACT**

Greedy algorithms appear in many areas of mathematics and computer science. These typically simple algorithms are characterized by their locally optimal decisions; yet, these decisions rarely lead to a globally optimal solution. We describe a greedy algorithm, from A. Odlyzko and R. P. Stanley (1978), for creating sequences of nonnegative integers without any 3-term arithmetic progressions, abbreviated AP, as subsequences. A 3-term arithmetic progression is a three number sequence  $\{x,y,z\}$  such that  $z-y=y-x$  and  $x<y<z$ . The study of these AP-free sequences relates to an amazing theorem by Green and Tao (2004), which states that the sequence of prime numbers contains arbitrarily long arithmetic sequences. We examine the characterization of some of these sequences generated by our greedy algorithm; that is, which integers are included or excluded in particular AP-free sequences. We also study the  $H(n)$  function, whose value is the number of 3-term APs  $\{j,k,n\}$  such that  $j$  and  $k$  are numbers in our AP-free sequence. In examining a particular AP-free sequence and its corresponding  $H(n)$  function, we see how the Fibonacci numbers make a surprising entrance.

## **Housing premium puzzle: What really determines the return on your house?**

**Matthew Miller**, Senior, Economics, LAS

**Mentor:** Bart Taub, Economics, LAS

### **ABSTRACT**

The objective of this research is to divert attention away from the traditional notion of the equity premium, and explain not how housing services can resolve this equity premium puzzle, but to look within the housing market to see if and

how I can solve the housing premium puzzle. According to my current research, this paper is one of the first to seriously claim there is a housing premium puzzle and to provide a credible solution that resolves the enigma. A previous claim was made by James D. Shilling (2003), but his resolution relies on implausibly high levels of risk aversion. There are two pieces of previous literature that propel this paper. The first being a relatively new paper by Sean D. Campbell, Morris A. Davis, Joshua Gallin, and Robert F. Martin (2009). They are the first, they claim, to show that returns to housing markets and returns to financial assets like stock have many similarities and that the housing premium contributes to housing valuations very much in the same way that the equity premium contributes to stock and bond valuations. Their analysis of 23 U.S. metropolitan areas finds that the expected future premia and rent growth tend to be positively correlated. Their analysis ignores, however, important user costs in the price of maintaining a home. This analysis then requires that I attempt to model the rate of return to holding housing, take into account the real-life costs to homeownership, and model the services that houses yield for their occupants. The second paper providing the solution is that from Robert Barro (2006, 2009). In this seminal work, Barro solves the equity premium in what I believe to be the most credible solution. His theory along with a recently updated 2009 version posit that high equity premia are the result of extreme macroeconomic events like financial crises and additional calamitous events like disease pandemics. Barro (2006) in the afterword makes a call for future research to examine the affect of housing prices on the equity premium. He writes: "Another extension expands the asset menu to include real estate, so that housing prices could be related to disaster probabilities" (p. 39). Thus these two papers, with adjustments made in my model, can help explain what moves the housing markets, rates of return on houses, and resolve the housing premium puzzle. The logic is this: Campbell et al. (2009) show that housing markets behave similarly to financial markets. Both markets exhibit a premium over riskless assets that is inconsistent with the standard consumption-based asset pricing theory. Robert Barro's (2006, 2009) rare disaster states explain most credibly the high equity premium. Thus, it follows that rare disaster states in the housing market might also explain a credible portion of the high housing premium. This paper provides the theoretical framework to explore this research question.

## **Measuring the impact of credit risk on pricing agricultural commodity swaps by conducting empirical analysis**

**Jung-Wook Kim**, Senior, Accountancy, Finance, Management Science, BUS

**Mentor:** Prachi Deuskar, Finance, BUS

### **ABSTRACT**

According to Robert L. McDonald, *Derivatives Markets*, the swap formulas in different cases take the general form. The pricing formula suggests two points. First, the formula does not explicitly incorporate the impact of counterparty

credit risk in pricing the swaps. Second, these two are the same formulas. All swap formulas in different cases take the general form since the fixed price in a swap is a weighted average of the corresponding forward prices, except that the interest swap rate is a weighted average of implied forward interest rates and the commodity swap price is a weighted average of commodity forward prices. In "Pricing Swap Default Risk," (Eric H. Sorensen and Thierry F. Bollier, *Financial Analysts Journal*, May/June 1994, 50, 3), Dr. Sorensen and Bollier developed a model of swap default risk in order to evaluate the impact of default of one party to the other solvent party based on the probability of swap counterparty defaulting. The paper largely focuses on measuring the impact of default risk of currency and interest rate swaps. Given the common characteristics of the two types of swaps, it is adequate to apply Sorensen and Bolliers model and its summary result to check the impact of counterparty credit risk on agricultural commodity swaps. In this paper, I will focus on the bilateral approach: the concept that is introduced by the paper where both parties assume a certain level of risk because it is more realistic in many cases than the unilateral approach where one party solely assumes a certain level of credit risk of its counterparty.

## **Session D.2: Words and Images, Ancient and Modern (Illini Room B)**

### **New technologies for documenting cylinder seals from the Ancient Near East**

**Trent Wright**, Senior, Classical Civilization and Astronomy, LAS

**Jessica Diaz**, Senior, Religion, LAS

**Craig Kreutzer**, Senior, Religion, LAS

**Mentor:** Wayne Pitard, Religion, LAS

#### **ABSTRACT**

The Spurlock Museum in collaboration with the University of Southern California has undertaken research using high-resolution, 360-degree cameras and polynomial texture mapping to document and study ancient Mesopotamian cylinder seals. These seals are tiny, intricately carved cylinders that were used as identity markers (somewhat like a modern signature) on official documents in the ancient Near East. The carved designs include scenes of gods and goddesses, kings and courtiers, heroes and wild animals. They provide considerable information about the economic, political, social and religious environment out of which they came. Since each seal had to be identified with a particular person, each had to be unique. Because of this, the art of the cylinder seal became one of the great art forms of Mesopotamia. The new technology at the Spurlock Museum allows scholars to analyze the cylindrical faces of the seals in a detail never before available, both by creating flat images of the carved surface of the

cylinder and by producing complex images that allow the user to change the angle of light on the surface at will. The new images will be made available in both printed form and online, so that they can be viewed all across the world.

## **A daughter for a son: Challenging gender roles in father/daughter relationships in Chicana feminist literature**

**Brenda L. Rodriguez**, Junior, English and Psychology, LAS

**Mentor:** Richard T. Rodriguez, English and Latina/Latino Studies, LAS

### **ABSTRACT**

This research project investigates and analyzes a cluster of foundational and emergent Chicana literary texts, which focus on father-daughter relationships. In particular, it focuses on the ways Chicana writers challenge patriarchy through daughters' exposure and defiance of the father as the purveyor of male authority. This theme is tracked and scrutinized in the works of Gloria Anzaldúa's *Borderlands*, Cherrie Moraga's *Loving in the War Years*, Helena Maria Viramontes's *The Moths and Other Stories*, and Ana Castillo's *My Father Was a Toltec*. The texts are read within the context of various schools of literary and critical theory such as feminism, queer studies, and psychoanalysis that ground the readings in a scholarly framework. This research significantly contributes to the field of literary and cultural studies by exploring aspects of Chicana cultural production from a heretofore previously unexamined analytic perspective.

## **Binary nature of photography in Cindy Sherman and Robert Longo**

**Caitlin Harrington**, Senior, Art History, LAS

**Mentor:** Irene Small, Art + Design, FAA

### **ABSTRACT**

In this research project I intend to reveal how photography's binary nature proves authenticity while simultaneously constructing representation is employed through Cindy Sherman's *Untitled Film Stills* and Robert Longo's *Men in the Cities* series. I will outline the elements in these series, which are specific to medium of photography that both artists utilize to reveal the facticity of photography. This includes the index to prove authenticity and the ability to manipulate photography until the evidence passes into simulacrum. On the authenticity of photography I will discuss the punctum and pathos formula. Punctum is Roland Barthes term for the wounding, personally touching detail, which establishes a direct relationship with the object or person within it. The factitiousness of photography requires something that pricks or wounds the view in order to add a level of authenticity to the doubt. I will investigate Aby Warburg's theory of pathos, which is the primitive words of a passionate gesture language, and allows viewers to read the coded images. The punctum and pathos theory are used together formulaically in order

to create the illusion of authenticity. Sherman and Longo use these elements in combination in a way specific to their postmodern time period but reach very different outcomes visually.

## **Lateralized apprehension of number at the intersection of language and perception**

**Amanda Moncada**, Senior, Psychology, LAS

**Mentor:** J. Kathryn Boch, Psychology, LAS

### **ABSTRACT**

For decades a controversial debate in the areas of psychology, anthropology, linguistics, and philosophy has centered on the argument of whether language affects human perception. In the domain of color perception, past psychological research has both supported and rejected the view that language does affect human perception. Recent research on brain lateralization suggests a reconciliation of the contradictory findings. Accordingly, there may be a larger linguistic effect on color perception in the right visual field (which projects to the left hemisphere) than in the left visual field, consistent with left-hemisphere dominance for language ability. The present study extended the lateralization hypothesis to the perception of numerosity assessing how number perception is influenced by the grammatical number system of English (i.e., singular and plural). Innate enumeration systems treat numerosities of one to three things similarly, whereas the grammatical number system treats numerosities of two and above similarly. The experiment used a task in which English speakers named arrays of objects with plural nouns (e.g., dogs). Latency to produce the nouns and accuracy in responses were measured. The critical manipulation was whether the object arrays appeared in the left or right visual field. The results showed a difference between the visual fields that is consistent with the lateralization hypothesis. Thus, when producing plural referents for objects presented in the right visual field, speakers were similarly fast for numerosities of two and higher, implying that numerosities which support linguistic plurality are treated equally. Contrastingly, in the left visual field, naming latencies with arrays of two and three objects differed from arrays with four or more objects. The results suggest that language affects perception when the language-dominant hemisphere is fully engaged in the perceptual process. Perhaps, the left hemisphere is where language actually holds the key to impacting human perception.

## **Session D.3: Investigating Impacts of Identity and Ideology (Illini Room C)**

### **Retiring racism: The association between color-blind racial ideology and perceptions of “The Chief,” a racialized university symbol**

**Jeffrey Yeung**, Senior, Psychology, LAS

**Mentor:** Helen Neville, Educational Psychology, EDU

#### **ABSTRACT**

Secondary data analysis was completed on 450 racially diverse third-year college students in the Illinois Longitudinal Diversity Project to examine the association between students' level of color-blind racial beliefs (i.e., the belief that race and racism are irrelevant for the contemporary moment, as measured by the Color-Blind Racial Attitudes Scale Short Form, CoBRAS-SF [Neville, Low, Liao, Walters, and Landrum-Brown, 2007]) and their level of agreement with the University of Illinois' decision to remove “The Chief,” a controversial Native American racialized university symbol. White students on average were less likely to support the university's decision to remove the symbol and Black students on average were more likely to support the decision. Additionally, men were more likely to disagree with the decision than women. As predicted, greater levels of racial color-blindness were significantly correlated with lower support with the decision to ban “The Chief”; the strength of this association differed across racial groups. Students also elaborated on their perceptions about the removal of “The Chief” in an open-ended question. Seven themes emerged about perceptions of the decision to remove the symbol, which included: (a) Dismissive, (b) Racial Sympathy/Empathy, (c) Racist/Offensive, (d) Pride/Tradition/Unity/Symbol, (e) Procedural, (f) Not Offensive/Not Racist, and (g) Freedom of Speech/Majority Rights/Politically Correct/Hypersensitivity. Implications of the findings, limitations, and future directions of the study are discussed.

### **The role of color(ism) in the racial experiences of black women: An exploration of racial life narratives**

**Amanda Long**, Senior, Psychology, LAS

**Mentor:** Helen Neville, Educational Psychology, EDU

#### **ABSTRACT**

Color(ism) plays an important role in many Black communities around the world in terms of higher educational attainment, socioeconomic status, racial identity attitudes, and the level of racial discrimination one endures. Most of the studies to date are quantitative and describe the relationship between color(ism) and social stratification. Many of the existing studies, however, lack information about how Blacks talk about and describe color(ism). This project adopted a

(racial) life narrative approach and examined 10 women's (7 from Bermuda and 3 from the United States) interpretation and experiences of issues of color(ism). A dimensional analysis was used to analyze the data. This analysis consisted of performing line-by-line open coding, mapping, and axial coding on the narratives (Braun and Clarke, 2006). Women defined dimensions of the main category of phenotype and its relevance to how they experience color(ism). One's phenotype affected several core areas including treatment by other Blacks, standards of beauty, and mate and child color preferences. Women also identified three adaption strategies—assimilation, internalization, and self-acceptance—in response to the mistreatment and external standards of beauty based on phenotype.

### **Maternal stress: The role of single mothers' work conditions on preschool children's socio-emotional development**

**Sarai Coba-Rodriguez**, Senior, Sociology, LAS

**Mentor:** Christy Lleras, Human and Community Development, ACES

#### **ABSTRACT**

Today, most single mothers of preschool children work, and often in jobs that are characterized by non-standard work hours (i.e., night shift, weekends) and low wages. While prior research has examined the impact of maternal employment on a variety of child outcomes, less attention has been paid to how work schedules, including shifts and number of hours worked, impact the ability of single mothers, in particular, to care for their children. Utilizing national data from the Early Child Longitudinal Study-birth cohort (ECLS-B), sponsored by the U.S. Department of Education and National Center for Educational Statistics (NCES), this study examines how maternal work conditions affect the socio-emotional development of preschool children. Unique to this study is the examination of maternal stress and the quality of parent-child interactions as potential mediators of this relationship within the context of single mother families. Results suggest that maternal work conditions affect levels of maternal stress, which impact the mother-child relationship, all of which ultimately affect preschool children's socio-emotional health in single mother families.

### **The link to educational and socio-economic disparities**

**Mauriell Amechi**, Junior, Communications, LAS

**Mentor:** Christopher Span, Educational Policy Studies, EDU

#### **ABSTRACT**

Over 3,000 postsecondary institutions across the country require standardized tests such as the SAT or ACT for admission into college. However, these exams may become a thing of the past as a growing number of colleges have eliminated the test as an admission requirement. Today, many skeptics continue to question the validity of testing as well as its impact on promoting a diverse

pool of applicants. According to the National Organization for Open and Fair Testing, over 800 four-year colleges and universities no longer require the SAT or ACT for admission. The shift in the use of standardized tests can even be seen at the level of graduate and professional schools. In the 21st century, it is crucial to question the importance of standardized tests in American education, especially regarding their impact on students from underrepresented backgrounds. This study offers a brief overview of the history of standardized testing in the United States. It concludes with an examination of how standardized tests impact the higher educational opportunities of minority (African American, Latina/o, Native American) and low-income students. In addition, this study addresses the essential question of whether test scores equal merit. It seeks to expand upon the evidence that deemphasizing testing as a predictor of merit or success enables colleges and students alike to reap the benefits of a quality education without sacrificing diversity and equity.

## **Session D.4: Life Sciences IV** (General Lounge, Room 210)

### **Spatial and temporal analyses of the reproductive system in the regenerating planarian *Schmidtea mediterranea***

**Nina Hosmane**, Junior, Molecular and Cellular Biology, LAS

**Mentor:** Phil Newmark, Cell and Developmental Biology, LAS

#### **ABSTRACT**

The freshwater planarian, *Schmidtea mediterranea*, is a unique model organism to study regeneration. These animals have remarkable abilities not only to regenerate lost body regions, but also have the potential to renew their germ line and reproductive structures *de novo* from a population of somatic stem cells called neoblasts. Here we characterize the spatial and temporal development of the female reproductive system of *S. mediterranea* during regeneration. Our results indicate that following amputation, a partial breakdown of the existing oviducts takes place. New fragments are soon generated and join to form two oviducts that extend to the ovaries, which are posterior to the brain and anterior to the testes. This suggests a spatial relationship between the growth and development of the oviducts, ovaries, and the testes. Furthermore, we investigated a potential role of the central nervous system (CNS) in regeneration of the planarians reproductive system. Disruption of the gene *nou-darake*, which restricts brain tissues to the anterior region of the animal, produces a phenotype with posterior CNS expansion. However, the spatial and temporal development of the testes, ovaries, and oviducts were unaffected. This suggests that an expansion of the CNS is not sufficient for altering the timing or positioning of these structures during regeneration.



## **The phylogeography of bluefin and rainwater killifish through analysis of mtDNA, nuclear DNA, and microsatellite data**

**Katherine Murphy**, Senior, Integrative Biology Honors, LAS

**Mentor:** Rebecca Fuller, Animal Biology, LAS

### **ABSTRACT**

The bluefin killifish (*Lucania goodei*) and the rainwater killifish (*L. parva*) are two closely related species of ray-finned fish of the family Fundulidae that are native to North America and whose populations often overlap. The two species are believed to be sister taxa, and ecological selection is thought to have played a major role in the speciation event. *Lucania goodei* is found solely in freshwater whereas *L. parva* is euryhaline and can be found in freshwater, brackish, and fully marine habitats. Throughout Florida, there are multiple drainages that host saltwater populations of *L. parva* at the coast and sympatric freshwater populations of both *L. goodei* and *L. parva*. The working assumption has been that these two species are monophyletic, but work on three-spined sticklebacks and other taxa indicate the possibility of parallel speciation (i.e. speciation happens multiple times resulting in similar forms across multiple drainages/habitat types). The other assumption has also been that freshwater populations of *L. parva* have descended from marine populations in the same drainage. In my study, I addressed the following two questions. First, are *Lucania goodei* and *L. parva* monophyletic species? Second, in *L. parva*, are freshwater populations more closely related to other freshwater populations or is genetic distance simply a function of distance among populations. To answer these questions, we sequenced mtDNA and nuclear DNA and determined their genotypes at four microsatellite loci for multiple individuals from multiple populations from both species. Surprisingly, the three different data sets produce different answers to these two simple questions. In my thesis, I will discuss possible reasons for these discrepancies.

## **Session D.5: Transnational Concerns (Room 209)**

### **Between war and peace: The competing extremisms of Osama bin Laden and Amr Khaled**

**Jennifer Hughes**, Senior, International Studies, LAS

**Mentor:** Mohammad Hassan Khalil, Religion, LAS

### **ABSTRACT**

My research is a comparative study of the religious ideas and political implications of two charismatic and influential Muslim leaders: Osama bin Laden, known for inciting violence against Americans and unbelievers, and Amr Khaled, the

famous modern televangelist of the Muslim world who promotes a message of peace and coexistence. Of particular importance is the connection between the influences that have led each of these men to become such powerful actors and the contrasting theological opinions they promote. Bin Laden and Khaled both formulated their ideologies outside of the traditional madrasa system, allowing for outlying interpretations and political presence previously unreached by scholars within this system. These men have gained power through popular support without the need for legitimacy of scholarship, instigating a crisis of authority in the Muslim world. Bin Laden and Khaled, while they appear at first to be polar opposites, do share many commonalities: the rhetorical ability to attract a massive number of followers; the ultimate goal of creating social and political change; the use of communication tools brought about through modern technology; the view that the path of Islam (however they may view it) can and should lead to the improvement of Muslim societies across the globe; and the belief in their personal responsibility to promote God's message. Here in the U.S., it is common to associate the words "radical Islam" with terrorism and intolerance, however; it is time to explore the possibility that the opposite ideology of peace and coexistence is also a form of radicalism, stemming from the same basic sources, and may be the antidote to bin Laden's message. By challenging the traditional framework of Islamic legal and theological society, these competing extremisms have had a destabilizing effect on the Muslim world, prompting the question: Where is the world of Islamic thought headed?

