

## Xavier University Exhibit

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Celebration of Student Research

Undergraduate

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2016

# Celebration 2016 Abstract Booklet and Student Presentation Schedule

Xavier University - Cincinnati

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2016

# Celebrate

## A CELEBRATION OF STUDENT RESEARCH AND CREATIVE ACTIVITY

On behalf of the College of Arts and Sciences and the Office of Undergraduate Research, we'd like to welcome you to the 22nd annual Celebration of Student Research and Creative Activity. Undergraduate research, as one of the signature experiences of a Xavier education, allows our students to do more than study their discipline; instead they become practitioners of their discipline. In their classes, they may study philosophy, science and art; through research with faculty mentors, they become philosophers, scientists and artists. The work presented here by 156, working with 57 faculty from 23 departments across all three colleges provide a snapshot of the present and an optimistic preview of the future of research in the disciplines represented.

To the student presenters: Congratulations on the successful completion of your projects and the well-deserved recognition of your hard work.

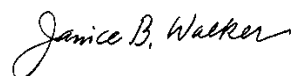
To the faculty mentors: Thank you for the encouragement of our students, directing their research efforts and helping them to discover their passion.

To the alumni in attendance: Thank you for the support that allows us to celebrate and recognize the work done over the past year, while expanding participation to more students and faculty in coming years.

And finally, to the student attendees: May you be inspired by the work of your colleagues such that one day you will choose to take advantage of similar opportunities to more deeply study and engage with your chosen discipline.

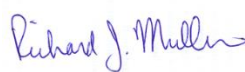
Sincerely,

Dr. Janice B. Walker



Dean, College of Arts and Science

Dr. Richard J. Mullins



Director, Office of Undergraduate Research

### **Undergraduate Research Advisory Board**

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## Keynote Speaker

### William Wester

William Wester graduated in 1987 from Xavier with a double major in Mathematics and Physics and was named Valedictorian. He then entered graduate school and obtained his Ph.D. in Physics from the University of California at Berkeley where he studied experimental particle physics. He was part of the team that discovered, in the mid-1990s, the top-quark, a fundamental particle of nature. His primary focus was building silicon tracking detectors and the study of particles containing the bottom quark. In 2003, the opportunity arose to help build a new silicon-based detector ... the world's most powerful digital camera that is now mounted on the 4-meter Blanco telescope in Chile. The camera is collecting data for the Dark Energy Survey which not only observes astronomical objects, but allows for measurements related to the fundamental particles, their interactions, and the current mysteries of dark matter and dark energy. Finally, William continues to be a die-hard Xavier fan and has been active in the National Alumni Association serving as the Chicago Chapter President (where he now lives) and then recently serving as the President of the National Alumni Board from 2012-2015.

## Undergraduate Research Mentor of the Year (URMY)

### Mollie McIntosh, Ph.D.

Dr. McIntosh received her B.S. in biology from the University of Dayton in 1999. She earned a M.S. in environmental science with a concentration in applied ecology from the School of Public and Environmental Affairs at Indiana University in 2001. Dr. McIntosh then continued on to obtain her Ph.D. in entomology at Michigan State University in 2007, and continued with post-doctoral work in Michigan before coming to Xavier in the fall of 2010.

Dr. McIntosh's research interests are centered in aquatic and forensic entomology, with particular interest in ecological interactions among organisms and the changing environment. Her projects vary, from assessing the impact of human activities on wetland and stream ecosystems to studying the impact of scavengers on decomposing bodies. Most recently, her collaborations with other faculty in the Department of Biology, has led to the creation of VEX (Vector Ecology at Xavier), a student research group focused on the ecology of vector-borne diseases, like West Nile Virus in the United States and Buruli ulcer in Western Africa. Critical to the success of Dr. McIntosh's research is the involvement of undergraduate students.

During her six years at Xavier, Dr. McIntosh has mentored over 34 undergraduate students, ranging from freshman to seniors. This research occurs all year (even during summers), with her managing anywhere from 6 to 13 students a semester. These students get "hands on" experience conducting science in both the field and laboratory learning basic skills in experimental design, data management, analysis and interpretation. Dr. McIntosh encourages and supports her students to present their research findings, not only at the Celebration of Research here at Xavier, but also local, regional and national scientific meetings. Since 2010, she has had 16 oral or poster presentations given by her students at such scientific meetings, including the Entomological Society of America, the North American Benthological Society, the Society of Freshwater Science, the National Council of Undergraduate Research, and the Ohio Valley Entomological Association. Over the past two years, she has also organized a larger group of Biology faculty and students (over 30 people total) to attend the regional Midwest Ecology and Evolution Conference. Currently Dr. McIntosh is working on two papers with Xavier undergraduates as co-authors.



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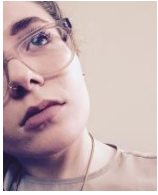
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## Art



### **SYMBOLISM INFORMED BY THE LIBERAL ARTS**

**Hannah Smith (Suzanne Chouteau)**

#### **Department of Art**

In these works the artist organizes, collects, and utilizes an array of information gathered from her liberal arts education to depict a more informed view of human relationships and personality. Much like a liberal arts education composed of philosophy, sociology, mathematics, physical sciences, and literature, the human personality is extensively diverse, rich with conflict and symbolism. The artist utilizes the multiple paneled, multiple figured, and mixed media approach in tandem with the informed symbolism inspired by the liberal arts education to create a nuanced visual narrative of various struggles of the human personality including; gender neutralization, stereotyping, personality disorders, and anxieties. The manipulation of the concept of polyrhythms—the style of layering multiple images or notes on top of one another, typically associated with West African art and music—enables the artist to explain a single narrative in multiple iterations within a single work. Conveying the multiplicity and complexity of a human personality that has been dissociated by conflicting cultural standards, norms, interactions, and expectations is at the heart of this research. Multiplicity is exemplified in one of the artist's works, "Chlora vs. the Flowers of Narcissus," in which the artist conveys her struggle with conflicting personality traits of humility and vanity through the Roman myth of Chlora. She is contrasted with a panel featuring the flowers which Roman gods were turned in to due to their narcissism. In this example, the self-portrait becomes a metaphor informed by literature and expanded beyond the traditional "portrait" with study of plant anatomy; the result is a metamorphosis of a figure. The artist then bolsters this naturalistic theme with an atypical mixed media wood-carved frame of trees based on observational work done during study in Italy. As liberal arts studies bolster conceptual and technical execution, so it does the intentionality of media use.