## **Corruption in post-Soviet nations: An analysis of countries in transition**

**Katherine Robillard**, Senior, Political Science and Psychology, LAS

**Mentor:** Carol Leff, Political Science, LAS

### **ABSTRACT**

My research focuses on the root causes of political corruption in post-Soviet nations. Many people may not immediately consider post-Soviet political corruption to be relevant to the international community, but the results of this type of research can be applied to other nations undergoing political transition in the future. Studying corruption is vital and informative because corruption is often associated with democratization and transparency within a society. By isolating variables associated with political corruption in transitioning nations, world leaders can work to reduce or eliminate these factors in their respective societies in order to maximize political progress. Based on preliminary research, I hypothesize that the highest levels of corruption within a society likely result from several variables working in tandem. Specifically, I believe that the post-Soviet countries with vast mineral wealth, a history of corruption, limited freedom of speech and expression, and unrestricted foreign aid will have the highest levels of corruption. Other societies that possess some (but not all) of these characteristics may have high levels of corruption, but not as high as the countries that possess all of these characteristics. I will utilize a joint

quantitative (small-n statistical analysis) and qualitative (case study) research approach to identify specific variables associated with the maximum corruption levels in each of these nations. Each of the 15 post-Soviet nations (Russia, Ukraine, Latvia, Lithuania, Belarus, Kazakhstan, Kyrgyzstan, Armenia, Georgia, Azerbaijan, Estonia, Turkmenistan, Uzbekistan, Tajikistan, and Moldova) will be included in the small-n statistical analysis, and 5 of these nations will be studied in-depth as case studies. These countries include Russia, Lithuania, Ukraine, Turkmenistan, and Georgia, and they have been selected due to the variability in their geography as well as religious background.

## **Social group conflict across the globe: Trends and patterns in the post-WWII era**

**Jared Hall**, Junior, Political Science and Linguistics, LAS

**Erica Mazzotti**, Senior, English, LAS

**Joseph Guinta**, Junior, International Studies, LAS

**Mentor:** Peter Nardulli, Political Science, LAS

### **ABSTRACT**

Suicide bombings in Karachi, racial cleansing in Darfur, separatist movements in China: much of the violence that occurs in today's world has its roots in ethnic tensions. Our research focuses on a problem that has plagued social life ever since it evolved beyond simple kinship groupings in isolated settings: group-based conflict. It is important to understand that ethnically-based conflict can be expressed non-violently, but regardless of the degree of violence involved, these movements have challenged social scientists in their investigations of social group movements in the post-WWII era. In order to gain a better understanding of these destabilizing events, this project systematically analyzes news reports to construct a large-scale view of group conflict over time. The method is based on the compilation and analysis of data extracted from an encompassing set of global news reports dealing with group-based conflict, both violent and non-violent. Data is extracted by humans, unlike other research that relies heavily on computer generated coding. By relying on human coders, we are able to capture more specific information on initiators, targets, context, and reactions to destabilizing act. Despite efforts to address these issues, conflicts rooted in ethnic, racial, religious and tribal groupings continue to emerge in different societies around the world. Moreover, many scholars have argued that the end of the Cold War and globalization have exacerbated the impact of these conflicts; if correct, this prognostication has dire implications for life in the 21st century. Our findings will not only provide a new perspective on the trends and patterns of ethnic conflict over the past 60 years, they will place destabilizing ethnically-based strife in a far richer context than previously possible. These events threaten societal stability worldwide; we hope to draw new insights into the forces that drive them.

# Poster Presentations

**PA Session: Morning Poster Presentations, 10:00-11:15 a.m. (Pine Lounge)**

## **PA.01. Withdrawn**

## **PA.02. Modern game environment for nuclear engineering education**

**Lewis Conley**, Junior, Nuclear, Plasma, and Radiological Engineering, ENG  
**Mentor:** Rizwan Uddin, Nuclear, Plasma, and Radiological Engineering, ENG

### **ABSTRACT**

Computer games have become an indisputable way to capture kids' attention. With sales in the millions and the majority of players aged 13 to 23, there is enormous potential to use these games as a device to teach children. This paper explores the use of a modification to the game Fallout 3 to enhance teaching and comprehension of concepts that set the foundation for nuclear engineering. Through the editor, nicknamed the Garden of Eden Creation Kit, or GECK, we can create a 3-D environment that allows for interactive educational content that can be played from any Fallout 3 computer game installation through custom packages. These packages contain extra levels with scenarios that introduce the players to some of the basic concepts necessary to build a foundation for nuclear reactor engineering.

## **PA.03. Ethical implications of HPV vaccination**

**Haley Filinson**, Senior, Nursing, NURS  
**Mentor:** Sandra Burke, Nursing, NURS

### **ABSTRACT**

This poster will discuss the human papilloma virus (HPV) and the HPV vaccine. The types of HPV, clinical manifestations, signs and symptoms, prevalence in the United States, the relationships between HPV and cervical cancer and HPV and genital warts, modes of HPV transmission, and information about the HPV vaccine will be included in the poster. The poster will also include information about ethical issues surrounding the HPV vaccine. A literature review will discuss whether or not the stigma associated with the HPV vaccine deters parents from allowing their children to become vaccinated; legal implications of the vaccine (if the vaccine will be a mandatory immunization among adolescent girls); ethical considerations, such as if teens are encouraged to be sexually active by promoting the HPV vaccine; parents' views on vaccinating their children; and

ways to encourage parental consent for the vaccine. The research poster will include background information, the research question, literature review, ideas for further research, and conclusions.

#### **PA.04. Differential habituation to negative stimuli distinguishes types of anxiety**

**Angeline De Leon**, Senior, Psychology, LAS

**Mentor:** Gregory Miller, Psychology, LAS; Jeffrey Spielberg, Psychology, LAS

##### **ABSTRACT**

Exposure is one of the most researched treatments for anxiety disorders (Moscovitch, 2009). A factor considered to be particularly important for successful treatment is habituation of the fear response during exposure (Foa and Kozak, 1986; Parrish, Radomsky, and Dugas, 2008). One question not yet examined is whether habituation occurs similarly in different types of anxiety, specifically, anxious apprehension and anxious arousal. Anxious apprehension has been theorized to serve as a means of cognitive avoidance, in which verbal rumination about feared outcomes distracts from the processing of imagery related to feared outcomes (Borkovec, 2004). This imagery is hypothesized to lead to an intense fear response. Therefore, engagement of worry leads to a decreased fear response in the short term, which may interfere with long-term habituation to threatening stimuli (Foa and Kozak, 1986; Turovsky, 2000). In contrast, anxious arousal has been theorized to be associated with immediate engagement with threatening stimuli. To explore differences between anxiety types in habituation to negative stimuli, the present study examined performance on the emotion-word Stroop task (Williams, Mathews, and MacLeod, 1996) and used functional magnetic resonance imaging to examine habituation in brain areas associated with the two types of anxiety. Questionnaires were used as measures of anxious apprehension and anxious arousal, and habituation was examined by contrasting performance during the first half of the task with performance during the second half. As predicted, anxious arousal was associated with habituation in brain areas involved in threat responding. In contrast, anxious apprehension was associated with habituation in Broca's area (reflecting decreased worry) but increased activation over time in areas involved in threat responding. Results indicate that anxiety types are associated with different patterns of habituation and suggest that exposure is more beneficial for anxious arousal than anxious apprehension. (Angeline A. De Leon, Jeffrey M. Spielberg, Wendy Heller, and Gregory Miller.)

#### **PA.05. Effects of intradialytic cycling on physical performance and cardiovascular disease risk in hemodialysis patients**

**Krysta M. Peters**, Senior, Community Health, AHS

**Mentor:** Ken Wilund, Kinesiology and Community Health, AHS

## **ABSTRACT**

Chronic Kidney Disease accounts for just less than two percent of the U.S. population (CDC, 2008). Once diagnosed with Stage 5 Chronic Kidney Disease (CKD-5), one is required to undergo dialysis treatments or kidney transplantation. For patients with CKD-5, dialysis has been known to decrease physical functioning, increase the prevalence of cardiovascular disease, and decrease their overall quality of life. The purpose of this study is to examine the effects of a four month intervention of intradialytic exercise on the development of cardiovascular disease risk factors, as well as physical functioning. Study participants are randomized into two groups: non-exercise, control; and scheduled exercise, intervention group. Participants included in the exercise segment are expected to exercise under the supervision of UIUC research staff three days a week at a moderate intensity for 45 minutes per session. Baseline and final four-month data was collected to show the effects on cardiac function and structure via echocardiography. The echocardiogram additionally measured any changes in epicardial fat deposits. Physical function testing was also performed in the form of an incremental shuttle walk test and blood chemistry tests showed changes in oxidative stress markers. The data showed improvements in cardiovascular health measures by decreasing levels of serum oxidative stress markers, serum alkaline phosphatase (risk factor for vascular calcification), and epicardial fat deposits in the exercise intervention group, while no significant changes were noted in the control group. Performance on the shuttle walk test also improved in the exercise group, with no changes present in the control.

## **PA.06. Evaluating consumer medication information from a health literacy perspective**

**Marielva Ayala**, Senior, Community Health, AHS

**Mentor:** Susan Farner, Kinesiology and Community Health, AHS

## **ABSTRACT**

Healthcare is an issue debated in Congress that affects America's social and economic makeup. As healthcare has become the bipartisan issue at the forefront of United States legislation, there are many aspects of healthcare that call for reform, in particular health literacy. A large portion of the U.S. population receives prescription medications, but an issue arises when many patients misuse medication due to miscomprehension or ambiguity of medication leaflets. There are multiple degrees of health literacy that affect patients' comprehension of drug information, including elevated diction, variability in leaflets among pharmacies, and verbose format. The objective of this qualitative and comprehensive investigation is to assess current literature on health literacy focusing on the comprehensibility of the leaflets provided to patients by pharmaceuticals and pharmacies. The methodology included literature review of articles found through various search engines, including PubMed, EBSCO, Google, Science Direct, Cumulative Index to Nursing and Allied Health (CINAHL), and *Journal of the American Medical Association (JAMA)*, and cross-referencing

pharmaceutical literacy, health literacy, medication guides, leaflet criteria, and medication instructions. In conjunction with literature reviews, interviews with pharmacists from Walgreens, CVS, Walmart, Carle, UIC, and the FDA will provide a qualitative analysis. The paper will provide findings that indicate inadequacy of leaflets and the importance of standardization of medication leaflets to ameliorate low health literacy and promote a better understanding of their medications.

### **PA.07. Frozen in time: Case study of a Siberian one-company town**

**Jonas Vaicikonis**, Senior, International Studies, LAS

**Mentor:** Clifford Singer, Political Science, LAS

#### **ABSTRACT**

Siberia has always been a place of deep importance to the Soviet and Russian psyche. Its wild and mineral-rich lands symbolize rugged individualism and economic possibility to Russians, much as the Wild West does to Americans. It is a harsh place that has historically been sparsely inhabited, even though many attempts have been made to exploit the area's bounty of mineral resources. The most salient attempt was made by the Soviet Union and includes a complicated history of GULAG prisons and ecological damage in the pursuit of industrialization. This poster will examine today's Russian Arctic through the prism of one-company towns, in an effort to explain the causes of their persistent economic and social problems. While I understand that this is a broad topic with economic, ecological, and foreign affairs implications, I will examine it through a strict case-study lens. I will first give a sketch of the history of Russian Arctic settlement under the Soviet Union, followed by an examination of a single one-company town during its transition to a market economy. Finally, I will compare the Russian Arctic to Canada's northern territories in an attempt to offer recommendations for future policy in the Russian Arctic.

### **PA.08. Revisiting an old prophecy: Marxist perspectives on economic globalization**

**Dotan Haim**, Junior, Political Science and Philosophy, LAS

**Mentors:** Matthew Winters, Political Science, LAS;

James Kuklinski, Political Science, LAS

#### **ABSTRACT**

Globalization is the distinguishing and defining characteristic of the modern world economy; the interconnectedness of world markets and populations has reached levels that we have never before seen. Along with this emerging phenomenon comes a series of daunting questions: Is the spread of global capitalism inevitable? Is it fair? Does it foster the human good? Sometimes lost in the discussion of these questions is the contribution of Karl Marx's commentary on the subject, which offers a historical and predictive perspective on the

spread of global capitalism. Marx was one of the very first social scientists to recognize and foresee the way in which the world would move towards a global capitalist system. Some point to the collapse of the communist bloc to discredit Marx's writings, but the communist regimes of the past century are not fair representations of a Marxist vision; from this perspective, they came to power through rash and premature revolutions. In reality, Marx has much to offer to the current discussion on the spread of global capitalism that might help us rethink how we frame the discussion and view the phenomenon overall. Specifically, Marx provides one of the earliest predictions of how the macroeconomic phenomena of globalization will affect the lives of individuals. In his discussion of estranged labor, he points to possible inconsistencies and injustices at the individual level that will result from a global capitalist system. He argues that the way that the individual begins to view the world under capitalism will eventually undermine the system and overpower the economic benefits. In this paper, I address this question: Have the real-world effects of economic globalization borne out Marx's predictions on the subject? Answering this question will shed light on whether economic globalization fosters sustainable human happiness. In addition, this test of Marxist predictions will give important insight as how the world will transform in the future under the constant pull of globalization.

## **PA.9. Backpack program evaluation**

**Terra Kern**, Senior, Human Development and Family Studies, ACES

**Mentor:** Barbara Fiese, Human and Community Development, ACES

### **ABSTRACT**

Millions of school-age children in the United States are in households experiencing food insecurity. The U.S. government works to address this serious public health issue through three major federal food assistance programs: the Supplemental Nutrition Assistance Program (SNAP), formerly known as the Food Stamp Program, the National School Lunch Program, and the National School Breakfast Program. Despite these programs, there still exists a gap between need and available services. One program that has been developed to meet the need of food insecure school-aged children is the Backpack Program. This program was piloted by Feeding America in 1995 and was approved as an official national program of the National Council of Feeding America in July of 2006. Food banks partner with local schools who help to identify children at-risk for hunger based on criteria developed by a nutritionist including behaviors related to food insecurity, physical indicators, school performance and home environment. Volunteers fill donated backpacks with child-friendly, easy-to-prepare food; the backpacks are discreetly distributed to children on Friday afternoon. Locally, the Backpack Program was piloted by the Eastern Illinois Food Bank in 2006, and as of 2009, the program has served 185 students, with plans to expand to two additional schools in 2009-10. It is the only weekend feeding program located in downstate Illinois. Nationally, there are more than 1,600 Backpack Programs in 41 states and Washington, D.C., serving more



than 70,000 children each year. Programs such as this represent an important component of the nation's efforts to alleviate food insecurity. However, little is known about the potential impact of the program on children's hunger relief and associated factors such as school performance. As of the 2009-10 school year, The Family Resiliency Center has partnered with the Eastern Illinois Food Bank to evaluate the effectiveness of the program.

## **PA.10. Native structure and folding dynamics of phosphoglycerate kinase are strongly perturbed by crowding**

**Tripta Mishra**, Senior, Specialized Chemistry, LAS

**Mentor:** Martin Gruebele, School of Chemical Sciences, LAS

### **ABSTRACT**

Phosphoglycerate kinase (PGK) is a key enzyme found in all living cells. The folding of this protein was studied *in vitro* and *in vivo* using Förster Resonance Energy Transfer (FRET). For FRET experiments, AcGFP1 and mCherry were attached to the N- and C-terminus of this protein. In the folded state, the termini are close to each other, leading to quenching of AcGFP1 fluorescence by mCherry. Upon unfolding, the termini move apart, leading to an increase in the AcGFP1 fluorescence, which allows us to monitor the kinetics of folding. For *in vivo* experiments, the folding of PGK was studied in bone cancer cells. To study its folding dynamics *in vitro*, the protein was expressed in *E. coli* and was purified using affinity chromatography. The experimental results show that, in contrast with *in vitro* experiments, PGK folding is generally slowed down in living cells, and exhibits considerable heterogeneity. (Tripta Mishra, Apratim Dhar, Simon Ebbinghaus, Antonios Samiotakis, Dirar Homouz, Margaret S. Cheung and Martin Gruebele; Department of Chemistry, University of Illinois, Urbana, IL 61801; Department of Physics, University of Houston, Houston, TX 77204; Department of Physics and Center for Biophysics and Computational Biology, University of Illinois, Urbana, IL 61801.)

## **PA.11. Trial of molecular diagnosis in one case of Anderson's disease**

**Julie McDaniel**, Junior, Pre-medicine and Finance, BUS

**Mentors:** Manabu Nakamura, Food Science and Human Nutrition, ACES; Michio Miyashita, Food Science and Human Nutrition, ACES

### **ABSTRACT**

Anderson's disease, or chylomicron retention disease (CMRD), is a rare autosomal recessive disorder characterized by a patient's inability to absorb lipids due to a defect in chylomicron secretion. This report is a case study of a Japanese boy who was admitted to the hospital at 6 months of age with low weight and chronic diarrhea. Using clinical findings, pathological findings, and a fat loading

intestinal biopsy, the patient was diagnosed with Anderson's disease. Mutation in SAR1B gene has been identified in some but not all patients with Anderson's disease. SAR1B is a GTP-binding protein associated with endoplasmic reticulum-derived vesicles. A previous study by our group showed no mutation in the coding regions of SAR1B gene from the patient. The goal of this study is to determine if there is any mutation on the promoter and exon-intron junction regions of the SAR1B gene in this patient. We first extracted genomic DNA from saliva samples and verified the purity of the sample. We then amplified the DNA using polymerase chain reaction (PCR). We selected primers based on the location where mutations were most probable on the SAR1B gene according to HAPMAP and past case studies. The DNA fragment was separated using gel electrophoresis and isolated from the gel through QIAquick Gel Extraction. Ethanol precipitation was then performed to increase concentration and clarity of the sample. The next step is preparation for sequencing using Big Dye. Finally, purification and capillary electrophoresis were done using ABI 3730XL capillary sequencer at the UIUC Core DNA Sequencing Facility. Data was interpreted using Sequencher 4.9 software. No mutations, however, were detected in the promoter regions, and exon-intron junctions sequenced. The results suggest that the mutation in the patient is more likely in another gene related to chylomicron secretion.

## **PA.12. Computational FTIR microspectroscopy to simulate spectral shifts in epithelium and stromal tissues as a function of sample thickness**

**Andrew Lee**, Junior, Bioengineering, ENG

**Mentors:** Rohith Reddy, Bioengineering, ENG; Rohit Bhargava, Bioengineering, ENG; Scott Carney, Electrical and Computer Engineering, ENG

### **ABSTRACT**

Fourier transform infrared (FTIR) microspectroscopy is a widely used method for analyzing the spatially localized spectral responses of various samples. In our group, we have developed a program that models and simulates this technique by employing a mathematical theory based on Maxwell's equations in order to model light propagation through homogenous samples. Taking into account focusing, material properties, and boundary conditions, this program uses average spectral data for given tissue samples as input and outputs the corresponding spectral response, simulating the responses found as if using an FTIR spectrometer. In this study, we use the developed code to simulate and examine the changes in the spectral responses of epithelial and stromal tissue as a function of sample thickness. According to Beer's law, the absorption spectrum of a given tissue will shift upward directly proportional to the increase in sample thickness. For our case, varying film thicknesses of each tissue class were used as inputs to the simulation for several cases including full aperture and half-aperture transmission and reflection modes. Presented are the corresponding spectral responses as well as 2D cross-sectional images of

the field distribution within each tissue class. Simulation results should indicate increasing spectral shifts by the same factor as the increase in film thickness. These results will provide another example to help validate the software model of FTIR microspectroscopy as a capable simulation to computationally analyze localized spectral responses.

### **PA.13. Exploring negativity in presidential campaign advertisements from the past to the present**

**Gregory Hart**, Senior, Political Science, LAS

**Mentor:** Scott Althaus, Political Science, LAS

#### **ABSTRACT**

Conventional wisdom contends that the degree of negativity in presidential campaign advertisements has progressively increased since the advent of television. Nonetheless, evidence in the form of presidential campaign songs—media many political scientists consider as the closest historical equivalents to the modern day television ad—tells a different story. Historical campaign songs, which were printed in publications and sung by supporters of different candidates at rallies, speeches, and other public events, in many cases contained extremely negative content. For example, one song sung by supporters of 1840 Whig presidential candidate William Henry Harrison decried President Martin Van Buren as a man who moves at Satan's beck and nod. This thesis tests conventional wisdom using a content analysis that compares the degree of negativity present in a sample of 250 presidential campaign songs dating from the 19th and early 20th centuries with that of a sample of 250 television ads from the mid to late 20th century. This thesis will shed light on whether modern elections are truly more negative than those in the past. Additionally, using voter turnout statistics, this thesis attempts to advance the debate over negativity's true role in presidential campaigns. Particular emphasis is placed on discovering whether negativity has any unique effect on the behavioral tendencies of the electorate or if its effect is tied to the broader cultural tendencies of the given time period in which the election took place.

### **PA.14. Dimensions of a school climate and their effect on students perceptions of school safety**

**Jameese Sykes**, Senior, Psychology, LAS

**Mentor:** Mark Aber, Psychology, LAS

#### **ABSTRACT**

The importance of a safe school is to provide a nurturing environment in which the teachers can teach and students can learn effectively. However, if students perceive their school as unsafe, this can hinder their learning environment. More specifically this study is concerned with whether certain dimensions of a school climate can affect students' perceptions of school safety such as Fairness (racial and disciplinary), Security Measures, Sense of Belonging, and Sense of

Achievement. Next the study examined if perceptions of school safety differed for Black and White students. The survey was administered to 1,809 high school students (grades 10-12) via paper and pencil in Spring 2009. The ninth graders made up 27.9% of the sample, tenth graders 26.3%, eleventh graders 24.1% and twelfth graders 21.6%. African Americans composed 27.8% of the sample, White students 54.8%. Results illustrated that certain dimensions of the school climate does affect students' perceptions of school safety. This suggests that the school faculty can create policies that ensure that students deem their school as safe.

### **PA.15. Longitudinal associations between peer victimization and perceptions of self and peers: Moderation by depression**

**Nicole Babuskow**, Senior, Psychology, LAS

**Mentor:** Jamie Abaied, Psychology, LAS

#### **ABSTRACT**

The present study examined how parental childrearing disagreements, division of labor for childrearing practices, and depressive symptoms were concurrently associated with mothers' and fathers' autonomy support and control during family interactions. Sixty-two two-parent families with a 5-year-old child participated in the current study. Both mothers and fathers completed three questionnaires assessing the level of disagreement with their spouses regarding childrearing practices, how they divided childrearing practices, and their depressive symptoms. In addition, families were observed in two different family interaction contexts (i.e., family dinnertime and task-oriented triadic family interaction) to assess the level of autonomy-support and control. Results indicated that only mothers were more likely to engage in controlling parenting behaviors during dinnertime when they reported more childrearing disagreements with their spouses. Fathers, on the other hand, appeared to be less autonomy supportive at dinnertime and more controlling during family task when they reported more depressive symptoms. Moreover, fathers were more controlling during dinnertime when they reported higher levels of actual and ideal levels of involvement in childrearing practices relative to their spouses.

### **PA.16. Hydropolitics: The international water transfers and commodification**

**Felipe Westhelle**, Senior, International Studies, LAS

**Mentors:** Brian Dill, Sociology, LAS; Jude Hays, Political Science, LAS

#### **ABSTRACT**

Hydropolitics, loosely defined as the politics of water's availability, has taken on a most interesting debate over water as a commodity or a human right. Water began a global phase of commodification during the neoliberal age with its

privatization, and most recently we are witnessing the creation of international water transfers and their international water markets. Water, as a necessity, bears immeasurable weight and importance and is leading to increased tension in areas already facing water scarcities and insecurities. To better understand international water transfers and markets we need to observe and study the effects that privatization of water, in the neoliberal wave of the 1990s, had. It was initially welcomed and hailed as a solution, but with the passage of time the impacts and effects of water's commodification fell short of achieving their proposed impacts. With the increased skepticism toward neoliberal policies, hydro politics took on a new dynamic, from intrastate to an interstate debate. Previously only incorporating private companies (so eminently in the 1990s) and host countries, the debate (and conflict) has now evolved into an interstate paradigm with agreements and treaties, evolving into international water markets. This poster identifies key factors related to international water transfers and explores the conditions under which they either increase the potential for cooperation or raise the possibility of conflict. It addresses the topic of international water transfers and international water markets. It also questions how countries engage in negotiation and the allocation of the theoretical models for the allocation of the water as either a commodity or a human right. Factors are identified from case studies that increase the potential for cooperation or conflict, and may provide a model for successful resolution of these issues for the future.

## **PA.17. The universality of international human rights treaties**

**Katherine H. Hapeman**, Senior, Political Science, LAS

**Mentor:** Paul Diehl, Political Science, LAS

### **ABSTRACT**

Foremost in any human rights discourse is an underlying tension between the respect for particular cultural practices, and the purported universality of rights that transcend state sovereignty. Although the origin of the current human rights regime is primarily a Western construct following the carnage of the Second World War, the rights are meant to apply equally to all peoples in all places at all times. The validity and moral authority of the rights regime depends upon its universality and objectivity meaning that the enumerated rights are valued and accepted by nearly everyone, and that they are not biased in favor of a certain nation or group. This presentation will examine the extent to which the content of international human rights treaties is both universal and equitably addresses the concerns of different peoples. A thorough investigation of all the relevant human rights treaties is lacking in the scholarly literature to this point. By further identifying which actors determine the content, and what kind of actors ratify the treaties, one can determine if the current human rights regime fairly represents the wide spectrum of human aspirations. By qualitatively examining fifteen of the major human rights treaties article by

article, the author ultimately concludes that the treaties themselves incorporate rights acceptable to nearly everyone, but that the application of the treaties is determined by power disparities in the international system.

### **PA.18. The effects of generic language on views of intelligence stability**

**Caitlin Carmichael**, Senior, Psychology and Molecular and Cellular Biology, LAS  
**Mentor:** Andrei Cimpian, Psychology, LAS

#### **ABSTRACT**

The way in which people view intelligence can have broad consequences, including effects on academic motivation. Researchers have identified two common ways people think about intelligence (Dweck, 2006). Some people see it as a fixed quality that cannot be changed. Others believe that intelligence can be altered through what you do (for example, by practice and effort, learning new skills, etc.). In this experiment, we are examining whether language can make one of these views more salient. Participants were asked to consider qualities of a single person (a male/female friend), or to think about qualities of an entire group of people (men or women as a whole). Based on some previous research in our lab, we hypothesized that being asked to think about the qualities of entire groups may highlight (at least temporarily) the view that intelligence is a fixed quality. In the future, we plan to carry out similar research with school-age children. Findings in support of our hypothesis would have implications for the ways parents and teachers communicate with children.

### **PA.19. Marital satisfaction and parenting in terms of autonomy-support and control**

**Andrea Gavidia**, Senior, Psychology, LAS  
**Mentor:** Aya Shigeto, Psychology, LAS

#### **ABSTRACT**

The present study examined how marital adjustment and parental disagreements about childrearing were concurrently associated with mothers' and fathers' parenting styles during family interactions. Parenting styles were classed into the two broad categories of autonomy-support and control. Sixty-five two-parent families with a 5-year-old child participated in the current study. Both mothers and fathers completed two questionnaires assessing the level of marital adjustment and the level of disagreement between spouses regarding child-rearing practices. In addition, families were observed in two different family interaction contexts: family dinnertime and task-oriented triadic family interaction, to assess the level of autonomy-supportive and controlling parenting. Results indicated a positive relationship between the level of childrearing disagreements and the amount of controlling behavior mothers exerted on their children at dinnertime. We also found that marital adjustment was negatively associated with fathers' autonomy-support during the task-oriented family

interaction. These results suggest spillover effects of marital relationship quality on parental autonomy support and control in family interaction contexts.

## **PA.20. Validation of Raman enhancement within multilayered nanoshells**

**Pratik Shailesh Randeria**, Senior, Bioengineering, ENG

**Mentors:** Rohit Bhargava, Bioengineering, ENG; Anil Kodali, Mechanical Science and Engineering, ENG; Matthew Schulmerich, Bioengineering, ENG

### **ABSTRACT**

Surface-enhanced Raman scattering (SERS) observed for analytes in nanostructured metal environments provides increased detection capabilities. The enhancement obtained is however dependent on the uncontrolled orientation and functionalization of the analyte on nanoparticles resulting in unreliability. By utilizing complex nanoparticles with embedded/functionalized reporter molecules and designing the structure, it is possible to create reliable labels for imaging applications. In this study, we demonstrate the SERS signals obtained in simple nanoparticle structures of different sizes and with different reporter molecules. We present here a validation of the labels designed for near-IR excitation and demonstrate the contrast achieved between the label response and an analyte response. A comparison is shown between theoretical predictions and experimental measurements.

## **PA.21. The limits of voluntary initiatives: The OECD guidelines for corporate social responsibility on the environment**

**Toni Funk**, Senior, International Studies, LAS

**Mentors:** Tom Bassett, Geography, LAS; and Marcelo Bucheli, Business Administration, BUS

### **ABSTRACT**

The OECD Guidelines for Multinational Enterprises is a set of international voluntary initiatives, which contain an extensive set of guidelines to promote Corporate Social Responsibility (CSR) in many arenas, including environmental protection. This initiative has a weak structure of accountability and enforcement. As a result, MNCs continue to operate in the global South despite their failure to abide by OECD guidelines. Through an analysis of environmental cases that have been brought against MNCs by NGOs worldwide, this paper shows why the voluntary initiative fails to produce the intended results of the OECD Guidelines. The results show that the OECD approach to environmental initiatives lacks an effective structure that holds its violators accountable and does little to reduce the environmental impact of MNCs operations. Despite the poor results, international bodies like the OECD and the United Nations appear reluctant to draft new standards and enforcement mechanisms.

## **PA.22. Direct-write assembly of 3D periodic ceramic structures**

**Ashley Gupta**, Senior, Chemistry, LAS

**Mentor:** S. Brett Walker, Materials Science and Engineering, ENG

### **ABSTRACT**

The design and fabrication of 3D periodic structures is of both scientific and technological importance. Current research efforts are focused on patterning ceramic structures via direct-write assembly. In this approach, a concentrated colloidal zirconia ink is deposited in a layer-by-layer build sequence to create 3D periodic lattices (5 x 5 x 1.25 cm<sup>3</sup>) composed of 500 micron cylindrical features with a center-to-center separation distance of approximately 2 mm. Such structures may find potential application as ceramic membranes for molten metal filtration. We will describe our efforts to optimize the ink formulation, printing parameters, and drying conditions to enable component assembly. (Ashley Gupta, Brett Walker, and Jennifer A. Lewis, Materials Science and Engineering Department, University of Illinois, Urbana, IL 61801.)

## **PA.23. Mealtime behavioral control level in relationship to child body mass index**

**Dontina Corpus**, Senior, Human Development and Family Studies, ACES

**Mentor:** Barbara Fiese, Human and Community Development, ACES

### **ABSTRACT**

Obesity among children has become a growing epidemic in the United States. It is important to investigate the multiple factors that contribute to child obesity. Previous research has found that children who engaged in healthier diets and who are at a healthy weight have parents who exercise positive persuasion and who insist on eating during the meal. Furthermore, in the situation where the child does not want the offered meal, parents who do not cook a separate meal have children who are healthier as well (Hendy et al., 2009). This particular study examines the relationship between the displayed behavioral control level and the child's body mass index. The mealtime interaction was video recorded and coded. The McMaster Clinical Rating Scale was utilized in order to assess the interactions among families. Two coders viewed the tapes and reached a reliability of .78, ensuring consistency among coders. The family mealtime interaction coding system was utilized in order to assess six main areas of coding (task accomplishment, communication, affect management, interpersonal involvement, behavior control, roles, and overall family functioning). The Mealtime Family Interaction coding system is adapted from the McMaster Clinical Rating Scale and is executed by video recording each family during a typical meal routine (breakfast, lunch, dinner) and rating each family on every area of interest. This study specifically looks at the behavior control variable in relationship to each child's BMI. Based on previous research, it is hypothesized



that behavior control and child's BMI will have an inverse relationship. Such that as the higher the family is rated on the behavior scale the lower the child's BMI will be.

### **PA.24. Extraction and recovery of lipids and valuable co-products from high moisture algal biomass using ethanol-based solvents**

**Derek Vardon**, Senior, Civil and Environmental Engineering, ENG

**Mentor:** Lance Schideman, Agricultural and Biological Engineering, ACES

#### **ABSTRACT**

Algal biofuels offer a promising alternative for renewable energy production and pollution mitigation due to the rapid growth rate, high lipid content and ability of certain species to grow on marginal waterbodies using waste stream nutrients and captured carbon dioxide. However, the aqueous environment in which algae thrive also presents a primary hurdle for the environmental, economic, and energetic sustainability of algal biofuel production. Extensive dewatering is required to produce low moisture biomass (<10% moisture) prior to the extraction of cellular lipids and other high value co-products using conventional hexane solvents. The dewatering process can quickly become energy intensive considering harvested algal biomass can contain up to 75-85% moisture depending on the processing method. In order to circumvent this issue, our research examined the feasibility of ethanol-based solvents for the extraction of lipids and valuable co-products from high moisture algal biomass. The performance of ethanol-based solvents was examined across various extraction parameters including biomass moisture content, cellular disruption treatment, solvent to biomass ratio, and reaction time. The resulting crude lipids were then separated by their polar classes using solid-phase extraction (SPE) cartridges and quantified using high performance liquid chromatography coupled to a refractive index detector (HPLC-RID). The lipid yield obtained with ethanol-based solvents was then compared against lipids extracted with the well known method of Bligh and Dyer using chloroform-methanol solvents.

### **PA.25. Upper respiratory infections in felines at the Champaign County Humane Society in relation to door knob sanitation**

**Kristen Knight**, Senior, Animal Sciences, ACES

**Mentor:** Amy Fischer, Animal Sciences, ACES

#### **ABSTRACT**

In medical establishments, the primary transfer of pathogens and disease is through hand to hand or hand to surface contact. I have found it very significant to increase the sanitation of commonly touched surfaces in an animal shelter setting. This project reviews the medically related consequences of sanitizing

the seventy eight door knobs at the Champaign County Humane Society (CCHS). Each door knob was cleaned once a day and data was collected on each feline daily, to monitor the rate of illness among the population. My hypothesis is this procedure will decrease the rate of animals euthanized in the CCHS due to health-related issues caused by Upper Respiratory Infections (URIs). A URI can be caused by viruses and forms of bacteria. Felines are more susceptible to these kinds of infections in the shelter setting which is commonly a stressful environment. Noise, overcrowding, poor ventilation, sick incoming animals, unvaccinated animals, and cross contamination are all reasons URI outbreaks may occur. CCHS runs entirely on donations and volunteer work. It is vital that every task at the shelter be made more efficient. By removing the causative agents and identifying the aspects that cause URIs in the shelter, shelters can better form a plan of how to prevent the spread of disease and control a healthier pet population. By monitoring treatment plans we can evaluate response and effect of medications, as well as determine where a prime location from which pathogen spread is centered.

## **PA.26. Monoclonal antibody production and optimization**

**Forrest Waters**, Senior, Molecular and Cellular Biology, LAS

**Mentor:** David Forsthoefel, Cell and Developmental Biology, LAS

### **ABSTRACT**

Monoclonal antibodies (MAbs) are a very useful tool in molecular biology. However, there are not as many publicly shared MAbs for the planarian as there are for other, more widely used, model organisms. The original goal of the project was to create new MAbs that marked the planarian intestine in the hope that the antibody stain would be good enough to help us visualize phenotypes of RNAi knockdowns in the planarian intestine. Furthermore, upon trials of different fixatives, it was observed that some antibodies labeled better in different conditions. A secondary goal was then created to optimize the staining conditions for each of the antibodies. The variables chosen for the optimization included different fixatives, different fix times, post-fixation treatments (such as antigen retrieval, reduction, and proteinase K), and block times. Optimizing the new MAbs using these variables resulted in useful antibodies that everyone in the planarian community may benefit from and demonstrate the many options available to scientists with problems in immunohistochemistry.

## **PA.27. The Super Bowl: What are we really watching?**

**Matthew R. Heberer**, Senior, Community Health, AHS

**Hazel Oza**, Junior, Community Health, AHS

**Kara Martin**, Senior, Community Health, AHS

**Renee Durack**, Senior, Community Health, AHS

**Elle Thermos**, Senior, Community Health, AHS

**Rachelle Tulley**, Senior, Community Health, AHS

**Chris Wang**, Senior, Community Health, AHS

**Erica Kilby**, Senior, Community Health, AHS

**Mentor:** Stephen Notaro, Kinesiology and Community Health, AHS

### **ABSTRACT**

As the number of television viewers increases during the Super Bowl, so does the importance and reach of advertisements aired during the game. The advertisements—and, more importantly, their content—have a profound impact on popular culture and consumer health behavior. Marketers pay millions for their products to be advertised during the Super Bowl. And for good reason: according to the Nielsen ratings, in 1999 there were about 83.7 million viewers. This year's Super Bowl brought in about 106.5 million viewers. The stakes have gotten higher for the advertising world; because of this, the cost of a 30-second commercial spot went up from \$1.6 million in 1999 to about \$2.5-2.8 million dollars this year. This research is based on the time frame of 1999-2010 and examines what was being advertised during the Super Bowl from a healthcare perspective. This study investigates the frequency of advertisements of foods, drinks, medications, and health promotional aids. We further look into how the frequency of these ads has changed, as well as how content has changed over the 12-year period. The study will analyze the impact on the health of the viewing audience and relate that information to healthcare trends in the population.

## **PA.28. Biocompatible flexible polymers and cellular growth**

**Radu Lazar**, Sophomore, Bioengineering, ENG

**Mentors:** Michael Walsh, Beckman Institute;

Rohit Bhargava, Bioengineering, ENG

### **ABSTRACT**

The need to study cellular development in environments similar to cells in vivo surroundings has led to using polymers as viable substrates. Polymer structural properties can be tuned by altering their fabrication to match desired mechanical attributes. However, there exists one major drawback: cells do not adhere to the polymers. To overcome this limitation, biocompatible polymers can be created by functionalizing some existing polymers either by incorporating cellular peptide adhesion sequences into their structure or by coating their surface with the same sequences. With this in mind, the goal of this study is to grow different cell lines on fabricated acrylic terpolymers and to investigate growth and differentiation changes in response to mechanical stress induced on the polymer substrate. Acrylic polymers have the added benefit of high flexibility while an easy fabrication technique allows for simple tuning of the materials mechanical properties. The acrylic terpolymers are created using a free radical solution polymerization and are functionalized using a coupling agent with RGD

containing peptide sequences, peptide sequences cellular receptors adhere to. Cells grown on these fabricated polymers can be analyzed using Fourier Transform Infrared (FT-IR) spectroscopy to study cellular changes in response to varying mechanical stresses. FT-IR can also be used to characterize the chemical composition of the fabricated polymer ensuring that the desired material is produced. Successful development of a polymer similar in mechanical properties to those of human tissue can lead to the creation of more complex 3D matrix structures that more completely mimic in vivo environments for cells and can lead to advanced study.