## **Athletic Training**



### **KNEE INJURY IN A COLLEGIATE SOCCER PLAYER**

**Adam Battiatto (Lisa Jutte)**

#### **Department of Athletic Training**

A nineteen-year-old, left-foot dominant, female, soccer player sustained an injury to her right knee while playing in a game. She had no past medical history in regards to her right knee. Upon evaluation by the University's athletic trainer, the patient reported that she planted her right foot and twisted to kick the soccer ball with her left foot. The patient also reported that she did not hear a "pop", but felt like her leg gave out. She first reported sharp, throbbing pain (7/10) initially, that decreased (5/10) towards the end of the evaluation. The patient reported no point tenderness, just general pain in her right knee. No gross deformity or discoloration was observed, however, mild-moderate edema around the patella was noted. The patient's passive knee flexion and extension ranges of motion (ROM) were within normal limits, but painful. She exhibited (+) Lachman's and Pivot Shift tests. The athletic trainers' recommendation was rest, ice, compress, and elevation of the right knee, 800 mg Ibuprofen three times per day as needed, and partial weight-bearing with crutches as tolerated. The patient was referred to the team physician. Differential Diagnosis: ACL sprain/tear, PCL sprain/tear, MCL sprain/tear, LCL sprain/tear, meniscal pathology, femoral bone contusion, tibia/fibula bone contusion, posterior capsular sprain Treatment: The physician's examination revealed the patient had mild (2+) knee effusion, limited ROM (0o-80o flexion), (+) Lachman (3-4 mm displacement with a soft endpoint) and anterior drawer, collateral ligaments intact, tenderness over lateral tibial plateau, lateral femoral condyle, and lateral joint line. An MRI two days post-injury showed a complete acute ACL tear with bone contusions along medial and lateral femoral condyle/tibial plateau, and grade-1 sprain of MCL, but no obvious tears of the menisci or articular cartilage damage. The patient elected to undergo a right knee arthroscopy with arthroscopic-assisted autologous patellar tendon graft anterior cruciate ligament reconstruction surgery that took place four weeks post-injury. The patient wore a brace locked out at 0 degrees of extension following surgery. The ROM was increased incrementally and resistance exercises were incorporated following a standard ACL rehabilitation protocol. Week one of rehabilitation consisted of passive and active ROM exercises for the knee and hip, quadriceps isometrics, stretching, patella mobilizations, isometric contractions with Electrical Russian Stimulation (50 pps, 300 Hz, 100 msec duration, 100 msec interval, 50% duty cycle), terminal knee extension, massage, ice, and compression. The patient progressed normally through standard rehabilitation during the following months. After about five months post-op, the patient showed quad strength in the 85% range (of contralateral side) during a Cybex strength test and was cleared to initiate a running program. Uniqueness: The patient was quickly progressing through standard rehabilitation and was on track to be cleared for full return-to-play around the six or seven month mark, but was set back by several bone contusions. These bone bruises occurred mostly during the running program that was set out for her. The patient has many dietary restrictions that could have played a significant role, too. Conclusion: ACL tears are very common, but there are no two rehabilitation programs that are exactly the same. Even with the bone contusions setting the patient back slightly, she progressed very rapidly through a standard return-to-play protocol rehabilitation program and responded very well to it. About nine months post-op, the patient was cleared for full return-to-play.

## **Biology**



### **LOCOMOTION ADAPTATIONS OF PROSIMIANS**

**Lindsey Berting (Dr. William Anyonge)**

#### **Department of Biology**

Prosimians, which include the smallest members of the primate order, display the most internally diverse methods of locomotion that can be grouped into three categories: vertical clinging and leaping, active quadrupedalism and slow climbing quadrupedalism. This study investigated the correlation between limb proportions and these most commonly utilized methods of locomotion among twelve prosimian species. Crural, brachial, and intermembral indices were computed from measurements made on digital images of the principal limb bones (femur, tibia, humerus and radius) of the species under study. The indices were then subjected to an analysis of variance to test for significant differences in limb proportions. Preliminary results indicate that limb proportions are strongly correlated with locomotor patterns. Species that utilize primarily quadrupedal and leaping locomotor patterns display slightly longer hind limbs in comparison to forelimbs. Species in the clinger group had the most equal proportion of brachial and crural indices.



## **TEMPORAL ACTIVITY PATTERNS OF THE SPOTTED PACA CUNICULUS PACA AND CENTRAL AMERICAN AGOUTI DASYPROCTA PUNCTATA IN RELATION TO LUNAR ILLUMINATION AND WEATHER CONDITIONS IN LOWLAND FOREST OF COSTA RICA**

**Hollie Boyd, Daniel Newman (Dr. George Farnsworth)**

**Department of Biology**



The Spotted Paca (*Cuniculus paca*) is a large rodent species inhabiting tropical forests of Central and South America. Increasingly, the conservation status of the paca is coming under threat by illegal poachers, who often use hunting dogs to locate burrows and root out game. In the interest of understanding the behavioral patterns of this nocturnal species we examined a 21-month camera trap dataset at a paca den in an ecological reserve in Costa Rica. The den is located in a natural cave within a densely-forested section of secondary rainforest. Previous studies indicated that the activity of pacas was influenced by the lunar cycle. We measured activity time and duration outside the den for the brightest 7 days (around full moon) and the darkest 7 days (around new moon) of the lunar phase. We also examined activity patterns during different seasons. In addition to nightly activity patterns, we also documented the paca regularly carrying leaf litter into the cave. With this study we hope to contribute to an existing body of knowledge on paca activity.



## **AN ASSESSMENT OF HABITAT QUALITY AND MACROINVERTEBRATE COMMUNITY STRUCTURE WITHIN THE MILL CREEK WATERSHED, CINCINNATI, OHIO**

**Meghan Burge, Donielle Phillips (Dr. Mollie McIntosh)**

**Department of Biology**

Urban streams often flow through densely populated, developed areas resulting in degraded ecosystem quality. The Mill Creek Watershed, located within the Cincinnati, Ohio region, is a heavily urbanized system with a long history of degradation due to multiple anthropogenic activities (e.g., industrial effluents, combined sewer overflows, channelization). Efforts are underway to improve stream quality, however baseline data are still needed to understand current conditions and to assess future improvements. The main objective of this study was to assess habitat quality and macroinvertebrate communities within the Mill Creek Watershed. Nine sites were sampled from four streams within the watershed, including the mainstem Mill Creek and three tributaries. Each site was sampled once from July 22-30, 2015. To assess habitat, the Ohio Qualitative Habitat Evaluation Index (QHEI) was conducted. Quantitative benthic macroinvertebrate samples were collected in riffle habitats (n=3) with a modified Surber sampler and D-framed net. Qualitative macroinvertebrate samples were collected from all available habitats (e.g., riffle, pool, run) for a timed thirty-minute search. All macroinvertebrates were preserved (70% ethanol), identified to the family level and selected indicator metrics were calculated. QHEI scores were higher in the upstream portions of the watershed, with most sites ranking as good or fair. Sensitive taxa (% EPT) and tolerant taxa (% Chironomidae) were highly variable within the watershed, with relative abundances ranging from 6-74% and 3-78%, respectively. Information gained from this study will help to better understand the current condition, detect future impairments, and guide management decisions for this urban watershed.



## **EXPRESSED BREAST MILK: EFFECTS OF REFRIGERATION ON BACTERIAL GROWTH, PH, LACTOSE, AND PROTEIN**

**Edward CaJacob, Sarah Klenk, Michelle Klueppelberg (Dr. Jennifer Robbins)**

**Department of Biology**



Recently there has been an increasing need for in-vitro storage of breast milk due to women being more involved in the workforce outside the home. Breast milk is a dynamic fluid proven to be more beneficial than powdered formula in promoting infant growth and development. Therefore, knowledge about the safe storage and expiration of expressed milk is paramount for the health of infants. We monitored lactose, protein content and pH as well as bacterial growth in milk expressed by three lactating mothers. Each sample was stored at 4° C (refrigeration). Lactose and protein levels did not vary significantly over the 6 day refrigeration period; however, pH dropped significantly, indicating a possible souring of the milk that may make it less attractive for infants. Bacteria cultured from the milk changed over the growth period, with some species decreasing and others increasing as the pH dropped. Pathogenic levels of bacteria were not observed. These findings suggest that the contents of expressed breast milk remain stable throughout a 6 day refrigeration period.





## **CHRONIC HYPOXIA INCREASES ENDOTHELIAL NITRIC OXIDE SYNTHASE PHOSPHORYLATION IN LUNGS FROM NEONATAL RATS**

**Ray deKay (Dr. Dorothy Engle)**

### **Department of Biology**

Chronic hypoxia (CH)-induced pulmonary hypertension contributes to disability and mortality in infants with chronic cardiorespiratory conditions. Although endothelial dysfunction is a contributing factor to neonatal PH, our preliminary studies suggest that CH paradoxically increases endothelium-derived nitric oxide (NO)-dependent pulmonary vasodilation in neonatal rats. However, whether this response to CH is due to increased expression or activity of NO synthases (NOS) is unknown. NO is produced by three NOS isoforms: neuronal NOS (nNOS), inducible NOS (iNOS), and endothelial NOS (eNOS). eNOS, in particular, is a primary source of NO in the vasculature that can be activated by phosphorylation at Ser1177. We therefore hypothesized that CH increases pulmonary expression and phosphorylation of eNOS in neonatal rats. To test this hypothesis, we assessed expression of eNOS, nNOS and iNOS, as well as levels of phosphorylated eNOS (phospho-eNOS) in whole lung homogenates from 2-wk-old control and CH (2 wk at 0.5 atm) rats by western blotting. Whereas CH was without effect on expression of either eNOS, iNOS or nNOS in whole lung samples, we observed a CH-dependent increase in the ratio of phospho-eNOS to total eNOS. We conclude that CH increases levels of phospho-eNOS in neonatal rat lungs, indicative of greater eNOS activity. This response to CH may provide a protective mechanism that limits CH-induced pulmonary hypertension in the neonate.

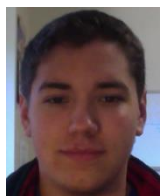


## **ASSESSMENT OF AN URBAN STORMWATER BIORETENTION SYSTEM FOR LOW-IMPACT DEVELOPMENT (LID)**

**Arnold Del Pilar, Bradley Rolfes (Dr. George Farnsworth)**

### **Department of Biology**

In the United States, combined sewer systems installed before the mid-20<sup>th</sup> century provided a cost-effective way to transport sewage and stormwater away from cities and to local rivers and streams. However, these older systems are not capable of handling excess flows of water during heavy rain events, due to increased watershed imperviousness. Urban stormwater best management practices (BMPs) have shown a reduction in total volume of stormwater runoff entering sewer systems, reducing Combined Sewer Overflows (CSOs) in combined sewer systems and thus reducing watershed pollution. Previous research has shown a reduction in turbidity, nutrients (Phosphorous and Nitrogen) and other pollutants in stormwater runoff in urban areas where stormwater BMPs, such as rain gardens, have been implemented. The goal of our research is to assess the effectiveness of the Rain/Bog garden adjacent Alter Hall and scientifically measure its effect on campus stormwater runoff. To determine the volume of rainfall retained by the system, we will measure the depth of water in the 500-gallon cistern, below the bioretention medium before and after heavy rain events, to assess its effectiveness. This research will provide valuable insight into the efficiency of this system and provide the groundwork for future research.



## **A TEMPORAL ASSESSMENT OF WEST NILE VIRUS IN LARVAL MOSQUITO POPULATIONS IN WETLAND ECOSYSTEMS OF SOUTHWEST OHIO**

**Jacob Gafranek, Jillian Maxey, Tyler Sauerbeck (Dr. Mollie McIntosh, Dr. Dorothy Engle, Dr. Jennifer Robbins)**

### **Department of Biology**

West Nile Virus (WNV) is a mosquito-borne pathogen transmitted horizontally among reservoir populations of birds. Infected mosquitoes may also transmit WNV to humans causing public health concern, with more than 2,000 cases/year in the United States from 2010 to 2015. Research efforts have mainly focused on horizontal transmission of WNV, however, less is known regarding possible vertical transmission of WNV from adult to larval mosquito. The objectives of this study were to (1) determine WNV prevalence in wild larval mosquito populations and (2) assess any temporal variation in WNV prevalence, both between year (2014-2015) and within year (2-month intervals). Mosquito larvae were sampled bimonthly at four wetland sites in the Cincinnati region of southwestern Ohio between May to October of 2014 and 2015. A standardized mosquito dipper was used to collect a composite, larval mosquito population sample ( $n=15-30$  dips) from shallow, edge habitats around the wetland. At each site, two composite mosquito samples were collected; one to detect WNV presence and the other for larval mosquito identifications. West Nile Virus was detected in larval mosquito populations at all four sites, with nine total positives over the two years, resulting in 10% positivity. There was no change in WNV prevalence between years; however, within year variation was observed, with the highest WNV prevalence in May/June in 2014 compared to later in the sampling season in 2015. Information from this study will contribute to general knowledge on mosquito population dynamics in Ohio and could aid in future control efforts for WNV.





## OPTIMAL PH AND NUTRIENTS FOR MICROCYSTIS SPP. PROLIFERATION IN LOW-TURBULENCE FRESHWATER MEDIA



Catherine Graff, Jordyn Ng (Dr. Jennifer Robbins)

### Department of Biology

Blooming cyanobacteria of the genus *Microcystis* have become an increasing problem in freshwater ecosystems throughout the world due to a variety of anthropogenic environmental disturbances. *Microcystis* spp. secrete hepatotoxins and neurotoxins during these blooms that harm humans, wildlife, and the fishing/recreation industries. It is therefore essential to be able to predict these blooms and prioritize water bodies for bloom prevention and control. However, data regarding *Microcystis* spp. laboratory culturing techniques, preferred environmental pH, and preferred environmental nutrients are scarce. This study therefore aimed to successfully culture *Microcystis* spp. in a controlled, microscale laboratory environment, define a smaller optimal pH range for *Microcystis* spp., and determine if *Microcystis* spp. has a nutrient preference of nitrogen or phosphorus. For all three experiments, *Microcystis* spp. was cultured in low-turbulence freshwater media. To determine the optimal microscale culturing conditions in our laboratory, *Microcystis* spp. was cultured in large containers (400 ml beakers) and small containers (13 x 100 mm test tubes). *Microcystis* spp. grew at a more rapid rate in the large containers ( $p \leq 0.01$ ), and we therefore used large containers to culture *Microcystis* spp. for the rest of the study. *Microcystis* spp. was then grown in five different pH treatments as well as different nitrogen and phosphorus treatments to determine optimal environmental conditions. *Microcystis* spp. grew best in the pH 6 treatment, but there was no difference in growth in the nitrogen and phosphorus treatments. This study was therefore able to contribute to the knowledge surrounding *Microcystis* spp. proliferation and assist in defining more specific optimal environmental conditions for harmful *Microcystis* spp. blooms.