## **PB Session: Early Afternoon Poster Presentations, 1:30-2:45 p.m. (Pine Lounge)**

### **PB.01. Islamist parties and secular politics: The secularization of Islamist policy**

**Nicholas Heller**, Senior, Political Science, LAS

**Mentor:** Jose Cheibub, Political Science, LAS

#### **ABSTRACT**

In 1985, a Lebanese Islamist organization known as Hezbollah released its first position statement entitled the Open Letter. The Open Letter states that Allah has made it intolerable for Muslims to participate in an unjust regime which is not predicated on the prescriptions of religion and upon the basis of the Sharia, as laid down by Muhammad (Hezbollah's Open Letter 1985). Despite its early condemnation of participating in secular politics, Hezbollah chose to take part in the 1992 parliamentary elections in Lebanon. Hezbollah's participation in secular politics is not an isolated incident, but rather a recurring theme in the Muslim world today. From Egypt to Indonesia, Islamist parties have begun to campaign for elected office in order to gain influence over the governance of Muslim society. This phenomenon is especially surprising given the anti-secular message of Islamist party doctrine, which promotes above all else the establishment of a united Islamic state throughout the Muslim world. Participation in secular politics has led Islamist groups to change many of their core policies. Hezbollah, for example, no longer openly supports the establishment of an Islamic state, which had been a key component of the group's 1985 policy as outlined by the Open Letter. In my paper, I argue that there are three mechanisms directly related to political participation, which lead Islamist groups to adopt more secular policies (i.e. policies that are not derived from religious law). These mechanisms include the perceived need of Islamist parties to cater to the needs of a wider constituency possessing secular values, the advantage of forming political alliances with secular political parties and organizations, and pressure exerted by foreign regimes. I examine each of these mechanisms in my analysis in order to determine why Islamist parties become more secular as a result of participation in secular politics.

## **PB.02. Child care nutrition and feeding contents-related oral health regulations comparative to U.S. standards**

**Sonny Song**, Sophomore, Undeclared, DGS

**Mentor:** Juhee Kim, Kinesiology and Community Health, AHS

### **ABSTRACT**

Early child caries (ECC) are increasing in the U.S. Nutrition and feeding practices are both important risk factors for the development of ECC. Yet, child care feeding practices related to ECC are scarce. We are currently conducting a document review to compare the state nutrition and feeding contents-related oral health regulations compared to those of the national standards among 15 states. The states that satisfied most of the regulations for child care centers were California, Illinois, Wisconsin and Texas. These states included regulations about 1) Not feeding cow's milk to children who are less than 12 months of age, 2) Breastfeeding, 3) Avoiding Bottle Use, 4) Frequency of Snacking, 5) Water Freely Available 6) 100% Fruit Juice, and 7) No Bottle Propping. Although these states satisfied the regulations, California and Wisconsin went against some of the regulations in various categories, such as Feeding formula without foods and Introduction of solids. Additionally, there were states that did not satisfy hardly any of the regulations, such as North Carolina and Massachusetts. These two states did not have any mention of 1) Not feeding cow's milk to children under 12 months of age, 2) Breastfeeding, 3) Formula with foods, 4) Introduction of solids, 5) Dietary modification on dental need, and 6) 100% fruit juice. In the future, the goal would be to analyze all 50 states for the state nutrition and feeding contents-related oral health regulations for child care centers and family child care homes to address the importance of nutrition and oral health. The results of this study will invoke an awareness about nutrition and oral health in child care setting.

## **PB.03. Characterization of RNA regulators in *Escherichia coli* for the construction of a bacterial decoder**

**Francis Lee**, Junior, Molecular and Cellular Biology, LAS

**Steve Waltersdorf**, Junior, Molecular and Cellular Biology, LAS

**Mentors:** Christopher Rao, Chemical and Biomolecular Engineering, LAS; Yong-Su Jin, Food Science and Human Nutrition, ACES; Joanne Manaster, Cell and Developmental Biology, LAS; Courtney Evans, Institute for Genomic Biology

### **ABSTRACT**

Previously, the majority of engineered, genetic regulation within bacteria has been achieved through the use of transcriptional regulators. This is primarily due to the wealth of data characterizing them as well as their relative simplicity.

However, the recent explosion of interest from the emerging field of RNA regulation provides new insights into the dynamic nature of genetic regulation. Small non-coding RNAs (sRNAs) comprise the chief regulatory mechanism for eliciting primary responses to environmental conditions. Acting in conjunction with proteins such as hfq (RNA chaperone), sRNAs provide a cost-effective specific and rapid response rate that is essential in targeting gene transcripts for regulation. Undergraduate representatives from the Illinois iGEM Bioware Team are exploring the molecular mechanisms of RNA-RNA interaction and RNA stability to construct a novel decoder function in *E. coli*. We aim to characterize several small RNA gene and target sequence combinations in a manner that allows for their direct application in genetic regulation. The decoder is a component of low-level computer architecture composed of a specific arrangement of logic gates. It provides the information processing components necessary to turn the presence or absence of two distinct inputs into one of four outputs. The small RNAs will provide the regulation necessary to create the circuitry behind this decoder. We will present our work involving small RNA cloning and characterization as well as a design for the application of RNA regulators in logic gates, ultimately leading to a modular and dynamic bacterial decoder.

#### **PB.04. Risk factors for the development of type 2 diabetes in children: A modified integrative literature**

**Katie Valentino**, Senior, Nursing, NURS

**Faculty Mentor:** Teresa J. Krassa, Nursing, NURS

##### **ABSTRACT**

In the past several years, there has been a significant rise in the diagnosis of type 2 diabetes mellitus (T2DM) in children. This prevalence seems to be ever more coincidental with the rapid increase in pediatric obesity. The purpose of this study was to determine the risk factors present in the development of T2DM in children. Orem's Model of Nursing (Hartweg, 1991) served as the conceptual framework for this modified integrative literature review study. A convenience sample of ten studies meeting the inclusion criteria and published between the years of 1995 to 2009 were found after searching the CINAHL and PubMed databases as well as via archival searching. Along with several determinants such as ethnicity and family history, the results of the study showed that obesity was a primary risk factor for the development of type 2 diabetes mellitus. Since there seemed to be a link between obesity and type diabetes mellitus in children, nurses need to implement prevention and education programs to promote wellness.

#### **PB.05. Physicians' and nurses' opinions on neonatal end-of-life care: A modified integrative literature review**

**Samantha Friedman**, Senior, Nursing, NURS

**Mentor:** Teresa J. Krassa, Nursing, NURS

## **ABSTRACT**

The purpose of this study was to conduct a modified integrative literature review of the research literature available on neonatologists' and nurses' ethical decision making on neonatal end-of-life (EOL) care. By reviewing the current research literature available on ethical decision making in neonatal end-of-life care, a better understanding of what research is needed in this field for the future will be discovered. Ten research articles found from searching PubMed and CINAHL databases using convenience sampling were included in this study. After reviewing the current research literature, it was found that most physicians and nurses find 23 weeks gestational age as the lower limit for futility, and 25 weeks gestational age as the upper limit for futility. Many physicians use gestational age as a guideline in resuscitation. Parents only sometimes influenced physicians' choices regarding end-of-life decisions. However, a low percentage of physicians frequently resisted a parental request in regards to end-of-life decisions. Nurses also felt that they should have had more input into EOL decisions. Parents, physicians, and nurses quality of life concerns were often mentioned in the research as an influence in end-of-life decisions. Although many neonatologists' and nurses' attitudes on ethical decision making on neonatal end-of-life care coincided, it can be concluded that more research needs to be done in this field in order to keep up with the growing medical technology that is responsible for the ethical dilemmas that we face today. Implications for nursing will be discussed.

## **PB.06. The effects of breast cancer treatment-related fatigue on quality of life**

**Emily Stonecipher**, Senior, Nursing, NURS

**Mentor:** Teresa J. Krassa, Nursing, NURS

## **ABSTRACT**

While fatigue affects many people daily, cancer patients tend to experience a more severe form of this symptom. The purpose of this study was to conduct a modified integrative literature review of the research currently available about the effects of cancer treatment-related fatigue on the lifestyle of breast cancer patients. Roy's Adaptation Model served as the conceptual framework for the study. A convenience sample of ten research studies focusing on the effects of treatment-related fatigue on breast cancer patients quality of life, published between 1989 and 2009 and meeting the inclusion criteria, were examined. The articles were found in PubMed and CINAHL databases. Results indicated that treatment-related fatigue has a significant impact on the quality of life in breast cancer patients, affecting their ability to maintain employment, interact with their families and friends, and decreasing their perception of their overall condition. Physical activity was shown to have a positive impact, decreasing feelings of uselessness and increasing energy. Implications are that more research should be done to expand knowledge on specific exercises impact on fatigue, and patients should be educated more vigilantly on potential fatigue

feelings and how to cope with them. Limitations are study selection bias, sole type of cancer selected which limits application to other types of cancer, and convenience sampling.

### **PB.07. 3-D virtual environments for improved training at nuclear power plants**

**Zachary D. Kriz**, Junior, Nuclear, Plasma, and Radiological Engineering, ENG  
**Imran Haddish**, Freshman, Nuclear, Plasma, and Radiological Engineering, ENG  
**Mentor:** Rizwan Uddin, Nuclear, Plasma, and Radiological Engineering, ENG

#### **ABSTRACT**

Training for personnel at a nuclear power plant (NPP) traditionally focuses on the usage of films, books, and other written texts to cover requisite material for the tasks an employee will encounter. While these methods are effective, they often lack an interactive aspect, which leads to a lack of feedback on performance of the individual trainee that could be used during the initial training to focus on areas where they may be lacking. Virtual training, which could be accomplished through the usage of a 3-D virtual reality environment, could be used to incorporate the traditional film and text material into an interactive environment. Within this environment the trainee would be exposed to the material which they must learn, and at the same time be exposed to situations where such material must be applied. This dual avenue of teaching could be observed by the instructor and provide feedback following any given scenario run. Our research has been focused on developing interactive models on the Unreal Engine III platform, specifically within the Unreal Tournament III Game editor. Several tools which are used to recreate the NPP scenarios include static meshes, virtual security cameras, multi-player options, color-coded floor/dosage zones, and embedded video and sound tracks. Within the editor, everything is created out of a mesh of polygons; a static mesh is merely a mesh that does not move. They exist to flesh out a model and make it look realistic. An example of a static mesh can be an operator panel in real-life, which is modeled in a program and imported into the editor. Color-coded dosage zones are a special static mesh which was developed to simulate the various radiation zones in a plant. The data on dosage levels is loaded into a spreadsheet, which then is implanted into a developed level, and when a trigger is hit the floor will display a color designating the level of radiation. Upon entering the zone inside the level, the trainee's player is damaged to represent the dosage of radiation he/she has accumulated. Embedded video is used to place an outside video recording into a surface in the level. This is a medium through which much instruction could be accomplished. For instance, a trainee could walk up to a computer monitor next to a tool they must use, and watch a video that explains the operation of the tool. Tools such as these, when implemented into the virtual levels, allow for the recreation of NPP specific scenarios, specifically scenarios for the improved interactive training of new personnel in a non-hazardous area.



## **PB.08. Attitude and opinion of undergraduate students at UIUC regarding climate change and sustainability issues**

**Serena Gountanis**, Junior, Mathematics and Geology, LAS

**Mentor:** Michael Stewart, Geology, LAS

### **ABSTRACT**

During the fall of 2007, James Scholar honors students at the University of Illinois at Urbana-Champaign began to survey their peers in regards to their opinions, attitudes, and knowledge on climate change science and environmental sustainability measures at the University of Illinois. The survey has continued each semester since its inception, and to date a total of 738 students have been surveyed. The data from each semester is analyzed separately and as part of a combined data set to determine trends in undergraduate mainstream thought regarding climate change and sustainability issues. Analysis of the data shows that (1) the undergraduate student body is generally well informed regarding climate change (73.85% claiming that they are either conscious or very conscious of how their actions affect climate change); and (2) awareness of climate change and sustainability issues is increasing each year, although the change is slight, possibly due to the already high level of awareness. Notably, students claim that their levels of consciousness have risen since arriving at the university, and many students claim they have taken action to reduce their carbon footprint. Significantly, most students do not favor student fees in support of improving the sustainability of campus facilities.

## **PB.09. Healthy meals for weight loss at fast food restaurants**

**Alexandra Ginos**, Senior, Dietetics, ACES

**Mentor:** Manabu Makamura, Food Science and Human Nutrition, ACES

### **ABSTRACT**

According to the World Health Organization, obesity is the most prevalent public health problem in the 21st century. Since fast food meals are eaten often by the average American and tend to be unhealthy, creating fast food meal options that satisfy core meal requirements is of great interest. The objective of this project is to evaluate the McDonald's menu to determine if healthy meal options are available on the menu. To determine if meal options met healthy meal requirements, common meal options were analyzed to see if they met the following criteria: total kilocalories of 600, grams of protein 20 g, combined saturated and trans fat of < 4 g, milligrams of sodium < 500 mg, and grams of fiber 7. The Big Mac Value Meal, which did not meet these core meal requirements, was compared to a healthier meal option (Premium Grilled Chicken Classic Sandwich without mayonnaise, Snack Size Fruit and Walnut Salad, and Side Salad) that met most core meal requirements. The Big Mac

Value Meal contained 225% of the recommended kcal amount, 358% of the recommended saturated and trans fat amount, and 107% of the recommended cholesterol amount. In comparison, the healthier Chicken Sandwich meal contained 100% of recommended kcals, 62.5% of recommended saturated and trans fat, and 100% of the recommended cholesterol value, and thus is a much healthier meal option than the Big Mac Value Meal. Since it was possible to create a healthy meal option that met most core meal requirements at McDonald's, this project demonstrates that healthy meal options can be found at McDonald's and other fast food restaurants.

### **PB.10. The effects of parenting behaviors on youth mental health: Urban Mexican Americans in the context of violence**

**Alethea Merelos**, Psychology and Spanish, LAS

**Mentor:** Jorge Ramirez, Psychology, LAS

#### **ABSTRACT**

Although it is well known that parenting is linked with Latino youth mental health, little is known about the role of parenting by fathers. Furthermore, the role of parenting in the context of ecological stressors, such as exposure to violence, has received little attention. These gaps in the literature were addressed in this study with a Mexican American sample of 150 adolescents (ages 14-19, M = 16.44 years) recruited from an immigrant enclave in a large Midwestern metropolitan area. Adolescents completed questionnaires of mothers' and fathers' acceptance and harsh parenting, youth mental health symptoms, and exposure to violence in the neighborhood. Results showed that Mothers' Harsh Parenting and violence were positively associated with higher levels of youth mental health symptoms. When taking into account mothers' parenting behaviors, Fathers' Acceptance was associated with lower levels of youth mental health symptoms. Separately, Fathers' Acceptance and Mothers' Harsh Parenting behaviors partially mediated the impact of violence on youth mental health symptoms. This finding revealed that parenting behaviors can explain, in part, why exposure to violence affects Mexican American youth mental health. However, exposure to violence still had a significant impact on youth mental health, despite parenting behaviors. This research suggests that, in addition to mothers, it is important to consider fathers in parenting interventions and that it is important to consider the limits of parenting on protecting youth from the impact of exposure to violence.

### **PB.11. Plasma deposition with high ionization fraction**

**Peter Fafilis**, Sophomore, Nuclear, Plasma, and Radiological Engineering, ENG

**Mentor:** Andrew Cloud, Nuclear, Plasma, and Radiological Engineering, ENG

## **ABSTRACT**

Of great importance in the computer chip industry is smaller, faster, more efficient chips. Computer chips are fabricated by the etching of trenches into a piece of silicon and the deposition of conducting material into the trenches. A common way to fill the trenches is deposition by way of plasma sputtering. Plasma sputtering is by nature isotropic. It is this isotropy that causes deep trenches to fill irregularly, typically with buildup on the side walls that can stop material from depositing much on the bottom. If the sputtered material were sufficiently ionized, an applied electric field could cause the sputtered material to deposit evenly along the trench, improving the depth to which trenches can be efficiently filled—and, eventually, improving the processing speeds and memory capacities of computers. We are experimenting with several pulsed power sources to increase the ionization fraction of the sputtered metal. By using a triple Langmuir probe, and several other diagnostic devices, we can determine the ionization fraction, and determine a proper voltage pulse to apply to the target to cause the highest ionization fraction possible.

## **PB.12. Acute behavioral impairment and microglial activation in the hippocampus in response to peripheral influenza infection**

**Kaushik Amancherla**, Senior, Molecular and Cellular Biology, LAS

**Mentor:** Heidi Jurgens, Neuroscience

## **ABSTRACT**

Acute cognitive and locomotor impairment can result from infections unrelated to the central nervous system (CNS). Prior studies using lipopolysaccharide, a bacterial endotoxin, have shown that immune signals from the periphery can act on the brain to cause sickness behavior. Furthermore, studies have shown that increased signaling of proinflammatory cytokines in the brain impairs learning and memory. However, very little data exist regarding the CNS immune response to peripheral viral infection. This study investigated changes in locomotor behavior and activation of microglia, the resident macrophages of the CNS, in the hippocampus following peripheral infection by influenza A/PR8/34 virus. The hippocampus plays an important role in memory and spatial navigation and behaviors associated with this region are vulnerable to disruption by proinflammatory cytokines. We detected a significant decrease in locomotor behavior in infected mice when compared to controls. Consistent with prior studies on the CNS response to peripheral infection, mRNA expression of several proinflammatory cytokines was significantly elevated in the hippocampus. In addition, an upregulation of MHC class II mRNA expression was detected, suggesting an increase in microglial activation. These preliminary results suggest that influenza virus causes acute behavioral impairment as a result of increased microglial activation and subsequent release of proinflammatory cytokines.

## **PB.13. Imposed constitutions: Enduring the long run**

**Leah Fontenot**, Senior, Political Science, LAS

**Faculty Member:** Jose Cheibub, Political Science

### **ABSTRACT**

The average constitution lasts a mere 17 years (Elkins, Ginsburg, and Melton, 2007). Constitutions produced during times of occupation average even shorter life spans. Previous research indicates that the longevity of constitutions created during a foreign occupation is a paltry seven years. However, there are a number of cases in which imposed constitutions have lasted for many decades. The 1947 Japanese constitution, created during a U.S. occupation, is currently the longest running constitution without a formal amendment. With this thesis, I hope to gain a better understanding of the factors that are particularly important to the lifespan of imposed constitutions. Knowing the likelihood that a particular constitution will achieve permanence will be useful when deciding if and how to draft constitutions in the future. It is beyond the scope of this research to determine what effect constitutional endurance has on future conflict with the occupier. Nevertheless, it is assumed that an occupier would consider constitutional stability a desirable characteristic, if for no other reason than having invested many resources in its creation. Since occupations will likely continue into the future, having as much information as possible on the stability of imposed constitutions has clear relevance to policy makers. In order to answer my research question, I will use a combination of case studies and statistical analysis. The cases that I plan to study in some detail will be Albania (1943) and Albania (1946), Hungary (1946) and Hungary (1949), Japan (1946), Italy (1943) and Italy (1947). These cases have been chosen because they provide a desirable set of characteristics to test my hypotheses. In order to perform my analysis I plan to utilize a combination of large N analysis and case studies. There are fewer than 50 imposed constitutions since World War II, so I believe it is important to incorporate all of them in my analysis. However, I also believe that a large N study alone would not give enough attention to the details that are unique in each constitutional situation. For that reason I believe that combining the two approaches will have the best result.

## **PB.14. The growing struggle: Labor conditions in developing nations**

**Valerie Johnston**, Senior, Political Science, LAS

**Mentor:** Mark Schrad, Political Science, LAS

### **ABSTRACT**

As the Global South industrializes, images of deplorable working conditions are publicized in the media. Taking these images to be true indicators of the working conditions in recently industrializing states, how can labor conditions be improved in these areas? Many factors I believe to be significant have gone unstudied until now and while corporations continue to globalize, the issue of

labor conditions is increasingly relevant. Using a structured comparison of South Africa and Pakistan, I will attempt to uncover the necessary mechanisms for improvement. I hypothesize that the right to unionize and collectively bargain coupled with other factors—such as the existence of a pro-labor political party, enforcement of preferential trade agreements, degree of direct foreign investment, and company codes of conduct—can improve labor standards. I use several indicators to test my hypotheses including popular news sources, government publications, the International Labour Organization, and the International Trade Union Confederation.

### **PB.15. Childhood obesity: Children's fruit and vegetable intake in relation to parents' income and consideration of price when buying food**

**Lisa Ann Pearson**, Junior, Community Health, AHS

**Mentor:** Gwen Costa Jacobsohn, Communication, LAS

#### **ABSTRACT**

The STRONG Kids Research Project is a multidisciplinary study investigating several factors that contribute to childhood obesity and health. Consenting children and families in central Illinois daycares are being studied, with the hopes of reaching 400 preschoolers and their families from 30 daycare centers over the course of 3 years. *Objectives:* The STRONG Kids Research Projects Panel Survey includes questions concerning multiple aspects that could contribute to childhood obesity, from demographics and parent beliefs to physical activity, food intake, and media influence. Specific questions from the survey data are analyzed to compare the amount of fruits and vegetables children actually eat to both annual household income and how much parents consider price when buying food. *Methods:* The Panel Survey was given to interested parents or guardians of a child between the age of 2 and 5 years with a birthday between June 1, 2005, and June 1, 2007. The surveys were distributed through consenting daycare centers and were to be completed either in paper form or online by the parents. This research is examining the data from the first wave of participants, cohort 1a, with a total of 228 completed surveys. The data collected was then compiled by trained research assistants to be analyzed and used in the STRONG Kids sub-projects. *Results:* While other studies suggest that annual income and consideration of price can be thought to directly affect a child's intake of fruits and vegetables, analysis of the STRONG Kids data on this topic is still being examined.

### **PB.16. Attention allocation for improved emotion recognition in individuals with autism**

**Miriam R. Holtzman**, Senior, Psychology, LAS

**Mentor:** Arthur Kramer, Psychology, LAS

## **ABSTRACT**

Due to difficulty in perceiving global or whole scenes, individuals with autism experience trouble with facial processing. Facial processing in non-autistics occurs through an implicit and holistic mechanism, while previous research has demonstrated that autistics employ more analytic or piecemeal processes of visual encoding. Autistics have additionally been shown to experience trouble when making assessments of emotion, due to differential activation of the brain areas typically responsible for emotion recognition in others. Pairing these ideas together, we hoped to improve our autistic subjects emotion recognition abilities, by directing their attention to cued pieces of a facial stimulus displayed on a computer screen. Neurologically normal control subjects also viewed the images while wearing eye trackers. In completing this experiment we hoped to demonstrate that an allocation of attention similar to neurologically normal controls might improve our autistic subjects facial perception abilities. Through this research we hoped to gain a better understanding of facial processing as well as the method of facial processing that is unique to autistic individuals. Despite previous claims that autistics possess weakened abilities to make judgments regarding emotions as seen on faces, with the right assistance, they might experience emotional recognition at an accuracy level closer to normal individuals. These results could demonstrate the potential for improvements in the everyday interactions of individuals with autism, thus improving their day to day experiences with other individuals in society, and even perhaps improving their overall well-being and sense of connectedness to others.

## **PB.17. Development of adolescent self-concept in American children**

**Abby Toms**, Senior, Psychology, LAS

**Mentor:** Eva Pomerantz, Psychology, LAS

## **ABSTRACT**

This research examined American children and how their self-concept develops over the adolescent stage. Four times over the seventh and eighth grades, children in the United States responded to the statement "I am" ten times in their own words. This gave insight into the child's development over the adolescent stage by highlighting what is important enough to the child to include in the statements. The statements were coded and given a point for specific categories if they were referenced such as family, peers, academics, sports and other hobbies. The goal of this study was to explore the characteristics of the adolescent stage and how they change over the two years. For example, children included their parents in their "I am" statements in the seventh grade, but do they continue to during the eighth grade year? Do the children instead include more peer references indicating a possible maturation of the child by moving away from the parents? The data were analyzed by determining the frequency that children included certain categories in their "I am" statements and how this frequency changed over time. The inclusion of categories over time will give insight into how the

adolescent stage develops over time.

### **PB.18. Cracking the cellulose code with super solvents; Cellulase assay of lignocellulosic biomass and evaluation of recycled ionic liquid dissolution properties**

**Anna Lucrezia Oldani**, Sophomore, Agricultural and Biological Engineering, ENG

**Sidney Knight**, Junior, Agricultural and Biological Engineering, ENG

**Mentor:** Mary-Grace Danao, Agricultural and Biological Engineering, ENG

#### **ABSTRACT**

The growing population challenges scientists to discover solutions to the energy crisis, focusing on environmentally conscious and renewable fuel sources to supplant current fuel resources. Harnessing the energy contained within unused biomass, such as crop residues, is a promising area of research. The cellulose within lignocellulosic material can be converted into ethanol through fermentation, providing a renewable fuel source that does not impact the food supply, does not require costly equipment, and provides an effective utilization of unused biomass. This project aims to assess the effectiveness of pre-treating lignocellulosic biomass with an ionic liquid (IL) and to evaluate the dissolution properties of recycled IL. The main step in accomplishing this objective involves treating lignocellulosic materials with an IL; the IL used was 1-ethyl-3-methylimidazolium acetate (EMIM-A). EMIM-A dissolves and loosens the lignocellulosic matrix, rendering the structure more permeable to the cellulase enzyme. Cellulase is used to convert cellulose to glucose, which is fermentable to ethanol fuel. The laboratory procedure involves the preparation of varying concentrations of cellulose and EMIM-A. The solutions were heated at varying temperatures until the cellulose biomass appeared amorphous under microscope. After dissolution, the amorphous cellulose was precipitated out by adding deionized water to the solution and separated from the solvent via centrifugation. The recovered amorphous cellulose was then treated with cellulase enzyme, and the level of glucose recovered was determined using a colorimetric 2,2'-azino-bis(3-ethylbenzthiazoline-6-sulphonic acid)(ABTS) assay. The supernatant a mixture of EMIM-A and water was heated at 200°C for 2 hours to evaporate the water. The efficacy of this recycled EMIM-A was determined by using it to pretreat a new batch of cellulose. The dissolution properties of EMIM-A and recycled EMIM-A were compared. Preliminary results showed that recycled EMIM-A is as effective as unused EMIM-A in pretreating cellulose samples.

### **PB.19. The relevance of parenting to psychopathic emotion**

**Andrew D. Gill**, Senior, Psychology, LAS

**Mentor:** Edelyn Verona, Psychology, LAS

## **ABSTRACT**

Individuals with Psychopathic Personality Disorder are typically fearless in the presence of negative consequences and unable to express empathic concern for others. While environmental experiences are rarely considered as having any significant effect upon the presentation of psychopathy, the present study endeavored to establish early-life rearing environment as a critical component in the development of psychopathic emotional deficits. Adult psychopaths' startle responses to emotionally aversive and neutral picture scenes were compared to their retrospective reports of specific parenting behaviors that they were exposed to in early life. Some of the negative pictures were identified as directly threatening to participants while others were categorized as victim scenes that depicted the suffering of others. As hypothesized, a weak-negative correlation was found between startle reflex to threat scenes and the callous-unemotional factor of psychopathy regardless of reported levels of maternal involvement. More significantly, startle reflexes to victim scenes were strongly and negatively associated with callousness and unemotionality when low maternal involvement was indicated, but were positively related when participants reported having highly-involved mothers. These results not only generally suggest that parenting behaviors can play a significant role in the development of psychopathic emotional deficits, but also indicate that maternal involvement may effectively moderate the relationship between psychopathy and the lack of an empathic concern for others.

## **PB.20. Lipogenic gene regulation in fatty acid deficient mice**

**Tyler Harpole**, Senior, Food Science and Human Nutrition, ACES; and Molecular and Cellular Biology, LAS

**Mentor:** Manuel Roquet, Food Science and Human Nutrition, ACES

## **ABSTRACT**

Polyunsaturated Fatty Acids (PUFAs) can regulate gene expression of lipogenic enzymes. It is not clear whether regulation is conferred by the dietary essential PUFA, linoleic acid (LA; 18:2n6) and  $\alpha$ -linolenic acid (ALA; 18:3n3), or by their respective further elongated and desaturated products, arachidonic acid (AA; 20:4) and docosahexenoic acid (DHA; 22:6n3). Specific AA and DHA deficiency can be achieved with the delta-6 desaturase knockout (D6D<sup>-/-</sup>) mouse without requiring depletion of their precursors, LA and ALA. Changes in gene expression are therefore specific to lack of AA and/or DHA. In order to determine the role of AA and DHA in regulating hepatic gene expression of delta-5 desaturase (D5D) and elongase-2 (ELOVL2), 16 week old wild type controls (+/+) and D6D<sup>-/-</sup> mice were fed either an AIN93G diet lacking AA and DHA, an AA supplemented (0.2%), or a DHA supplemented diet (0.2%). Liver gene expression was quantified by real time PCR. D6D<sup>-/-</sup> liver showed a significant increase ( $p < 0.05$ ) for D5D (78%) and ELOVL2 (148%) relative to +/+. Both AA and DHA supplemented <sup>-/-</sup> groups had restored D5D expression back to +/+



level. ELOVL2 was only restored back to +/- level in DHA supplemented -/-while AA supplemented -/-ELOVL2 expression stayed significantly increased ( $p < 0.05$ ) (112%). In conclusion, both AA and DHA, but not the PUFA LA and ALA, are able to downregulate D5D gene expression in D6D-/-, while downregulation of ELOVL2 is specific to DHA.

## **PB.21. The draft in the winds of war**

**Sara Brown**, Senior, Political Science, LAS

**Mentor:** John Vasquez, Political Science, LAS

### **ABSTRACT**

The goal of my research is to answer the question, Under what conditions do countries adopt conscription policies? Over almost 200 years, during which two world wars have waged, both Switzerland and Sweden have remained neutral powers, yet both are ready for war with conscripted armies. Why would two countries known for neutrality have military conscription, when both India and Pakistan, who have fought four wars against each other, do not? Spain is the only western country to have never implemented a draft and over half of the world still relies on conscription. It's important to understand why a country would decide to draft its army instead of using an all-volunteer force. There is little focus on the effect of external threats on conscription in previous research. The current U.S. military policy still has a provision to re-implement the draft using the Selective Service System, so this gives insight into if and when that could happen. The research looks at three hypotheses. The first predicts that when countries are involved in arms races, conscription is more likely. Hypothesis two states that countries that feel an increase in threat to their security are more likely to conscript. Finally, countries with more allies are less likely to conscript their military forces. The research uses a large N study to look at every country military design. It looks at the use of conscription in each country and during what year or years it was used. It focuses on the number of allies each country has, whether they have been involved in as arms race and whether they have any rivals. The data is compiled using the Correlates of War Project, Enduring Rivalry research, and Alliance Treaty Obligations and Provisions data. By looking at how these four factors interact, it becomes apparent when conscription is used.

## **PB.22. Vocabulary and phonological growth in a young child with Childhood Apraxia of Speech (CAS)**

**Kristin Lyons**, Senior, Speech and Hearing Science, AHS

**Coleen Shanahan**, Senior, Speech and Hearing Science, AHS

**Mentor:** Cynthia J. Johnson, Speech and Hearing Science, AHS

### **ABSTRACT**

We are conducting a case study designed to understand the vocabulary and speech (phonological) growth of children with Childhood Apraxia of Speech

(CAS), a speech disorder in which children are unable to consistently initiate voluntary movements of the muscles and oral structures necessary for speech. Our objective, using a qualitative research design, is to document how one child with severe CAS learns vocabulary and word pronunciation (phonology) when the onset of speech has been delayed and is extremely difficult. CAS is characterized by very slow expressive vocabulary growth, many vowel errors, inconsistent pronunciation of words, absence of complex consonants from the child's speech repertoire, speech production often limited to single words, unusual intonation patterns in phrases, and better listening than speaking skills. There is currently no known cause for this disorder. We are currently collecting data from a number of different standardized tests and published test procedures; spontaneous language samples; screening of the child's hearing and structure/function of his articulators (mouth, tongue, teeth, lips, jaw, palate, etc.); interviews with the family, the child's caretakers, teachers and related professionals; educational and medical reports supplied by the parents; speech-language diaries kept by the child's family; and videotapes of the child speaking and playing, supplied by the family. Our research will provide a detailed examination of vocabulary and speech learning at an age later than typical learning. The research holds particular significance in that there has been very little research on CAS reported in the literature to this date and to the investigators knowledge. The findings of our research will also provide a broad view (from many sources) of the context in which late-learners are able to learn to speak words. Finally, our research has clinical significance in that it can be used to predict growth trajectories in children with CAS.

## **PB.23. BMI distribution of Cohort 1a**

**Hannah Roosevelt**, Senior, Dietetics, ACES

**Mentor:** Margarita Teran-Garcia, Food Sciences and Human Nutrition

### **ABSTRACT**

The STRONG Kids Program is an interdisciplinary approach to examining the causes and the factors affecting childhood obesity. The overall study aims to follow up to 400 children and families for 3 years in central Illinois. *Objectives:* This portion of the study is analyzing the body mass index (BMI) of 2-5 year-old children collected from 22 daycares in cohort 1a, in relation to their age, ethnicity and comparing these results to national standards. Results will be used in determining biological, social and behavioral risk factors associated with childhood obesity in our community to be applied at the national level. *Methods:* Trained individuals collected anthropometric data, including height and weight according to standard operational procedures, for 181 children. Weight was measured using an electronic remote display digital scale to the nearest 0.1kg while height was determined by using a portable stadiometer to the nearest 0.5cm. This data was used to calculate BMI and compared to CDC growth charts. *Results:* Preliminary analysis shows that 16.6% of children are overweight (above the 85th percentile for their age and sex) with 7.2% of

them categorized as obese (above the 95th percentile). The age range of 24-35 months has the highest prevalence of obesity while 36-47 months has the greatest prevalence of overweight and obese children. Population distribution of our current sample shows 60% white Caucasian, 22% mixed ethnicity, 13% African American and 6% Asian. *Conclusion:* A comparative analysis of current findings has indicated the distribution of pediatric obesity among STRONG Kids participants to be below that of the national average. The STRONG kids program is now expanding to other communities increasing the number of participating day cares in cohort 1b to 30. This action is expected to counter environmental factors affecting collected data by increasing sample size and diversity of the population.

## **PB.24. Complementary feeding practices among low-income mothers**

**Dennise Staab**, Junior, Community Health, AHS

**Mentor:** Rose Ann Mathai, Nutritional Sciences, AHS

### **ABSTRACT**

Initiation and types of solid food introduction are nutritional risk factors for the development of childhood obesity. Our objective is to determine the age and type of solid food introduction for infants ages 2 to 6 months. Parent-infant dyads (n=35) were recruited from the Women, Infants and Children Office in Champaign, Illinois. Parents completed a survey and the following questions were extracted: How old was your child when solid food was first introduced (include baby foods in jar)? and How old was your child when he/she started eating the following foods? Approximately 66% of infants had not yet been introduced to solid foods. Of the remaining 34% of infants who had been introduced, 6% were three months old, 20% were four months old, 6% were five months old and 3% were six months old. When divided into different food categories, no infants had been fed cow's milk, but 9% were given soy milk, 11% infant cereal from a bottle and 31% spoon fed infant cereal. There was 6% fed some form of other grains including bread or crackers but none were fed pasta, rice, muffin or other cereal (not infant). Fruit or vegetable baby food was fed to 28% of infants while 3% were given meat baby food. Regarding table food, 6% had been fed chopped/mashed fruits and vegetables, 0% chopped/mashed meat and 3% were offered the same table food as the rest of the family. Three percent of infants had been given fruit cocktail, fruit flavored drinks or less than 100% fruit juice, and 20% were drinking 100% fruit juice. None of the participants had been introduced to Gatorade, sport drinks, Kool Aid, soda pop, or other sweet tea drinks. Many infants did not meet the infant feeding recommendations on age of introduction of complementary food (6 months). (Dennise Staab, Tiffany Freeman, Sophia Bodnar, Rose Ann Mathai, Jae Eun Shim, and Juhee Kim.)

## **PB.25. Nutrition education**

**Ana Ristich**, Senior, Food Science and Nutrition, ACES

**Mentors:** Manabu T. Nakamura, Food Science and Human Nutrition, ACES;  
Nathan Pratt, Food Science and Human Nutrition, ACES

### **ABSTRACT**

According to the World Health Organization, obesity is the most prevalent public health issue in the 21st century. With the severity of this health issue noted publicly, it is fortunate that obesity, a preventable form of death, can be targeted and reversed with proper education and implementation. This research evaluates frozen meal options available to consumers at local supermarkets and grocery distributors throughout the United States. Information collected is organized into excel tables and bar graphs. From this information, food brands are organized into different levels of similarity to the core meal with a traffic light approach using red for stop or do not eat, yellow for moderate values, and green for adequate values which abide with the proper range of values decided upon. Frozen meal options are analyzed in comparison to the ideal core meal with set nutrient values. Ideal core meal requirements include: total kilocalories of 600, grams of protein 20 g, combined saturated and trans fat of < 4 g, milligrams of sodium < 500 mg, milligrams of cholesterol <100 mg and grams of fiber 7. South Beach Diet's Sesame Chicken Sandwich Wrap follows the guidelines closely with calories, protein, fiber, sodium, saturated fat and cholesterol at 44, 105, 214, 89, 63 and 57% respectively, while Jimmy Dean's Sausage Biscuit defends the counter at 77, 50, 14, 110, 224 and 46%. Percentages are calculated in respect to the ideal core meal and according to the nutrient maximum/minimum guidelines.

## **PB.26. Withdrawn**

## **PB.27. Separation, alignment and deposition of carbon-based nanomaterials**

**Charishma Puliyaanda**, Senior, Electrical Engineering, ENG

**Mentor:** Joshua D. Wood, Electrical and Computer Engineering, ENG

### **ABSTRACT**

Creating next generation carbon-based nanotechnology requires control and manipulation of carbon nanomaterials with industry compatible, top-down methods. Therefore, we develop techniques for the separation and alignment of carbon nanotubes (CNTs), nanoscale, one-dimensional cylinders of carbon. In addition, we investigate methods for the clean deposition of two-dimensional sheets of oxidized carbon called graphene oxide (GO). We aim to separate metallic CNTs from semiconducting ones by eddy currents. We apply non-uniform voltage waveforms to suspended carbon nanotube solutions, generating a perturbative force that causes CNT bundle oscillation. By conducting CNT

photoluminescence measurements, we can assess the separation effectiveness. We believe separation occurs from stronger eddy current forces in the metallic CNTs over the semiconducting CNTs. Employing standard photolithography techniques allows us to obtain metal patterns with a micron separation, which we use to conduct dielectrophoretic alignment of CNTs. Ultimately, the aligned CNTs will be used to examine fundamental CNT-CNT junction physics. Finally, we develop a scanning tunneling microscopy compatible, clean freeze-dry process for the ex-situ and in-situ deposition of GO onto silicon.