## IMPACTS OF AMUR HONEYSUCKLE ON SOIL RESPIRATION IN AN URBAN FOREST



Emily Jonagan, Andrew Utz (Dr. Brent Blair)

### Department of Biology

Amur honeysuckle (*Lonicera maackii*) is a shrub species native to temperate regions of Asia including northern and western China, Japan, Mongolia, and Korea. Amur honeysuckle was introduced in the United States in the mid 19th century as an ornamental bush, and was subsequently used for hedgerows between homes. It has since spread rapidly throughout the country and is an invasive species in the Cincinnati area. The purpose of this study was to examine the changes in soil respiration in Mount Airy forest outside of Cincinnati due to the presence of Amur honeysuckle. We collected soil respiration, temperature, and water content samples during late October and early November of 2015, and again in the Spring of 2016. In addition, we collected a leaf area index of the upper and lower canopies. Data was collected from four different plot locations within the old-growth forest, highlighting the different factors of having either honeysuckle or no honeysuckle. Complete results from this research are still pending.



## NEGATIVE BIOFEEDBACK INTERACTIONS BETWEEN PRUNUS SEROTINA, PYTHIUM SPP. AND LONICERA MACKII



Kira Liggins (Dr. Kathryn Morris)

### Department of Biology

Biofeedback mechanisms comprise both interesting and applicable interactions between many organisms. A well-studied biofeedback loop involves *Prunus serotina* and *Pythium* spp. A key factor in driving this negative feedback loop appears to be high soil moisture which promotes *Pythium* growth. In this experiment, the addition of *Lonicera mackii* and its effects on soil moisture was examined in tandem with *P. serotina* and *Pythium*. We predicted that the presence of *L. mackii* within this biofeedback loop increased *Pythium* toxicity to *P. serotina*. In our field site we found four *P. serotina* trees with three *L. mackii* surrounding each. Three treatments (control, tying back of *L. mackii*, and cutting *L. mackii*) were applied around each *P. serotina*. Photosynthetically Active Radiation was measured both above *L. mackii* height and at ground level. Soil was collected immediately before treatment application and one month after, and *Pythium* abundance was quantified. The percent increase or decrease of *Pythium* was compared across treatments. Also light availability was directly compared to *Pythium* abundance.

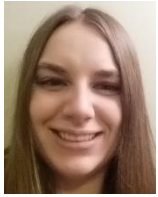


## **ROLE OF TEMPERATURE AND SHADE COVERAGE ON BEHAVIOR AND HABITAT USE OF CAPTIVE AFRICAN LIONS, SNOW LEOPARDS, AND COUGARS**

**Caitlin Mack (Dr. George Farnsworth)**

### **Department of Biology**

Big cats are native to a wide variety of environments. Captive cats living in zoos are often housed in climates quite different from their native range. For this study, African lions (*Panthera leo*), snow leopards (*Panthera uncia*), and cougars (*Puma concolor*) residing at the Cincinnati Zoo & Botanical Garden were observed in outdoor enclosures from public viewing areas. I expected cats native to cold climates, such as the snow leopards, to be more active during periods of lower temperatures. Cats of each species were observed on ten different days between September 2015 and February 2016 for a total of fifteen observation hours, in temperatures ranging from 33 °F to 73 °F. Outdoor enclosures were diagramed and divided up into sections identified as shaded or exposed. During each observation period, cats' behavior and position in their enclosures were recorded at one-minute intervals for thirty minutes. Lions were found to be less active than snow leopards and cougars. All cats were observed more frequently in shaded portions of the exhibit during warmer temperatures. Temperature, however, was not found to have a significant effect on the average activity levels. The activity levels and environmental preferences in cats may be influenced by individual acclimatization as well as their species' native climate. Care should be taken to provide opportunities for cats to move between areas of various exposure levels when designing habitats for big cat species in captivity.



## **SOUTHWESTERN WILLOW FLYCATCHER NESTING SUCCESS IN THE MIDDLE RIO GRANDE BASIN OF NEW MEXICO**

**Camille Neitzel (Dr. George Farnsworth)**

### **Department of Biology**

The Southwestern Willow Flycatcher (*Empidonax traillii extimus*) is a federally listed endangered species that spends the summer months breeding in riparian habitats in the southwestern United States. It is thought that the main cause of the decline is due to habitat destruction and habitat degradation due to invasive species. In order to gain more information about the status of the species, annual surveys are conducted during the summer breeding months in the southwestern United States. This study used presence/absence surveys, nest data information, and habitat suitability collected in the summer of 2012 from the middle Rio Grande Basin in New Mexico provided by the Bureau of Reclamation. This information was then analyzed using a multiple regression analysis software in order to determine what vegetation the species preferred and to determine if this vegetation had an impact on breeding success. The Southwestern Willow Flycatcher nesting success was most successful in suitable vegetation within 50 meters of water. The suitable vegetation was medium-sized trees with a well-developed or little or no understory along with shrub-sized stands. These different habitat types consisted of species such as coyote willow (*Salix exigua*), Russian olive (*Elaeagnus angustifolia*), and non-monotypic saltceder (*Tamarisk* spp.). This suggests that there might be less habitat destruction or more food available in this area. Understanding where Southwestern Willow Flycatchers have the most nest success could be used to better determine what riparian areas should be monitored and how other areas may be improved.



## RESPONSE OF ANOPLOPHORA GLABRIPENNIS (COLEOPTERA: CERAMBYCIDAE: LAMIINAE) TO VARIATION IN TRAP COLOR

Alexander Reitz (Dr. Ann Ray)

### Department of Biology

The Asian longhorned beetle (ALB), *Anoplophora glabripennis* (Motschulsky) (Coleoptera: Cerambycidae: Lamiinae), is an invasive, wood-boring pest that has established in several locations in the United States, Canada and Europe. In North America, larvae of this species bore into the vascular tissue of hosts that are predominately in the genera *Acer*, *Aesculus*, *Betula*, *Salix*, and *Ulmus*, ultimately leading to tree death. Efforts to survey for ALB in North America rely on visual inspection, which is labor intensive and subject to error. Additionally, methods to trap ALB adults using semiochemical lures have been relatively ineffective, indicating that beetles are not strongly attracted to known lures or traps. Previous studies on woodboring insects such as the emerald ash borer (*Agrilus planipennis* Fairmaire) have revealed a strong attraction to color which lead to overall improvements in trap catch. Due to these results, we conducted a study to test the effects of color on ALB trap efficacy. Electroretinogram studies revealed that the retinal cells of ALB adults responded strongly to wavelengths of 450 and 412-670 nm. Therefore, in field surveys, we tested the response of ALB adults to panel traps that were painted to match these wavelengths versus a standard black panel trap. We repeated these surveys at five sites within the Bethel, Ohio quarantine zone. We did not trap any ALB adults during the trapping period from June to August which suggests that beetles were not strongly attracted to the tested colors. However, these results could have been impacted by low population densities in the quarantine zone due to aggressive eradication efforts.