## **PB.28. When the money does not matter**

**Jason Gluskin**, Senior, Political Science and History, LAS

**Mentor:** Jeff Mondak, Political Science, LAS

### **ABSTRACT**

The question I am studying is, Under what conditions does the candidate with lower campaign spending win in open seat Congressional elections? To test this question I analyze all 188 open seat House elections from 2000 to 2008. These data have been gathered from various editions of the Almanac of American Politics. I hypothesize that factors that make candidates successful in Congressional elections will also be influential in allowing candidates to moderate the influence of campaign spending. My hypotheses stem from two larger theories related to Congressional elections, that the partisan make-up of the district matters for which candidate is elected, and that personal characteristics will make some candidates better equipped to defeat a well-funded opponent. The independent variables related to the partisan make-up of the district that are tested are the party's share of the two-party presidential vote, the party of the last member of Congress, the party of the current president, and whether it was a mid-term or presidential election year. The variables that are tested for candidate characteristics are related to the prior office of the candidate, differentiating between prior legislative experience, prior statewide office experience, and local office experience. This study finds that there are certain factors that increase a candidate's ability to defeat a better-funded opponent. The factors found to exert the greatest influence are prior office experience and shared party affiliation with the winning presidential candidate during presidential election years.

## **PB.29. Perceptual load-induced local competitive interactions across visual quadrants**

**Andrew Brown**, Senior, Psychology, LAS

**Mentor:** Diane Beck, Psychology, LAS

### **ABSTRACT**

The mechanisms through which selective attention occurs in the visual cortex have been a subject of research and debate for many decades. Debates about

selective attention prior to the mid-90s centered on an early vs. late selection model; however, views were mixed on how to explain this phenomenon. Perceptual load theory offered a potential resolution by explaining early and late selection as a function of display load (N. Lavie, 1995). For example, a display with low load would result in late selection of a target stimulus since perceptual resources are not taxed, and a high bias is required from the individual to resolve competition between distractors. While perceptual load theory attempts to explain why early vs. late selection happens, it does not account for how this happens. Most recently, it has been proposed that perceptual load is a result of local competitive interactions between stimuli in visual cortex and the top-down bias required to resolve this competition (Torralbo and Beck, 2008). Previous research has also shown that when a target shares a hemifield with non-targets, they compete for representation and the distractor effect is reduced from the condition in which a target appears in its own hemifield. The presence of such an effect has only been tested across the vertical meridian, yet hemispheric separation exists across the horizontal meridian in certain regions of visual cortex. In the following experiment, we test reaction times across both the vertical and horizontal meridians to find whether distractor effects can be modulated across the horizontal meridian. Participants are slower to find the target when it appears in a separate hemifield, as expected; however, there is no modulation of the distractor effect across the horizontal meridian only. Therefore, our data suggest that bias across the horizontal meridian cannot be determined.

### **PB.30. Physical fitness and cognition of elementary school children**

**Lauren Fraczek**, Senior, Kinesiology, AHS

**Mentor:** Charles Hillman, Kinesiology and Community Health, AHS

#### **ABSTRACT**

Previous research suggests that physical fitness has demonstrated a beneficial relationship to brain health in children. The cognitive advantages seen in children due to their engagement in physical activity span from the rudimentary level to the level of scholastic performance. Taking this into account, the Pedagogical Technology Laboratory designed the FIT Kids Program. FIT Kids is a research study in which 3rd, 4th, and 5th grade Champaign and Urbana elementary school students participate in an after school fitness program. The program is designed for participants to engage physical activity in accordance with the current recommendation of at least 60 minutes of MVPA each day. The children in this study completed physical and cognitive baseline measures carried out by the Neurocognitive Kinesiology Laboratory. Physical measures included  $VO_2$  max, fat free  $VO_2$  max, and BMI. Cognitive measures included the Sternberg Triarchic Abilities Test (STAT), KBIT, LowTrail, HighTrail, and Standard Reading, Spelling, and Arithmetic tests. Each day school is in session, the subjects participate in the FIT Kids Program. At the end of the year, the subjects undergo

the same testing measures used at baseline to determine whether changes in physical fitness are associated with changes in cognition. These measurements are correlated to components of the Fitnessgram Test, which is completed in stages throughout the duration of the program. Specifically, Fitnessgram scores for the PACER, push-ups and sit-ups, and sit and reach tests are examined. A correlation study of the baseline scores from the 2008-2009 and 2009-2010 sample was conducted. Results indicate that low BMI and high fat free VO<sub>2</sub> max are associated with better scores on KBIT, LowTrail, HighTrail, Standard Arithmetic, Pro1, and Pro3 cognitive measures. Relationships between BMI and VO<sub>2</sub> max with Standardized Reading and Spelling and Pro5 scores were not statistically significant.

### **PB.31. Children's use of verb tense and aspect as a cue to generic meaning**

**Trent Meltzer**, Senior, Psychology, LAS

**Mentor:** Andrei Cimpian, Psychology, LAS

#### **ABSTRACT**

Parents often use generic language (e.g., "Horses eat hay") to teach their children about the world. However, such language cannot be identified by a simple rule; children must integrate a variety of cues (grammatical, contextual, knowledge-based) to arrive at a generic interpretation. In this study, we asked whether four- and five-year-olds could use tense and aspect to identify generic sentences. Although these cues may not be entirely reliable, sentences in the simple present tense (e.g., "A spider doesn't chew its food") might encourage a generic interpretation more than the same sentences in the simple past tense (e.g., "A spider didn't chew its food") or in the present progressive aspect (e.g., "A spider is not chewing its food"). We presented children with sentences that varied only in verb tense and aspect and measured children's interpretation in two ways. First, we simply asked them whether the sentences were about "Just one" animal or "A whole lot" of animals. The prediction here would be that children should say "A whole lot" most often for the sentences in the simple present tense, as these are hypothesized to be interpreted as generic. This prediction was confirmed. Second, we asked children to recall the sentences after a 4-minute delay. The prediction here would be that children should make more bare plural recall errors (e.g., "Spiders don't chew their food"), which signal a generic interpretation, in the simple present tense condition than in the other two; in contrast, definite singular recall errors (e.g., "The spider didn't chew its food"), which signal a non-generic interpretation, should predominate in the simple past tense and present progressive aspect conditions. Both of these predictions were confirmed. Our results indicated that children could use tense and aspect as a cue to generic meaning. This might provide children with a powerful means for learning about the world.

### **PB.32. Family mealtimes: An observational study of parental prompts and its influence on child compliance to eat**

**Jessica Dosik**, Senior, Human Development and Family Studies, ACES

**Mentors:** Barbara Fiese, Human Development and Family Studies, ACES;  
Amber Hammons, Human Development and Family Studies, ACES

#### **ABSTRACT**

Family mealtimes play a critical role in overall family functioning. Many studies have shown that family mealtimes are positively correlated with eating healthy foods (e.g. Neumark-Sztainer et al., 2003). How a parent reacts to or encourages a child to eat is influential on compliance to eat at mealtime. A study by Orrell-Valente et al. (2007), found that pressuring a school-age child to eat is highly correlated with refusal of food while neutral prompts, reasoning, and play rewards were correlated with agreement to eat. The focus of this research is to investigate different types of prompts parents use to encourage preschool-age children to eat and its relation to child compliance. The overarching objective of this study is to examine how the family mealtime impacts preschool age children and their eating habits. The family mealtimes study has 41 families and is an observational study. The focal child in each video is a preschool age child (2-5 years of age) of varying gender and race. The videos were recorded and then two coders watched the videos and coded them using the Mealtime Observation Checklist. The checklist consists of eighteen items asking questions about the presence of television, how the meal is served, and food refusal, for example. Two coders watched the mealtime videos with an intercoder reliability of 92%, which was calculated using percent agreement. Preliminary findings show that ten out of twenty families used some type of persuasion when the child refused food or was not eating up to the parents' standards. The results of this study could potentially inform future interventions by revealing effective ways for parents to encourage healthy food consumption, and optimal methods of encouragement for child compliance to eat for preschool age children.

### **PB.33. Electrophysiological investigation of effects of extracellular administration of D-amino acids in neurons of *Aplysia californica***

**Lee Replegle**, Senior, Molecular and Cellular Biology, LAS

**Mentor:** Stanislav Rubakhin, Chemistry, LAS

#### **ABSTRACT**

Amino acids have important roles in a variety of physiological and biochemical processes including protein synthesis, energy generation, and intercellular signaling. For many years L-amino acids were a prime target of investigations in animal models with the assumption that D-amino acids (D-AAAs) play a limited role in higher organism functioning. However, several D-AA have been detected in nervous and endocrine tissues in a variety of animals including humans.



Other studies have also reported D-Asp modulating the release and synthesis of certain hormones. D-asp is biosynthesized in central nervous system of classical neurobiological model marine mollusk *Aplysia californica*. It has been shown that in *Aplysia californica*, D-Asp is released from tissue upon chemical or electrical stimulation in a Ca-dependent manner and is actively transported in nerves. Observations such as these have allowed us to hypothesize that D-Asp may act as a classical neurotransmitter in the *Aplysia* CNS. Accordingly, the Sweedler research group has taken an interest in investigating the possibility of D-Asp acting as an intercellular messenger as well as intracellular modulator of cell function. We have carried out electrophysiological investigations regarding the effects of extracellular and intracellular applications of D-Asp and its enantiomer L-Asp which is also a putative neurotransmitter in the *Aplysia* CNS. We have determined that D-Asp can elicit electrophysiological responses differing from L-Asp when applied to individual *A. californica* cultured neurons. The responses between D- and L-Asp differ in magnitude as well as polarity at times. We are working on determination of the molecular mechanisms of responses including electrophysiological and pharmacological determination of D-Asp receptors and/or transporters involved.

### **PB.34. "Being white in a multicultural society": Understanding whiteness in an intergroup dialogue**

**Jeffrey Yeung**, Senior, Psychology, LAS

**Mentor:** Lisa Spanierman, Educational Psychology, EDU

#### **ABSTRACT**

Diversity initiatives at the University of Illinois at Urbana-Champaign have become a campus priority. Inclusiveness initiatives, cultural programming, and social justice education are some methods of fostering a diverse campus. One means of diversity education is through a 7-week intergroup dialogue. In this pilot ethnographic study, I utilized Critical Whiteness Studies as a theoretical framework to empirically examine students' experience in an intergroup dialogue entitled, "Being White in a Multicultural Society." Two semi-structured interviews were conducted during the fourth week of the course with two self-identified White females at age 18. Interviews were audio recorded and transcribed verbatim. Initial themes emerged when the two interviews were examined separately. Initial themes that were consistent and apparent in both interviews were considered central or main themes. Two broad domains emerged. First, dialogue process themes which included four main themes: (a) curious about being White, (b) no initial expectations, (c) like dialogue process of hearing different perspectives and opinions, and (d) still trying to understand Whiteness. The second domain was Whiteness and racial themes, which included five main themes: (a) invisibility and normalcy of Whiteness, (b) perceptions of racism as an individual phenomenon, (c) color-blind racial ideology, (d) myth of meritocracy, and (e) fear of being labeled racist. Implications of the findings, limitations, future directions for a subsequent study are discussed. Last, two

recommendations were provided to the university: (a) increase opportunities for White students to explore and understand Whiteness and racism, which may include additional intergroup dialogues, workshops, diversity forums, classes, campus events, etc., and (b) develop and fund a systematic research program at Illinois on diversity education among White students.

### **PB.35. Electrostatic transfer of monolayer graphene grown on copper foil**

**Roshan Choxi**, Senior, Computer Engineering, ENG

**Mentor:** Justin Koepke, Electrical and Computer Engineering, ENG

#### **ABSTRACT**

The growth of graphene on metal substrates, in particular, single-layer graphene on copper, suggests technological applications requiring graphene transfer from the growth substrate. However, it is difficult to transfer a large area of single-layer graphene with high quality, although using a multistep polymethylmethacrylate (PMMA) based process looks promising. Transferring graphene by etching away the metal graphene growth substrate, as is the case with nickel and copper, can incorporate residues from the wet etching step, affecting graphene quality. Here, we demonstrate a simple method of large-area, single-layer, and high quality graphene transfer by electrostatic force. Using graphene grown by chemical vapor deposition directly on copper foils, we can transfer millimeter-sized, mostly single-layer graphene onto different substrates. We also note transfer of some bilayer graphene. By varying the electrostatic force with different electric fields, this technique furthers our understanding of the interaction between graphene and the copper film. Through Raman spectroscopy, atomic force microscopy, and scanning electron microscopy, we examine the number of defects and wrinkles in the transferred graphene layers, which gives us information about the graphene growth process on copper.

### **PB.36. Classification of mucin chemotypes using FTIR**

**Caroline Cvetkovic**, Junior, Bioengineering, ENG

**Mentors:** Michael Walsh, Beckman Institute; Rohit Bhargava, Bioengineering, ENG; Jennifer Croix, Nutritional Sciences, LAS; Jason Ip, Fellowships

#### **ABSTRACT**

Fourier Transform Infrared (FTIR) Spectroscopy is a technique used to chemically and visually analyze the molecular makeup of a certain material by considering chemical absorbencies at various wavelengths. The absorption of a particular wavelength indicates the structure of the molecule and the types of bonding present. Chemical profiling is an important tool in examining biological tissues. By comparing infrared images to those previously prepared with a histological stain, a system of automated classification can be established. The implications of this method include a more efficient process for early detection, understanding, and treatment of diseases and cancers. The objective of this research study is to

utilize automated histopathology procedures to study specific mucin chemotypes in human colon and small intestine. Biopsies from the ileum, ascending (right) colon, descending (left) colon, and rectum were analyzed for the presence of sulfated and sialylated mucins. The right colon is high in sulfomucin, which has sulfuric ester-containing glycoproteins. Conversely, the ileum is rich in sialomucin, but lacking in sulfomucin. The rectum displays a combination of both sialomucin and sulfomucin. A staining method using high iron diamine-alcian blue (HID/AB) was employed to visualize the sialomucins and sulfomucins in the biopsies. High iron diamine stains the sulfated mucins dark brown, while alcian blue stains the sialomucins at a low pH. An abnormal expression of the aforementioned mucin chemotypes is observed in gastrointestinal diseases, such as inflammatory bowel syndrome and certain adenocarcinomas. FTIR will aid in the association of specific mucins with degree of gastrointestinal disease. Further study of mucins in the colon and small intestine could lead to advancements in diagnosis and treatment of disease and cancer.

## **PC Session: Late Afternoon Poster Presentations, 3:15-4:30 p.m. (Pine Lounge)**

### **PC.01. Twelve-month-olds' expectations about adults' responses to distress**

**Jessica Houston**, Senior, Psychology, LAS

**Mentors:** Renee Baillargeon, Psychology, LAS;  
Glenn Roisman, Psychology, LAS

#### **ABSTRACT**

Recent research suggests that infants have expectations about how others should respond to a distressed individual. The present research asked whether 12-month-olds would have expectations about how a human adult should respond to a distressed baby in everyday events. Infants were assigned to a crying- or a laughing-baby condition and first received two familiarization trials. Each trial involved a videotaped event in which a woman folded towels at a table; against the back wall, infants could see a chair with additional towels, on the left, and a large stroller, on the right (infants could not see whether a baby occupied the stroller). The only difference between the two familiarization trials was that they involved different women, a blonde and a brunette. Next, infants received an unresponsive- and a responsive-woman test trial (order was counterbalanced). Each trial began with one of the women folding towels. After a few seconds, a baby was heard crying (crying-baby condition) or laughing (laughing-baby condition). The woman then walked to the back wall until she was midway between the chair and the stroller. In the unresponsive-agent event, the woman bent over the chair and picked up the towels laid there; in the responsive-agent event, the woman bent over the stroller, as though

attending to the baby. Infants in the crying-baby condition looked reliably longer at the unresponsive- than at the responsive-agent event, whereas those in the laughing-baby condition looked equally at the two events. These results suggest that 12-month-olds expect a woman to respond to a crying baby, and look reliably longer if she ignores, instead of attends to, the baby; no such expectation is observed when the baby is laughing. Our results thus provide new evidence that expectations about agents' responses to distress are already present by the end of the first year.

### **PC.02. Salty piece in fuel puzzle: Comparing the pretreatment of lignocellulosic biomass in ionic liquids and deep eutectic solvents**

**Sidney Knight**, Senior, Agricultural and Biological Engineering, ACES

**Mentor:** Mary-Grace Danao, Agricultural and Biological Engineering, ENG

#### **ABSTRACT**

As the fossil fuel supply dwindles and the need for energy increases, science searches for an environmentally friendly and renewable fuel capable of satiating the world's energy demand. Many contending fuel sources require expensive equipment or conflict with food supplies. There must be a focus on the conversion of cellulose, the most abundant of earth's organic polymers, into a viable fuel. The objective of this research project was to compare the dissolution of lignocellulosic biomass in an ionic liquid (IL) and deep eutectic solvent (DES) at different temperatures and concentrations. ILs are salts with low melting points that are non-flammable, have negligible vapor pressure, are chemically and thermally stable, and variably miscible with water and organic solvents. DESs, like ILs, have been shown to dissolve organic, inorganic, and polymeric materials. Unlike ILs, DESs are easier to produce and require less costly compounds. The IL used was 1-ethyl-3-methylimidazolium acetate (EMIM-A), and the DES used was choline chloride and urea in a 2:1 molar ratio mixture. The solutions were prepared and heated at selected temperatures until the biomass appeared amorphous under a microscope. Results show that EMIM-A readily dissolved cellulose and Avicel; no appreciable changes were detected in xylan and corn kernel fiber suspended in EMIM-A. Although DESs and ILs exhibit similar dissolution of metals, the DESs did not dissolve any of the lignocellulosic biomass samples at 80°C. Future plans of study include increasing the temperature of the solutions, investigating the permeability of the amorphous biomass with a cellulase enzyme treatment, and determining if EMIM-A can be recycled and re-used as a pretreatment solvent for lignocellulosic biomass.

### **PC.03. Multicultural influences and perceptions of stuttering and their appreciation in therapy**

**Adetutu Ogundare**, Senior, Speech and Hearing Science, AHS

**Mentor:** Nicoline Ambrose, Speech and Hearing Science, AHS

## **ABSTRACT**

Speech language pathologists often report that they encounter difficulties when they treat stuttering patients from differing cultural backgrounds. However, the patients themselves often lack an awareness that they can seek treatment for stuttering and whom to seek treatment from. Furthermore, persons who stutter (PWS) may also hold folk beliefs that prescribe cures for their pathology but do not actually work. For example, many Latino/a Americans believe that stuttering can be treated surgically by cutting the tongue, putting a pencil under it, or scaring the person who stutters (Tellis, 2003). In the fall semester of 2009, I conducted a survey of 177 students (mostly undergraduates) to assess Tellis's claim. I also conducted in-depth interviews with four persons from different cultural origins who stutter. The survey results were constant with Tellis's claim. Most of the participants do not know what speech language pathologists do. Consequently, they do not know of the therapeutic means to ease and possibly eliminate stuttering. In contrast, the interviews conducted reveal that PWS cope with their condition within their own cultural frameworks. For example, an interviewee of Asian ethnicity dealt with criticisms about his stuttering by criticizing his critics. In conclusion, my research supports Tellis's contention that speech language pathologists must bridge the gap between themselves and individuals of multicultural backgrounds in therapy.

## **PC.04. Transfer of large-area graphene to SiO<sub>2</sub> substrates**

**Tomasz Kalbarczyk**, Junior, Computer Engineering, ENG

**Mentor:** Scott Schmucker, Electrical and Computer Engineering, ENG

## **ABSTRACT**

In the area of nano-electronics and semiconductors, graphene (a two-dimensional monolayer of carbon atoms) has been attracting a great deal of interest because of its high electron mobility properties. Its high electrical conductivity and high optical transparency make graphene an ideal candidate for use as a transparent conductive electrode, which is essential in the manufacture of touchscreens, light-emitting displays, and light-emitting diodes. In addition, graphene shows promise as a complement to silicon in the construction of field-effect transistors. However, in order to take advantage of these useful properties of graphene, large area sheets of graphene are required. There has been much success in growing graphene on copper foils, but these sheets then need to be transferred from copper (a conductor) to more useful semi-conductive surfaces such as silicon. I experimented with a solution-based method of transfer using a polymer, PMMA (polymethyl-methacrylate) to facilitate the transfer of graphene grown on copper foils to a silicon dioxide substrate. In order to determine the appropriate changes in variables during transfer, I used AFM microscopy and Raman spectroscopy to characterize the transferred graphene. Notable characteristics included the smoothness of the graphene, the size of each sheet, and the presence of impurities. In conclusion, my transfer technique

successfully yielded large area pieces of graphene. However, since it involves a wet transfer method, each trial can have varying amounts of impurities, even with seemingly constant variables. In addition, due to the human interaction involved, the transfer technique can prove difficult to replicate for first-time goers. Despite these limitations, I have confidence that this technique will serve as a great stride in determining a reliable transfer process to make graphene usable for all of its remarkable properties.

### **PC.05. Degradation of myelination in the menu: A study of aging**

**Gene Yu**, Junior, Bioengineering, ENG

**Mentor:** Brad Sutton, Bioengineering, ENG

#### **ABSTRACT**

Current research indicates a shift towards decreased fractional anisotropy (FA) and increased radial diffusivity (RD) as the aging process continues. These changes stem from the degradation of the myelination of nerve fibers in the brain. One key feature of myelin is to preserve the directionality of the signal as it traverses through the complex network of nerves in the brain. Therefore, the FA, a measure of unidirectionality, should decrease in older subjects while RD, a measure of the ability of water to diffuse out of the neurons, should increase. In order to examine pathways involved in processing visual stimuli in the brain, the analysis techniques developed had to be validated. To do so, pathways in the brain that were known to degrade were studied. The chosen region was the genu of the corpus callosum. Diffusion weighted images from 13 old subjects and 14 young subjects were obtained using an MRI scanner. FiberTracker from the Neurolib software package was used to calculate the FA and RD from for each data set. Fiber tracking was then performed to obtain the relevant fibers. Using FiberViewer, the FA and RD values along the fibers were extracted. A mean FA and RD were calculated to represent the young and old subjects. An outlier analysis was performed to filter out data that strayed 2 standard deviations beyond the FA and the RA measures. The mean FA value for the old subjects was 0.5064 and the FA value for the young was 0.5661. A p-value of 0.0067 suggested that these values represented a significant difference. RD values for old and young subjects were found to be 0.688 and 0.58214 respectively with a p-value of 0.0778. This method of analysis results in the trend that older brains have reduced FA values and increased RD values; thus, the process of analysis was validated.

### **PC.06. China's wild wild West**

**Joann Wong**, Senior, Political Science, LAS

**Mentor:** Carol Leff, Political Science, LAS

#### **ABSTRACT**

Studies of ethnic conflict have customarily focused on either contextual factors present in a state or a state's nationality policy. I believe that the most effective

way to study ethnic conflict and its causes is to study how contextual factors interact with a states nationality policy. Because nearly every state in the world is multiethnic, ethnic conflict is a very tangible concern for the international community. One major state that could soon face destabilizing ethnic conflict is China, which recognizes 55 ethnic minority groups, but has no uniform nationality policy. I hope to determine the contextual factors and specific nationality policies that cause a group to engage in ethnic conflict. It is my hypothesis that ethnic conflict is spurred by three intersecting factors: repressive nationality policy, a group with concentrated border populations, and group perception that they do not share equal status with other minority groups within the state. I will test this hypothesis by closely studying three ethnic minorities in China, focusing on the Chinese government's official policy towards the various groups and the conflictual or cooperative relationship it has with each group. I will use information from Minorities at Risk, Amnesty International, and newspaper and journal articles as well as Chinese statistical data to investigate the relationship the Chinese government has with its ethnic minority groups.

## **PC.07. Age-related changes in alpha-endosulfine, an endogenous K-ATP channel modulator**

**Kaleigh Roberts**, Senior, Bioengineering, ENG

**Mentor:** Paul Gold, Psychology, LAS

### **ABSTRACT**

Past research has demonstrated the importance of neuroendocrine responses to an experience for the institution of reliable memory of that event. Of particular note are the effects of epinephrine and glucose, both of which have been shown to enhance memory and to reverse age-related impairments in various populations. This study sought to explore the hypothesis that glucose enhances memory by modulating alpha-endosulfine (ENSA), an endogenous ligand for the sulfonylurea receptor subunits of ATP sensitive (KATP) K channels. Peripherally, ENSA utilizes sulfonylurea-like binding to close KATP channels and trigger insulin release. While the presence of ENSA and KATP channels in the brain have been confirmed, their roles are still unclear. It is hypothesized that ENSA may play an important role in glucose sensing and neurotransmitter release in the brain. Additionally, significant decreases in ENSA in aged animals have been observed in most brain areas. This decrease in ENSA may result in continuous opening of KATP channels leading to decreased neurotransmitter release and disruption of cellular potassium fluxes. In this experiment, we used young and old animals injected with glucose or saline immediately after inhibitory avoidance training in order to test the hypothesis that glucose increases ENSA expression in the brain. We then quantified ENSA expression using immunohistochemistry and densitometric analysis. Our data demonstrated a significant decrease in ENSA expression in old animals for some brain regions, but not others. Contradictory to our hypothesis, there were no significant glucose-related effects on ENSA expression and training decreased ENSA expression compared to naive controls.

These data may be the result of only measuring ENSA expression at one timepoint: 30 minutes post-training. Future work will seek to determine the effects of glucose and training on ENSA at additional timepoints after training.

### **PC.08. The influence of mentoring on pro-social behavior: Applying social bond and social learning theories of delinquency**

**Lara M. Meyer**, Senior, Sociology, LAS

**Stacia Miksys**, Senior, Sociology, LAS

#### **ABSTRACT**

We are examining the correlation between adolescents and young adults who have mentors and their likelihood to participate in antisocial and delinquent behavior in comparison to their un-mentored counterparts. To determine these relationships, if any, we will use four extensive waves of data on young adults from the National Longitudinal Study of Adolescent Health (Add Health). The dependent variables we will be examining are antisocial and destructive activities, such as drug and alcohol use, violence, and having a negative self-image. The main independent variable is the presence of a natural mentoring relationship as identified by the youth. Using the Social Bond theory, we propose that adolescents who have a mentor are less at risk to engage in delinquent behaviors. Social Bond Theory suggests that when people become involved with a mentor their bond to society is strengthened and they are therefore less likely to commit deviant acts. As Social Learning Theory posits, being linked with people who partake in conventional activities such as mentors increases young adults' likelihood of partaking in the same positive behavior. If these theories hold true, an increase in mentoring relationships and programs may lead to greater social cohesion by minimizing delinquent activities among adolescents and young adults.

### **PC.09. Expression analysis of miRNA families in various *Miscanthus x giganteus* organs**

**Ornella Wa Ngamboma**, Junior, Molecular and Cellular Biology, LAS

**Mentor:** Steve Moose, Crop Sciences, ACES

#### **ABSTRACT**

*Miscanthus x giganteus* (*Mxg*) is a tall rhizomatous perennial grass that has long-term potential as a biofuel feedstock. It is cold tolerant, produces a large amount of biomass, and stores nutrients in the rhizomes. For these reasons, *Mxg* is being considered as a sustainable source for biomass for biofuel production. Research trials are being conducted in the United States to develop *Miscanthus* as a renewal energy source and an alternative crop for biofuel. MicroRNAs (miRNAs) are non-coding RNAs that play a role in the regulation of gene expression and prevent the translation of certain mRNAs into proteins. In this project, we are studying the expression of selected miRNA in five various *Mxg*



tissues, leaf, leaf-roll, stem, shoot-apex and sub-apex, using a quantitative RT-PCR approach. This will provide quantitative estimates of the miRNA expression levels in the various tissues, which will lead to the identification of gene(s) that are post-transcriptionally regulated by those miRNAs. Based on this knowledge further experiments will be conducted to understand the effect of the miRNA-regulated genes on the biomass deposition. Ultimately, this project can provide preliminary data about improving the biomass production in *Mxg*.

## **PC.10. Informal mentors, civic engagement, and juvenile delinquency: Using social bond theory to understand youth pro-social and antisocial activity**

**Snehalatha Gantla**, Senior, English, LAS

**Kelsey Antle**, Senior, Sociology, LAS

**Mentor:** Margaret Kelley, Sociology, LAS

### **ABSTRACT**

Our research objective is to test whether the presence of an informal mentor has a negative effect on deviant behavior and involvement with the criminal justice system. We propose that higher rates of frequency, duration and closeness of mentoring relationships are associated with lower rates of deviant behavior and criminal justice involvement. Finally, we expect that those youth with early mentors will also report higher civic participation in subsequent waves, since mentoring encourages taking one's place in a non-deviant society. We will also examine what kind of effect increased civic participation has on rate of deviance. Our approach is based on the Social Bond theory of deviance (Hirschi, 1969). Hirschi argues that to refrain from deviance, individuals must have four elements of social integration -attachment, belief, commitment and involvement. We are investigating mentors as a source of attachment to a non-deviant system. We use the National Longitudinal Study of Adolescent Health (Add Health) to test our hypotheses derived from Social Bond theory. Our independent variables include strength of relationship (frequency, closeness, duration, and mentor role) and civic participation and citizenship. Our dependent variables include several measures of criminal behavior and rate of involvement with the criminal justice system (first time vs. repeated; involvement level -juvenile detention vs. minor offenses). Through regression analysis we intend to measure the correlation between mentoring relationships and involvement in deviant behavior. We expect that this research will help us further our understanding of mentoring and its effects on deviant behavior.

## **PC.11. The role of father-adolescent relationships in Mexican-origin girls' adjustment in the context of mother-adolescent relationships**

**Rebecca Lara**, Senior, Psychology, LAS

**Mentor:** Mayra Bámaca-Colbert, Human Nutrition and Family Studies, ACES; and Graciela Espinosa-Hernández, Human Development and Family Studies, ACES

### **ABSTRACT**

Latino adolescents report high rates of school dropouts and depression. Although parent-child relationships have frequently been associated with Latino adolescents adjustment, little attention has been given to the role of fathers in the context of mothers. We examined the association between fathers' positive parenting (i.e., autonomy granting and supportive parenting) and daughters' adjustment (i.e., depressive symptoms and academic motivation), as well as the role of mothers (i.e., supportive parenting) in shaping these associations. Because having at least one positive parent-adolescent relationship may foster better outcomes when adolescents perceive a less optimal relationship with the other parent (Simons and Conger, 2009), we predicted that fathers' positive parenting would be a stronger predictor of daughters adjustment when daughters report less maternal support than when daughters report more maternal support. Data were drawn from Wave 1 of a longitudinal study on Mexican-origin girls. Participants were 202 girls in 7th or 10th grade living with both biological parents. Daughters completed measures of paternal autonomy granting, parents support, depressive symptoms, and academic motivation. Findings suggest that fathers' parenting predicts daughters' adjustment differently in the context of mothers' parenting. For instance, in the context of a low-supportive relationship with mothers, fathers' autonomy granting predicted better adjustment, whereas this was not true in the context of a supportive relationship with mothers. It is possible that in the low mother-support group, fathers try to compensate for the lack of maternal support by providing their daughters with signs of love in terms of autonomy granting which, in turn, may be interpreted by daughters as a sign of their fathers' care, helping them feel better. Interestingly, fathers' support predicted more academic motivation, but only among daughters who reported high maternal support, suggesting that the process by which fathers' and mothers' parenting interact to predict adjustment differ depending on the parenting behavior and outcome variable examined.

## **PC.12. This is it: Jazz! Locales and experiential definitions of jazz in Urbana-Champaign**

**Laura Margaret Lynch**, Junior, Sociocultural and Linguistic Anthropology, LAS

## **ABSTRACT**

In a search to define jazz music, I sought to recognize evidence of personality in each local venue that jazz can be found. From analyzing several different locales, ranging from downtown Urbana's Iron Post to the concert halls of Krannert Center for the Performing Arts, I began to recognize a central shift in focus and purpose for the performance of jazz, and eagerly continued on to learn why. With the help of local voices (primarily that of jazz musicians), I began to recognize the microcosmic existences of jazz as living cells whose life fluctuations are also highly dependent on economics, technology, and other developments of the time.

## **PC.13. Regulation of cAMP concentration and protein kinase A activity by $\beta$ -adrenergic receptor activated adenylyl cyclase and phosphodiesterase in cardiac myocytes**

**Dawen Zhang**, Senior, Bioengineering, ENG

**Mentor:** Yang Xiang, Molecular and Integrative Physiology, ENG

## **ABSTRACT**

Rises in cAMP/Protein Kinase A (PKA) activity through  $\beta$ -adrenergic receptor activation is responsible for increase of heart rate and contractile force under physiological stress. Accumulating evidence shows the significance of localization of cAMP/PKA activities in physiological responses. We hypothesize that cAMP/PKA spatiotemporal distribution and activity is highly dependent on adenylyl cyclase (AC) production of cAMP and phosphodiesterase (PDE) degradation of cAMP. Using fluorescence resonance energy transfer (FRET) imaging for detection of cAMP and PKA activities in live cardiac myocytes, we show a transient, isoproterenol dose-dependent increase in cAMP/PKA activities from  $10^{-12}$  M to  $10^{-8}$  M. In contrast, concentrations from  $10^{-8}$  M to  $10^{-5}$  M induced a saturated response, followed by a decrease to different levels that were later sustained in a dose-dependent manner. Inhibition or overexpression of ACVI or PDE4D8 disrupts the cAMP equilibrium, and changes the temporal response of cAMP/PKA activities. Together, these data show that at low concentrations of isoproterenol stimulation, there is a dose-dependent increase of cAMP, with the amount of AC being a rate-limiting factor. At these concentrations, PDE isoforms in the receptor complexes confine cAMP locally. At higher concentrations of isoproterenol, there is an increasing extent of PDE dissociation from these receptor complexes, allowing for a more sustained cAMP accumulation and diffusion for PKA activation of phospholamban and TnI, leading to increased cardiac performance.

## **PC.14. Engineering multilayered nanospheres for tailored optical responses**

**Rohun Palekar**, Bioengineering, ENG

**Mentors:** Rohit Bhargava, Bioengineering, ENG; Matthew Schulmerich, Bioengineering, ENG; Anil Kodali, Bioengineering, ENG

### **ABSTRACT**

Optical responses of multilayered nanospheres with alternating gold and silica dielectric layers can be tuned with geometrical configuration. The interaction of plasmons in the metal layers leads to resonances which are manifested in both the near-field and far-field responses. We present here the design and fabrication of different multilayered nanospheres with resonances in visible and near-infrared regions. The design is conducted by evaluating the near-fields and far-fields using classical EM theory and the fabrication is achieved in colloidal solutions using surface functionalized molecular linkers. In principle, these spheres can be utilized as labels in different spectroscopic modalities based on light scattering and absorption. Here, we demonstrate their application in Raman spectroscopy and UV-Vis-NIR spectroscopy and show a comparison of spectra for different geometrical configurations.

## **PC.15. Discourse performance across time in individuals with acquired neurogenic communication disorders**

**Megan Dean**, Senior, Speech and Hearing Science, AHS

**Laura Savicki**, Senior, Speech and Hearing Science, AHS

**Mentor:** Julie Hengst, Speech and Hearing Science, AHS

### **ABSTRACT**

In the US alone over a million people annually are diagnosed with acquired communication disorders (e.g., aphasia, dysarthria, cognitive-communication impairment) due to brain damage from trauma, strokes, or diseases. These neurogenic communication disorders disrupt individuals' everyday discourse, including their abilities to manage conversations, tell stories, give directions, and organize detailed descriptions. Clinically, measuring interactional discourse abilities is notoriously complex, since discourse performance routinely varies with task demands, participants, and social situations. This current study is part of a longitudinal research project designed to explore the patterns of stability and variation within discourse across time in individuals with acquired neurogenic communication disorders. This current study is a pilot of the protocol. Four participants will be included in the pilot: one with right hemisphere brain damage, one with mild dementia, and two comparison participants without brain damage. The protocol includes three 90-minute sessions, which are videotaped and conducted within two weeks; across sessions standardized testing will be administered to assess participants' speech, language, and

hearing abilities, and six 30-minute discourse samples will be obtained using two different discourse sampling protocols. The first approach, AphasiaBank (AB), conceptualizes discourse as part of the linguistic system, and utilizes formal elicitation and assessment measures. The second approach, Mediated Discourse Elicitation Protocol (MDEP) using dynamic elicitation and assessment techniques, conceptualizes discourse as an interactional, collaborative process. Currently data collection is complete for two participants and in process for a third, transcription for collected sessions is started, and we anticipate having the data for four participants collected, analyzed and coded by the end of March 2010. In the future, this project will be extended to include the populations of individuals with aphasia, motor speech disorders, and traumatic brain injury. The data collected from this project will guide clinicians in assessing interactional discourse abilities for clients with acquired communication disorders.

## **PC.16. Health-related quality of life for persons with graph-versus-host disease post-hematopoietic stem cell transplant through non-pharmacologic means**

**Nadia Froehling**, Senior, Nursing, NURS

**Mentors:** Jean Mills, Nursing, NURS; Sandra Burke, Nursing, NURS

### **ABSTRACT**

*Purpose:* To investigate current literature discussing effects of non-pharmacological interventions on health-related quality of life (HRQoL) for persons with GVHD after HSCT. *Background:* In the U.S., 35%-50% of HSCT recipients develop acute GVHD. The care management for acute or chronic GVHD must consider adverse effects, gastrointestinal and organ dysfunction, dermatological manifestations, medication side effects, psychosocial, and economic issues. Health-related quality of life is a valid and important measurement of the success of prophylaxis and treatment for acute and chronic GVHD, however, other interventions that improve functional status and HRQoL, independent of GVHD prophylaxis and other pharmacological therapies, deserve attention from the scientific community. *Studies examined:* Descriptive, randomized controlled, non-randomized controlled, cohort, literature review articles, and Cochrane reviews published after 1993 containing the key terms GVHD, Nursing, HSCT, Quality of Life, Nutrition, Nutritional Support, Bone Marrow Transplant, Cancer, Support Groups, Stress, Immune Function, Coping, Guided Imagery, Relaxation, Visualization, Complementary Medicine, Massage Therapy, Therapeutic Touch, Spiritual Well-Being, Nutrition Therapy, and Stem Cells. *Results:* Factors that influence HRQoL include levels of relaxation, sleep quality, fatigue, pain, anxiety, nausea, and immune function response. This literature review indicates that enhanced relaxation; improved sleep quality; decreased fatigue; relief of pain, anxiety, and nausea; and immune system response improvements can be attributed to the use of massage therapy. Consistent practice of guided imagery is also helpful. *Conclusion:* Guided imagery, therapeutic touch, group support, massage therapy and meditation reduce stress, anxiety, and

depression while improving coping attitudes and the perception of support. All factors improve patients' HRQoL. Most studies were underpowered, therefore, larger randomized double blind studies are needed. *Practice implications:* Using complimentary and alternative therapies, such as guided imagery, therapeutic touch, group support, massage therapy and meditation may improve patients' HRQoL, despite consistent scientific evidence proving positive physiological effects in patients with graph versus host disease.