## A SURVEY OF PREDACIOUS AQUATIC MACROINVERTEBRATES IN WATERBODIES ASSOCIATED WITH BURULI ULCER IN BENIN, AFRICA

Alexander Reitz, Jessica Reker (Dr. Mollie McIntosh)

### Department of Biology

Buruli ulcer (BU) is an emerging, infectious disease found in 32 countries worldwide, with most reported cases occurring in Africa. Infections are most common in children (ages 4-15) and can result in large ulcers, scarring, disfigurement and amputation. The causative bacteria, *Mycobacterium ulcerans*, has been associated with disturbed aquatic environments; however, the natural distribution and mode of transmission is currently unknown. Predacious aquatic macroinvertebrates have been suggested as possible vectors. The main objectives of this study were to assess predacious aquatic macroinvertebrates in (1) multiple waterbodies with varying BU endemicity and (2) a single, high endemicity waterbody overtime. Four waterbodies, all associated with varying levels of BU, were surveyed in the Lalo region of Benin, Africa, in May 2012. One waterbody, with consistent high BU endemicity, was surveyed overtime in May/June 2012, 2013, and 2014. Standardized macroinvertebrate samples (n=4) were collected from each site and subsequently sorted and identified to the family level using dissecting microscopes in the laboratory. In 2012, predacious macroinvertebrates were identified at all four sites. Sites with higher BU endemicity had greater relative predator abundance (~40-45%) and higher evenness; however predator community composition did vary across sites. At the highly endemic site, predator relative abundance did vary overtime (27 to 57%). The community composition was also variable overtime with Hemiptera or Odonata being the dominant taxa. This study will contribute to our general understanding of predator dynamics and combined with future vector studies may aid in efforts to reduce the spread of Buruli ulcer.





## THE EFFECT OF FALLBACK FOODS ON SKULL MORPHOLOGY IN THE GREAT APES

Matt Sanfilippo (Dr. William Anyonge)

Department of Biology

Fallback foods are defined as resources of relatively poor nutritional quality that become particularly important dietary components in times where preferred foods are unavailable. Consumption of these foods is correlated with times of great stress and mortality within a species, indicating their potential to act as a selective pressure on the feeding adaptations of organisms. The focus of this study was on the individual adaptations that have evolved in the family *Hominidae* (the Great Apes) as a response to the fallback foods particular to each species. Three members of *Hominidae* were selected for examination; *Pongo pygmaeus* (the Bornean Orangutan), *Pan troglodytes* (the Common Chimpanzee), and *Gorilla gorilla* (the Lowland Gorilla) based on the significant variation between their known fallback food selections. *P. pygmaeus* is known for consumption of unripe fruits, seeds, and barks, *G. gorilla* is notorious for consumption of low quality terrestrial herbaceous vegetation (THV), bark and woody pith, and *P. troglodytes* frequently expand their territory in search of preferred foods, rather than defaulting to lower quality food sources. Sample images of each organism were obtained from the Field Museum of Natural History (Chicago, IL). Measurements were then made of relevant cranial-morphological features (such as masseteric and temporalis muscle attachment sites proportional to overall cranial and mandibular length) using the image analysis software ImageJ.



## ROLE OF TEMPERATURE AND SHADE COVERAGE ON BEHAVIOR AND HABITAT USE OF CAPTIVE AFRICAN LIONS, SNOW LEOPARDS, AND COUGARS

Brenna Walters (Dr. Ann Ray)

Department of Biology

The Asian longhorned beetle, *Anoplophora glabripennis* (Motschulsky) (ALB; Coleoptera: Cerambycidae: Lamiinae) is an invasive woodboring beetle in North America. To identify life stages and potential sources of infestation in the field, the national ALB Eradication Program relies on ground surveys which are time consuming and subject to error. To assist in surveying efforts, trapping mechanisms are being developed in order to better locate and control infestations, especially where population densities are low. Currently, trapping technologies rely on semiochemical lures which have been shown to be relatively ineffective. In previous laboratory bioassays, adults of a congener of ALB, *A. malasiaca*, were attracted to visual stimuli approximating the shape and size of adult beetles. Therefore, we hypothesized that ALB may rely on visual stimuli for orientation. In this study, we evaluated the orientation of both male and female *A. glabripennis* to similar visual stimuli. Our treatments included dead beetles, 3D-printed models, black beads, and blue clay balls. There were no significant differences in the responses of adult beetles of either sex to any of the stimuli versus control. These results suggest that visual cues may not effect ALB orientation.



## Chemistry



### **PLANT EXPRESSION SYSTEM FOR COPPER AMINE OXIDASES**

**Lucas Bertaux-Skeirik (Dr. Stephen Mills)**

#### **Department of Chemistry**

Copper Amine Oxidases are a group of enzymes that catalyze the conversion of primary amines to aldehydes and ammonium, reducing  $O_2$  to  $H_2O_2$  in the process, and utilizing 2,4,5-trihydroxyphenylalanine (TPQ) and  $Cu^{2+}$  as cofactors. Research suggests that CAOs may use different mechanisms depending on the specific homolog. In order to gain a better understanding of why different homologs proceed through different mechanisms, more homologs must be studied. The aim of this research is to develop an expression system in plants for various homologs of CAOs. Initially we will target hVAP1 (a human CAO), BSAO (bovine serum amine oxidase), and possibly PSAO (a plant CAO). Plant expression systems have been developed for commercial production of some proteins, including hirudin and ZMapp. Expression of green fluorescent protein (GFP) has also been achieved in *Nicotiana benthamiana* plants through the use of *Agrobacterium tumefaciens* infiltration. This research seeks to utilize this system to express different homologs of CAOs in plants. The first step in this project is to express GFP in *N. benthamiana* as a proof of principle. To do this, a plant expression vector with the gene for GFP needed to be constructed. Site directed mutagenesis was performed on specific areas of GFP's genetic sequence so that it could properly anneal into the vector. The next step in this research will be to transform this vector into *A. tumefaciens*, and then introduce the *Agrobacterium* into the *N. benthamiana* plants through vacuum infiltration. The expression of GFP by the plant will be evaluated using a UV light, since GFP fluoresces. If successful, this process will be repeated for the different CAO homologs. Expression of CAOs in plants will allow us to study the mechanisms of these enzymes.



### **PURIFICATION AND CHARACTERIZATION OF LACTATE DEHYDROGENASE FROM VARIOUS SOURCES**

**Mitchell Cornely, Aristide Kilundu (Dr. Stephen Mills)**

#### **Department of Chemistry**

Lactate Dehydrogenase (LDH) is an important enzyme in the anaerobic metabolism of glucose for the generation of Adenosine Triphosphate. LDH catalyzes the inter-conversion of pyruvate to lactate as NADH is oxidized to form  $NAD^+$ . Lactate Dehydrogenase has been shown to be a tetramer comprised of a combination of M and H subunits. The LDH tetramer found in skeletal muscles is mostly of the M-subunit, while the tetramer found in the heart is primarily the H-subunit. It has been suggested that lactate dehydrogenase subunits possess different functions and properties which influence their role in the production of lactate from pyruvate, and vice versa. The aim of this research was to determine whether the LDH found in the heart has different kinetic characteristics than the version found in the skeletal muscle. Both chicken heart and breast as well as beef heart were used as sources of Lactate Dehydrogenase. Extraction and purification were performed by centrifuging the homogenized tissue and precipitating the sample with ammonium sulfate. The molecules were then separated in dialysis tubing. Ion exchange chromatography (Q-Sepharose) was also performed to further separate the molecules. Finally, kinetic studies utilizing UV-Vis spectroscopy were performed to analyze the enzymatic activity of Lactate dehydrogenase isoforms, as well as to investigate whether each isoform favors the conversion of lactate to pyruvate or vice versa.



## DETECTION OF PHENYLARSONIC ACID IN AIR

Alex Curry (Dr. Barbara Hopkins)

### Department of Chemistry

Building upon the previous research of similar organo-arsenic compounds Roxarsone and *para*-Arsanilic acid, a National Institute of Occupational Safety and Health (NIOSH) approved method was created and tested to detect Phenylarsonic Acid (PAA) in air using glass fiber and polyvinyl chloride (PVC) filters. Previous research on Roxarsone and *para*-arsanilic acid used PVC filters while that for PAA did not. Following NIOSH guidelines, a single instrument method using the technique of High Performance Liquid Chromatography (HPLC) was created to detect PAA and tested by recording various levels of PAA based off the Permissible Exposure Limit (PEL) of Arsenic. By first finding a method limit of detection with the glass fiber filters, tests of different concentrations such as 0.1, 0.5, 1, 1.5 and 2 times the PEL of PAA have been conducted with the PVC filters to validate the method's ability to detect PAA at both above and below the allowed limit accurately using this type of filter. Validating this technique with different concentrations as well as testing the filters over various time intervals demonstrates that the method is both accurate and practical to apply to work places that are in danger of PAA excess. As a result data is now available for all three organo-arsenic compounds (Roxarsone, *para*-Arsanilic acid and Phenylarsonic acid) using polyvinyl chloride filters.



## THIN LAYER CHROMATOGRAPHY-DIGITAL IMAGE ANALYSIS (TLC-DIA) FOR QUANTITATIVE DETERMINATION OF CREATININE

Emily Kerr (Dr. Supaporn Kradtap Hartwell)

### Department of Chemistry

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## INVESTIGATION FOR THE EFFECTIVENESS OF ENZYME BROMELAIN IN DEPROTEINIZATION OF SHRIMP SHELL IN THE PRODUCTION OF CHITIN/CHITOSAN

Emily Kerr, Ruba Lahoud (Dr. Supaporn Kradtap Hartwell)

### Department of Chemistry

Chitosan is a biopolymer that has various applications in chemical/biochemical analyses. The production of chitosan from the exoskeleton of crustaceans involves 3 main steps; demineralization with acid, deproteinization with base, and deacetylation with strong base. In this research chitosan is produced from raw shrimp shells and characterized by estimating 1) its molecular weight using viscosity test, 2) ash content through ashing in a muffle furnace, and 3) percent deacetylation from potentiometric titration. In addition, the alternative possibility of using protease enzyme such as bromelain in place of NaOH in the deproteinization step is being investigated. The latter batch of chitosan is being characterized the same way as the previous batch.



## METAL-ORGANIC FRAMEWORKS

Jamal Labani (Dr. Craig Davis)

### Department of Chemistry

Metal-organic frameworks have sparked an immensely fast expand of chemistry. General MOF characteristics include rigid architecture, solid state structure, square grams larger than any other porous material, and its pores can be manipulated without changing its structure. MOFs tend to be white, crystalline material like baby powder. The open structure has all absorption spaces for gas molecules and pores without walls which don't get clogged. MOF 200 holds the record at 11,000 m<sup>2</sup>/g. Possibilities for MOF use are endless, and researchers are exploring the most relevant possible applications. In the future, it will likely be possible for MOFs to capture and compact gas and turn it into fuel; this would put MOFs in automobiles as fuel without the need for purification. Consequently, the automobile would travel twice the distance before needing to refuel. The same concept applies to using MOFs to capture CO<sub>2</sub> before it gets in the air. Yaghi and other researchers continue to develop MOFs and experiment with their applications. Our objective is to mainly research, then develop a three hour laboratory exercise. In which undergraduates can have firsthand experience Metal Organic Frameworks. Specifically, to investigate the structures and unique properties of MOFs. For the students to think critically about the equilibrium of the reversible adsorption of CO<sub>2</sub> (g) within CD-MOFs + the chemisorption & physisorption processes. For students to be directly engaged in topics of renewable resources and environmental remediation.



## USING V-51 NMR TO PROBE THE FORMATION OF ETHYL ESTERS OF THE VANADATE ANION

Jamal Labani (Dr. Craig Davis)

### Department of Chemistry

Vanadium, the 23rd element on the periodic table, is a soft silver-grey ductile transition metal. Vanadium is considered a valuable element due to its versatility in a wide array of industries. It is used as an additive in steel manufacturing to producing a strong alloy. The ease with which Vanadium gains and loses electrons makes it a component of a very stable battery. This stable electrochemical property of the element makes it an important element towards battery technology. Vanadium has shown to be biologically active and important for systems to work properly such as the case with some sea creatures that utilize a Vanadate dependent enzymes for functionality. Furthermore, it proved to have utility in the medical field by mimicking and enhancing the ability of the insulin enzyme contributing to the treatment of Type II Diabetes. The two main isotopes of Vanadium that exist in nature are V51 & V50 with abundances of 0.25% & 99.75% respectively. The V51 nucleus has a nuclear spin of 7/2 making it NMR active. This sparks a great interest from bio-organic chemists because it can be used to examine enzymes containing Vanadium center. Our objective is to mainly produce a three hour laboratory exercise, in which undergraduates can have firsthand experience with V51 spectroscopy. Specifically, to investigate the formation of the Vanadate mono- & di- ester formation by manipulating ethanol concentration. The equilibrium constants K1 would be calculated from the formation of the mono-ethyl ester from the Vanadate anion and ethanol, while equilibrium constant K2, likewise, is calculated from the formation of the diethyl ester from the mono-ethyl ester. Finally, the pH dependence of the chemical shift of the parent Vanadate anion will also be examined, as well as substituting the ethanol with methanol or chromium.



## SYNTHESIS OF BOTH ENANTIOMERS OF PILOSININE VIA A STEREODIVERGENT CONJUGATE ADDITION STRATEGY

Emily Prebhalo, Cassandra Zaremba (Dr. Richard Mullins)

### Department of Chemistry

Pilosinine and pilocarpine are naturally occurring alkaloids produced by the plant species *Pilocarpus jaborandi*. These compounds have received substantial attention as compounds that act as partial agonists of the muscarine-M3 receptors. In recent work, asymmetric conjugate addition reactions to nonracemic 4-phenyl-N-enoyl-1,3-oxazolidinones have been shown to give different stereochemical outcomes depending on the conditions employed. Through the application of these stereodivergent reactions, the synthesis of (+)- and (-)- pilosinine has been completed from a single enantiomer of the oxazolidinone chiral auxiliary. The complete synthesis of both enantiomers utilizing this flexible strategy will be presented.

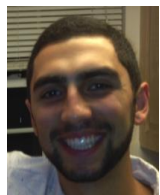


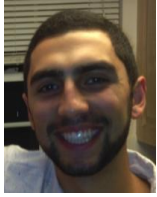
## DETECTION OF TRACE MANGANESE BY CATHODIC STRIPPING VOLTAMMETRY

Andrew Ray, Roy Saikali (Dr. Adam Bange)

### Department of Chemistry

The National Institute of Health has realized that few pragmatic methods are available for consistent detection of trace concentrations of toxic heavy metals in the body. Existing techniques such as ICP-MS and AAS use large sample volumes, have large operating costs, and require significant skill to operate. For these reasons, the goal of our research is to develop a biosensor design that applies the principles of cathodic stripping voltammetry to utilize minimum sample volumes and detect trace manganese concentrations in clinical samples as low as a few parts per billion. In addition to trace manganese detection and optimization, the effect of iron on observed manganese concentrations was explored using cathodic stripping voltammetry. Iron, which is a neighbor to manganese on the periodic table, is a critical component of biological redox chemistry. Serving as key components of hemoglobin, myoglobin and cytochromes in the electron transport chain, iron is crucial a crucial component of homeostatic function. Due to iron's similar chemical and physical properties to manganese, it is present in most extraction solutions examined with sensor CSV. During cathodic stripping voltammetry, it was observed that iron's presence in equal concentrations to manganese lowers the observed concentration of manganese during CSV. The reduction of manganese signals in CSV was observed for both ferrous (Fe<sup>2+</sup>) and ferric (Fe<sup>3+</sup>) ion solutions.