## **PC.17. Augmentative and alternative communication (AAC) use in schools**

**Lisa Mellman**, Senior, Speech and Hearing Science, AHS

**Mentor:** Laura DeThorne, Speech and Hearing Science, AHS

### **ABSTRACT**

Although literature has documented recommended best practices regarding AAC, few field studies have directly examined how such devices are being used within educational settings. Because the classroom represents the primary academic learning environment for school-age children, understanding current practices regarding AAC within this context will provide critical information on how to facilitate successful implementation in this setting. The present study was designed to examine communication practices in the classroom focused on three focal child participants, their classroom teachers, and associated speech-language pathologists. In addition to semi-structured interviews of all participants, a series of six classroom observations per child were completed across different days and activities. All data was collected via shorthand by the primary examiner and subjected to multiple reviews to code observational and interview data according to both pre-established and emergent themes. Key themes that developed across all three children and their individual settings included social interaction, general AAC use, and missed opportunities. Overall findings suggest that AAC is being used as an important form of augmentative input and means to facilitate participation in classroom routines. However, additional support is needed within the education environment to facilitate children's social interaction in particular.

## **PC.18. Visual target distance in bowling**

**Andrew Kickertz**, Kinesiology, AHS; and General Engineering, ENG

**Mentor:** Les Carlton, Kinesiology and Community Health, AHS

### **ABSTRACT**

*Topic:* My study investigates vision's role in human motor control. More specifically, the relationship between accuracy and visual target distance in bowling will be examined. The role of visual fixations will also be analyzed. Final fixation is the last fixation that begins before the initiation of a movement, such as throwing. The consensus of previous studies is that expert performers tend to have earlier final fixation onsets. Final fixation duration is longer in successful

trials as compared to misses; longer in experts than novices; and longer in more difficult tasks. The location of point of gaze is critical. Experts typically spend more time looking at the target, as compared to other locations. In striking tasks such as putting, most of an expert's fixations are on the ball and the hole. In throwing, performers have only one visual target. However, bowling is a rolling task, which affords fixations on intermediate targets along the ground. To date there have been no studies on vision in bowling. There is only anecdotal evidence of the impact of target distance on performance. Bowlers typically use the arrows (15 feet down the 60 foot lane) as a visual target. So, why are intermediate visual targets used in rolling tasks? And what is the most effective visual target distance in terms of spatial accuracy? *Methods:* Approximately 12 right-handed expert bowlers will be tested. Eye movement data will be recorded using a head-mounted pupil and corneal reflection system. Spatial accuracy will be measured by video analysis. The participant will throw 20 trials in each of 4 conditions: using a visual target 20-, 40-, and 60-feet down the lane, as well as at a target of the participant's choosing.

## **PC.19. Economic conditions as a factor in terrorism: Egypt, 2004-2006**

**Mary Sloan**, Senior, International Studies, LAS

**Mentors:** Alex Winter-Nelson, Agricultural and Consumer Economics, ACES; Mohammad Khalil, Religion, LAS

### **ABSTRACT**

In 1999, after almost a decade of violence in Egypt, a truce was established between the Egyptian government and the Islamist militants who were responsible. Many of the Islamist militants in prison at the time recanted their violent ways and admitted that these methods were not rooted in Islam. Unfortunately, this truce was short-lived. On October 7, 2004, three consecutive bomb attacks targeting tourist areas in the Sinai Peninsula occurred. These attacks were the beginning of another cycle of terrorism in Egypt that would last for two years. This paper isolates the economic motivations behind terrorism and determines that they were the foundational factor behind the attacks that occurred between 2004 and 2006. In an effort to establish an understanding of the motivations of the most recent cycle of violence, the paper analyzes the two previous cycles of terrorism in Egypt and their motivations. It reveals the roots of the ideology Islam as the solution and its relationship to poor economic conditions and terrorism. In order to properly construct this argument, a special emphasis is placed on the following: the economic impact of the second cycle of violence during the 1990s, the progression of the economy following the truce established in 1999, and the groups and persons involved in the attacks.

## **PC.20. Production of transparent conductors**

**Leigh Kesler**, Sophomore, Nuclear, Plasma, and Radiological Engineering, ENG

**Mentor:** Martin Neumann, Nuclear, Plasma, and Radiological Engineering, ENG

## **ABSTRACT**

In today's world, touch screens and LCD television sets have become commonplace. In the near future, even flexible phones and solar panels could be possible, in part because of transparent conductors. In order to bring this world of tomorrow closer to a reality, the Center for Plasma-Material Interactions at the University of Illinois has established an experiment with a dual magnetron configuration in order to sputter thin films onto various substrates. The system uses a combination of DC-powered magnetrons and an RF power source along with an argon/oxygen gas mixture in order to produce transparent conducting oxide films of superior quality. The materials investigated in this project are indium tin oxide (ITO) and aluminum-doped zinc oxide (AZO), both of which are used in industry for electronic devices. These films are sputtered onto glass and plastic substrates with the goal of obtaining results with at least 90% transparency in the visible spectrum and resistivity on the order of 10<sup>-3</sup> ohm-cm. In order to obtain optimal results, a number of parameters are altered, including: the gas mixture, RF power, and DC current to the magnetrons. Film quality is characterized by several techniques, including profilometry, four-point probe, and X-ray diffraction, in order to produce the best film possible, and thereby bring the future of electronic devices into the present.

## **PC.21. The impact of home literacy environments and familial support on childhood writing disorders**

**Anne Capron**, Senior, Speech and Hearing Science, AHS

**Mentor:** Cynthia Johnson, Speech and Hearing Science, AHS

## **ABSTRACT**

Parents and siblings who are in constant contact with their child/sibling have the unique opportunity to help support their emergent writing skills. Whether they serve as a positive or a negative influence, the impact that families have is profound. The present study examines the impact of familial support in the emergent writing of children with moderate-to-severe speech-language impairments. The qualitative research method employed in this case study provides highly descriptive narratives of four data sets obtained from a first-grade boy. The data sets include a home interview with the child's parent, a video-recorded tour of the child's home, a questionnaire filled out by the child's parent, and a writing sample created by the child. This ethnographic case study examines the value that parents place on their child's pre-writing ability, the writing activities that the parents themselves engage in, reading and writing materials present in the home, and the writing assistance parents and siblings offer to the emergent writer. Despite the richly literate home environments that many parents provide for their children, severe literacy problems often still persist.



## **PC.22. Thermoelectric magnetohydrodynamic driven flows in liquid metals**

**Matthew Lee**, Senior, Molecular and Cellular Biology, LAS

**Mentor:** Wenyu Xu, Nuclear, Plasma, and Radiological Engineering, ENG

### **ABSTRACT**

One of the demands fusion energy places on reactor designs is the ability of materials to handle high heat flux. Most notably is the divertor region, where energy deposition is most dense. Liquid lithium has shown promise in the handling of such heat loads and has additional benefits to plasma systems. The Solid/Liquid Lithium Divertor Experiment (SLiDE) is dedicated to exploring temperature driven flows in liquid metal in the presence of fusion relevant magnetic fields. An electron beam is used to create a surface heat flux on a pool of liquid metal which is diagnosed with an array of thermocouples. Recent experimental runs have resulted in the observation of thermoelectric magnetohydrodynamic (TEMHD) flows in liquid lithium. This convection flow adds to the desirable use of liquid metals as plasma facing components. However, more data needs to be generated to further characterize liquid lithium's power handling capabilities. SLiDEs current focus requires the use of infrared optics to determine the surface heat flux of liquid lithium. Undergraduates on the project participate in design, construction and operation of the machine. The experimental apparatus touches on a wide variety of topics including electromagnetism, fluid dynamics, heat transfer, and computer control. (M. B. Lee, T. Mui, M. A. Jaworski, M.J. Neumann, W. Xu, and D. N. Ruzic.)

## **PC.23. Algae biofuels project**

**Alex Valvassori**, Junior, Chemistry and Earth Systems, the Environment and Society, LAS

**Oliver Hui**, Agricultural and Biological Engineering, ENG

**Anna Oldani**, Agricultural and Biological Engineering, ENG

**Mentors:** Lance Schideman, Agricultural and Biological Engineering, ENG; Derek Vardon, Civil and Environmental Engineering, ENG

### **ABSTRACT**

With funding provided by the Student Sustainability Committee, the Algae Biofuels Project began during the summer of 2007 with the hopes of demonstrating three key functions of algae. First and foremost is the conversion of algae into a biofuel source. To date, algae has proven to be more energy-dense (per acre of growth space) than other biofuel, such as corn. Through partnership with the University of Illinois Engineers Without Borders biodiesel project, the group seeks to fuel university vehicles with algae-based biofuel. In addition, the group aims to develop a demonstration site to increase the community's awareness of algae's potential as a fuel source. In conjunction with the Abbott power plant, the group will use algae for carbon sequestration beginning in the spring of 2010. Waste flue gas from the plant can be used to

propagate enhanced algal growth. Like most photosynthetic microorganisms, algae grow faster and more abundantly under increased carbon dioxide concentrations. Not only does this increase the total algae yield for conversion to fuel, it also reduces the greenhouse gas emissions affecting climate change. Currently, the group is evaluating the effects of increased CO<sub>2</sub> concentrations on algae growth. Finally, algae has the ability to grow in a variety of water conditions. Algae can be grown in salty, polluted, and other waste waters. During the growth process, algae consumes many of the pollutants in the wastewater. This process would otherwise be expensive and energy intensive. This is another area of possible future research for the group. The scientific data generated through the experiments of this project can be used to validate claims that algae is an effective fuel source. The previously stated claims are well accepted by the scientific community, and the results of this project will contribute to the available data on algae. Algae has enormous promise for the future and this research can bring algae one step closer to its full potential as a fuel source.

## **PC.24. Perceptions and outcomes of the 2010 Olympic bidding process: A historical and cultural interpretation of Chicago's attempt to bring the 2016 Summer Olympics to Chicago**

**Reid Behrens**, Senior, International Studies, LAS

**Mentor:** Synthia Sydnor, Kinesiology and Community Health, AHS

### **ABSTRACT**

As a result of taking a holistic approach toward studying Chicago's attempt to bring the 2016 Chicago Olympic Games to the City of Chicago, I have found it necessary to write a history of the actual bidding process, which began in 2006, in order to better understand how the bid relates to culture and public perception for the City of Chicago. The history is not only illuminated by the roles of corporations but actual Chicagoans' voices as well. After the 2016 Summer Olympics were awarded to Rio De Janeiro, Brazil, many Chicagoans were left wondering what had happened. There were many Chicagoans who wanted the Olympics to be brought to Chicago and many who were completely against it. My research will not focus on one side or the other; instead, I will strictly examine what Chicagoans perceived of the Olympic bidding process in correlation to literature, and actual historical events surrounding the Olympics bidding process in correlation to Chicago's attempt. Understanding how Chicagoans felt about the City of Chicago's attempt to gain the bid is important because other scholars will be able to determine what led to Chicago not earning the bid. Was it the City of Chicago's fault? Did the boating associations' attempts to get rid of the bid sway the City of Chicago to make misrepresentations in front of the International Olympic Committee? These are important questions that can be answered by others as a result of my research. Understanding Chicagoans' perceptions of the Olympic Games is extremely important to many different corporations, public groups, and scholars in all sorts of facets.

## **PC.25. Medical conditions among clients using a free health center**

**Crystal Amoah**, Community Health, AHS

**Mentor:** Stephen Notaro, Kinesiology and Community Health, AHS

### **ABSTRACT**

An estimated 47 million Americans are uninsured; this could result in high levels of chronic illness. This study reviews medical records and diagnostic information of patients from the Champaign County Christian Health Center (CCCHC). The CCCHC is a faith-based clinic created to provide free health services to uninsured residents of the Champaign, Urbana, and Rantoul area. Medical diagnosis information collected from 2,499 patients' records from the CCCHC was classified into categories ranging from chronic to acute illness. Using SPSS and Excel records, the data will be analyzed to identify if patients who attended the free clinic had higher rates of chronic illness, such as hypertension, asthma, and diabetes. The result could indicate a higher need for primary care, including methods to help educate individuals on behaviors that could help promote healthy living. Free clinics increase access to primary care for the uninsured, which should result in greater health outcomes.

## **PC.26. When can the people govern?**

**Joshua Feiger**, Senior, Political Science, LAS

**Mentor:** Mark Schrad, Political Science, LAS

### **ABSTRACT**

This paper seeks to determine the necessary and sufficient factors required for the democratization of authoritarian regimes. My contribution to this scholarly debate will focus on a small number of countries from Eastern Europe that have experienced varying levels of democratic success. This small N most similar systems design comparison is the best way to determine why one country is a successful democracy and why another country with similar characteristics cannot democratize. The findings of this investigation carry significant political importance for current transitional democracies, future transitional democracies, and countries seeking to promote democracy abroad. I will help determine why some countries are currently stagnating in transitional phases of democratization and analyze why some countries fail. Additionally, countries seeking to promote democracy can make more informed decisions regarding their influences on transitional nations. This study will influence the form of aid and level of involvement external actors should have to provide a transitional democracy with the best chance of being successful. Based on my findings, policymakers in foreign nations that support the transitional attempt will be able to make more educated decisions. This study tests four hypotheses to determine what factors affect democratization success. First, I hypothesize that countries in which an authoritarian regime has been in power for a longer time will have more difficulty democratizing.

Second, countries with better economic conditions and more highly educated citizens have a better chance at successfully democratizing. Third, assistance from external actors will help a country's chances to democratize. And fourth, democratization will be more successful if the transitional state is surrounded by successful democracies. My case studies serve to test these hypotheses and the findings determine their accuracy.

## **PC.27. Disability relevant design**

**Wan Choi**, Freshman, Undeclared, DGS

**Jackie Braemer**, Sophomore, Painting, Art + Design, FAA

**Mentor:** Deana McDonagh, Art + Design, FAA

### **ABSTRACT**

As two Intersections Living-Learning Community interns, we will report on research we conducted with Professor McDonagh, teacher of a course on Disability and Relevant Design. Through her work, she is trying to make the lives of disabled people better by designing low-cost products that are more efficient to their needs. As her research assistants, we will present an overview of the products designed in her course. The poster will also include findings from library online databases and research that we worked on throughout the semester. In addition, our poster will show the benefits of working side-by-side with people who benefit from assistive technologies. Finally, our poster addresses the value of involvement in an internship that enabled us to support student designers and their professor.

## **PC.28. Automated histopathology by FT-IR imaging of stained breast tissue**

**Lauren Sheehy**, Sophomore, Bioengineering, ENG

**Mentor:** Rohit Bhargava, Bioengineering, ENG

### **ABSTRACT**

Widespread breast cancer screening has led to a large number of breast biopsies. These biopsies require pathology assessments that may not be optimal to meet the growing demand for tissue evaluation. Automated techniques could improve cancer diagnosis efficiency and accuracy. This study is an evaluation of the effectiveness of Fourier transform infrared (FT-IR) spectroscopy for cell type recognition in stained breast tissue samples. Current procedure calls for hematoxylin and eosin contrast staining on biopsied tissue and manual evaluation by pathologists. This method, while easy, low cost, and well understood, is subject to inconsistencies inherent in human interpretation. FT-IR spectroscopy is an attractive platform for quantitative analysis. The first step of histologic analysis is to identify the cell types within the tissue. In this study a model is developed to classify two cell types: epithelium and stroma. This is an important step in tumor identification, as over 99% of cancers arise in epithelial tissue and large masses of epithelium are an indicator of cancer.

By combining the chemical and molecular information of FT-IR spectroscopy with optical microscopy, an image can be produced that contains spectral and spatial information. Pixels from this image are then classified as epithelium or stroma based on their spectral profile. This provides a quantitative analysis that can support or refute the pathologist's qualitative analysis. Development of algorithms to classify stained tissue could facilitate the development of an automated device that would stain tissue, collect FT-IR images, and provide an automated and objective tumor diagnosis.

## **PC.29. Optimization of DNA extraction and collection in STRONG Kids Project**

**Jill Jozefowicz**, Senior, Human Nutrition, ACES

**Anthony Wang**, Graduate Student, Nutritional Sciences, ACES

**Yingying Wang**, Graduate Student, Nutritional Sciences, ACES

**Mentor:** Margarita Teran-Garcia, Food Science and Human Nutrition, ACES

### **ABSTRACT**

Childhood obesity is reaching epidemic proportions. In 2008, it was estimated that prevalence of overweight and obesity among children ages 2-4 reached 14.6%. The STRONG Kids Project aims to document significant predictors of mechanisms through which individuals develop health-related behaviors and attitudes and develop prevention and intervention programs for families and children that are evidence based and promote healthy development. The cellular level study of the STRONG Kids Project intends to identify and understand the genes that are associated with weight gain in children and the way in which these genes interact within the social and behavioral context of a child's environment. The key to examining these interactions is to conduct high throughput genotyping to search for single nucleotide polymorphisms in select candidate genes of interest. Our objective is to prepare genomic DNA extracted from saliva kits for genotyping and to optimize this process in order to obtain highest quality and quantity of DNA. This includes adapting the extraction protocol for children's saliva and a comparison of yield and quality of DNA from differing modes of collection in the field. We conducted a pilot project to compare DNA yield and quality depending upon the mode of saliva collection (either 3, 5, 7 sponges or spit). The average yield of DNA collected increased as sponge number increased. The three sponge average yield was 11.88 µg, five sponge average was 15.4 µg, and seven sponge average was 41.22 µg, and all samples had a 260/280 OD ratio average at or above 1.6. PCR amplification confirms that these samples could be used for genotyping. This project demonstrates that more starting material yields more DNA, and it is crucial to carefully follow extraction protocol to maximize DNA yield and quality.

## **PC.30. Effects of plyometric and sensorimotor training on neck muscle electromyography: A pilot investigation**

**Tyler Surma**, Senior, Kinesiology, AHS

**Mentor:** Steven Broglio, Kinesiology and Community Health, AHS

### **ABSTRACT**

Researchers estimate that 1.6-2.8 million concussions occur annually. Previous studies have suggested that plyometric and sensorimotor neck strengthening may elicit the appropriate neuromuscular responses to reduce the acceleration of the head during perturbation. We conducted a pilot investigation to discover the effects of this type of training protocol. Twelve subjects participated in the study. Subjects were randomly assigned to a five-week training intervention focused on either plyometric/isometric or sensorimotor/isometric exercises. Baseline and post-intervention strength measurements were recorded. EMG was recorded bilaterally for the upper trapezius and sternocleidomastoid muscles during head perturbation. At the end of the five-week intervention, neck strength had increased significantly, likely due to rapid neural adaptations. Analysis of the EMG onset time indicated no significant differences for group or time ( $p < 0.05$ ), although the averaged time effect sizes were large for the front (0.11) and side (0.13) perturbations. We believe that with a larger sample, a reduction in variability will improve the results of the EMG onset time. Also, due to the significant increases in neck strength, an effect on head acceleration may be observed.

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