## THE DETERMINATION OF MANGANESE CONCENTRATION THROUGH CATHODIC STRIPPING VOLTAMMETRY

Roy Saikali (Dr. Adam Bange)

Department of Chemistry

The purpose of this project is to determine the concentration of manganese in the human body. Manganese helps the body form connective tissue, bones, blood clotting factors, and sex hormones. While there are methods to determine concentration of metals, the aim of this project is to create a device that is cheap, accurate, disposable, and easy to use. Stripping voltammetry allows for a highly sensitive and accurate analysis of a solution at very low concentrations. For the experiment, the use of a working, counter, and reference electrode are needed to collect data from the voltammogram. Cathodic stripping injects a positive potential through the working electrode, oxidizing manganese to manganese oxide during the 300 second deposition. After a resting period of 10 seconds, the working electrode deploys a negative potential, reducing the manganese oxide back to manganese. The negative potential can then be used to plot current changes, which are transformed into a graph to show concentration of manganese in a solution. The next step of the project was adding iron to the manganese solution and seeing how this affects the stripping potential.



## PREPARATION OF PEROXIDASE ENZYME BASE CARBON ELECTRODE

Renesha Thakkar (Dr. Supaporn Kradtap Hartwell)

Department of Chemistry

Carbon electrode is widely used in chemical analysis with electrochemical detection because it is lower cost than metal electrodes. Incorporating enzyme onto the electrode surface will help improve selectivity of chemical analysis. The objective of this research is to find the optimum conditions for constructing a low cost enzyme peroxidase based carbon electrode. Peroxidase from plant tissues such as radish is tested by mixing it with carbon materials. Two formats of electrode are being investigated; carbon paste electrode (CPE) and pencil lead rod electrode. Carbon materials tested include graphite powder, ground pencil lead, and various grades of pencil lead rod (HB, B4, B2). The effect of glutaraldehyde cross linker and chitosan on the immobilization of enzyme onto carbon materials is also studied. Performances of the electrodes are investigated by examining the characteristics of cyclic voltammograms obtained when running the experiments in the phosphate buffer solution with various concentrations of hydrogen peroxide.

## Communications



## A LOOK AT SOUTH PARK'S SATIRICAL VIEW OF MODERN PARENTING

Alex Van Leeuwen (Dr. Tom Clark)

Department of Communications and Entrepreneurship

This presentation analyzes how the scriptwriters for the cartoon, *South Park*, highly popular with a young viewer demographic, employ populist storylines to satirize the roles that schools and parents play in educating elementary school children. Scholars such as Gerbner, Gross, Morgan, & Signorielli have argued in support of cultivation theory: that television is the greatest influencer of the ideas held by individuals in American society. Given that the average American watches television 7.4 hours per day, its programs both reflect and impact cultural attitudes and beliefs. The study proposed for the Downing will contribute to a literature stream that examines how elements of ideologies manifest themselves in popular cultural artifacts. *South Park* has been identified as a show is driven by an ideology of populism: it lampoons both conservative and liberal ideologies for straying from the "common sense" of average people. It has been identified as transgressive because it has broached controversial topics (which programs with live actors have avoided) and features characters who use profanity and show disrespect toward other characters. Critics say the scriptwriters can do this because animated adult cartoons are rhetorical heirs of nursery rhymes saying, doing, and showing all kinds of things that would be forbidden in "more serious" cultural art forms. In this study, three episodes of *South Park* that parody how young children are educated in public schools, *Proper Condom Use*, *My Future Self and Me*, and *Butt Out*, are examined. It explores these three questions

- What qualities of *South Park* make it appealing to its primary demographic?
- How does narrative function to reflect a populist ideology in *South Park*?
- How do specific characters reflect different ideologies?
- How do specific elements of the plot reflect conflicting ideologies?



## Computer Science



### **CAMPUS GPS**

**Patrick Hallman (William Watts)**

#### **Department of Computer Science**

This project will help to solve the problem of having to navigate a University's Campus which can be a very difficult task if one isn't familiar with the campus or attended the University before. Even after attending a University a couple years down the road, many changes can occur to its appearance which is why having a GPS system which is continuously updated with the new appearance of the campus could be quite beneficial. A normal GPS system can only get you so far, but can't direct you down sidewalks or inside buildings to the specific room of your needs. Having a GPS system tell you to walk  $\frac{1}{4}$  of a mile north isn't going to help you much especially when there are buildings in the way or you're on a rural campus. The Universal Campus GPS system will provide users the ability to leave one classroom in one building and direct the user directly onto the floor of another building in order to find their classroom. It will do this by using a shortest-path algorithm in order for them to reach their destination in the quickest and most efficient way possible. Giving users this ability will help to improve their confidence as they walk through campus and help them to better understand the quickest routes to ensure they always make it to class on time. Having students late to class because they couldn't find the classroom should be a thing of the past with how much technology we have these days. Although this software is intended to be used by freshmen starting their first year of college, this software will also be useful to those who are visitors to the campus as well. Visitors are usually the people who have the hardest time navigating the campus because they have no clue where anything around them is located. Students can try their best to help these visitors out but most of the time the students are in a rush to get somewhere and can't give these visitors an in-depth picture of how to get to their destination. There is also the fact that many visitors won't ask students for directions because most of the time students are either looking at their phones or have ear buds in and don't really think much about people they are walking by. This Universal Campus GPS will provide these visitors with an easy to use interface making it possible for them to reach their destination without the need of having to ask a random student for directions. It will also help give these visitors a better experience as they navigate the campus not having to worry about how the will be making it to their next destination on campus.

This software will be intended to be used as the user walks through the University's Campus. Using this software while driving through the Universities Campus is not recommended as the software was built upon the basis that the user will be navigating their campus on foot. This software differentiates from Google Maps in the sense that it uses pictures of landmarks located on the campus to help direct the user to the destination helping to make it a much friendlier and personal oriented GPS system. This software will direct the user to their destination without the need of cardinal directions. This software will be created this way to ensure that the weather doesn't have any effect on the user's ability to navigate the University's Campus. Making this GPS system universal will give it the ability to be used on a number of different campuses and not limit this GPS system's full potential!

## Economics



### **REDUCING HYPOTHETICAL BIAS IN THE CONTINGENT VALUATION METHOD**

**Mark Anliker (Dr. Clay McManus)**

#### **Department of Economics/Philosophy, Politics, and the People (PPP)**

A growing body of economic literature suggests that the contingent valuation method is not an inherently invalid approach to assessing public economic character, but rather that the methodology has room for improvement. In this study, a novel "social comparison" strategy was employed in order to attempt to reduce hypothetical bias. The study was conducted experimentally, using undergraduate students from Cincinnati, Ohio as subjects. Although the experiment did not produce significant results, the study imparts larger questions for future research into reducing hypothetical bias as well as into the philosophical underpinnings of public good valuation.



## HOW MONETARY PAYOFFS INFLUENCE TRUSTING BEHAVIOR

Sarah Bailey (Thomas McManus)

Department of Economics

This experiment ran an investment game and then the treatment group ran a public goods contribution game. The second game was used in order to create some incentive for participants to signal trust in the investment game. The hypothesis is that participants are less likely to lie when trust can be used in the future to receive a higher payoff and when there is greater transparency. This study found that as there is more transparency in the investment, when there is a need to signal trust, participants are less likely to lie. When there is no need to signal trust, people return money less when there is a greater chance of a higher payoff.



## THE EFFECT OF INCOME INEQUALITY ON VOTER TURNOUT IN INTERNATIONAL ELECTIONS

Colin Foos (Hasan Faruq)

Department of Economics

In the current United States Presidential election, Democratic Senator Bernie Sanders has made wealth and income inequality the leading issue of his candidacy. The relatively unexpected popularity of Sanders' candidacy speaks to the growing frustration with the rise of income inequality in the U.S, a trend that has been likewise observed around the world. This paper examines income inequality's effect on voter participation in democratic elections on an international scale. On the one hand, rising levels of inequality may make voters feel disenfranchised with current political and economic systems and subsequently dissuade them from going to the polls. On the other, this dissatisfaction with the status quo could be a motivating force in driving voter turnout. Using voter turnout data and inequality measures in years corresponding to elections, this paper seeks to determine whether there is a causal relationship between income inequality and voter turnout.

## English



## THE IDEALIZATION OF NATURE IN ROMANTIC ERA POETRY

Megan Johnston (Dr. Kristen Renzi)

Department of English

One aspect of romantic era poetry is the interaction between humans and nature. This era occurred during the industrial revolution when the technological advancements were given greater importance at the expense of nature. The romantic poets emphasize the power of nature both as a source of release from hardship and pain, but also as a power that can lead to destruction. This thesis will focus on how humans idealize nature and use it as a way to cope with the hardship faced in life. The poetry of Keats and Shelley will be utilized and referenced in order to demonstrate the idealization and power of nature in relation to human understanding of this force. "Ode to a Nightingale", "To Night", "To Sleep" and "Bright Star" all portray the lasting qualities and the perceived perfection of nature. This theme is present throughout romantic poetry and presents itself in a variety of ways. Depending on the poem, nature is seen as a calming force, which helps the speaker cope with the challenges and hardships he or she is facing in life. Nature is also seen as a corrective force that resets corrupt or damaging elements within itself. This parallels the idea of humans going into nature as a coping mechanism to escape and cope with the reality of their lives. This is significant because nature is a driving force in our own lives and the boundary between human existence and nature is sometimes skewed. I contend that nature is an idealized force, which propels people to desire to be apart of it. This becomes prevalent when the idea of the afterlife is brought into these poems. Many of these poems depict the connotation that humans become one with nature after death, this causes the longing for some of the speakers to desire to join nature because of how nature is idealized.

## Entrepreneurship



### **CERKL: AN ENGAGING ENTREPRENEURIAL INTERNSHIP**

**William Bentley (Dr. Rashmi Assudani)**

#### **Department of Entrepreneurship**

Cerkl was started as a project by founder Tarek Kamil for the Madeira school district in early 2012. He recognized that in an age of technology, where everyone strives to stay connected, there was still a large disconnect. Through a small amount of research he found that newsletters were essentially the same as they were over 100 years ago and decided to make a change. By 2013 Cerkl's site was formally launched and by the end of 2014 more than 200 organizations, including Xavier University, Cincinnati Public Schools and the Cincinnati USA Regional Chamber were signed on. At this point Cerkl is continuing to grow, finding new ways to reach out to organizations and provide better features for those already signed on. This past summer I was given the opportunity as one of the first recipients of the Hap Castleberry Grant to do an internship with Cerkl and see firsthand the workings of a startup in Cincinnati's booming entrepreneurial community. I was able to see the opportunities, goals, and challenges that are faced in the early stages of starting a business and how thought, research, and development goes to reaching a final solution. I hope to share some of the experiences I had as a member of the Cerkl team and show how directly the coursework of Xavier University connected to some of the tasks I took on during my internship. Providing market research, social media posts, and databases for future use, I was able to provide direct value to Cerkl as an organization that is still being used. I received development through this internship personally, professionally, and academically, as I was opened to whole new mindset on how to approach new problems that may be faced in any situation.



### **ENTREPRENEURSHIP IN CINCINNATI**

**Joe Cantrel (Rashmi Assudani)**

#### **Department of Entrepreneurship**

To begin I will give a brief description of Frameri, the company I interned for last semester, located in Over the Rhine. The product they sell is the world's first interchangeable eyewear system, in-other-words, glasses where you can interchange your lenses and frames. Frameri was a graduate of the Brandery, an accelerator organization in Cincinnati that helps startups become viable, profitable businesses. One of the more recent developments in the company has been a partnership with a lens manufacturing company called EnChroma who have created a lens specifically to help colorblind people see color. The history behind the company began with the CEO, Konrad Billetz: "At the age of 11, our founder, Konrad Billetz, was shot in the eye by a friend with a BB gun. Rushed to the hospital, Konrad was told by doctors that he'd likely go blind. Luckily, the doctors were wrong, but since that incident, he has been forced to wear corrective lenses and glasses. This is when his frustration for the eyewear industry began. It never made sense to Konrad why glasses are made the way they are. The thing that's so integrated into your wardrobe and personal style is the hardest to change. That's why he started Frameri. It's time for glasses to change." Frameri was gaining traction in the Cincinnati area and decided to apply to the show Shark Tank with hopes it may connect them with a knowledgeable investor and gain a ton of media exposure in the process. In combination with the fact that the investors found the eyewear industry to be supersaturated with competition, the offers they made were for more equity than our CEO was willing to give away at that point. That being said, since the episode aired in May of 2015, Frameri showed an immediate increase in ecommerce sales. As far as my role in the company, I was responsible for a number of logistics and operational activities. The first project that I took on required me to do a gender analysis on the company's entire selection of frames. Other projects included putting in place ways to track inventory and sales to project how fast our frames would sell so that we can determine optimal re-order quantities and dates. The bulk of my internship consisted of putting together a disbursement request form for the state of Ohio that reported all the expenses of the business since their start in 2013. Frameri received a grant from the state for \$1.5 million dollars and had to report that they spent at least 80% of that on business activities other than travel and entertainment. In other words, I had to go transaction by transaction, looking at the date of the expense, and trying to find a receipt or invoice that proved that Frameri spent the money on one of the designated business activities. To relate this to my entrepreneurial studies major, many of the concepts and ideas that I used to complete my projects drew directly from core curriculum classes like Information Systems 120 and 220 as well as Statistics 220. These classes taught me the skills I needed to navigate the companies Microsoft Excel, Powerpoint, Word, and many other software programs like such. The Castleberry Grant gave me one of the best opportunities I have ever received and helped me to secure the job I am excited to be starting in in May after Graduation.



## **GROWING A STARTUP**

**Brandon Lipman (Dr. Rashmi Assudani)**

### **Department of Entrepreneurship**

While working with HireWheel I started by assessing their current state and getting a clear understanding of where they were positioning themselves in the industry. After doing this I developed three customer personas that we can now use to be more clear on who we are targeting. These personas also help us unify our messaging and content attaching each piece of content to a specific persona. Also, I am working to implement the High Tempo-Testing growth framework aiming to increase the speed of experimentation from one experiment or test per week to three.



## **WATERFIELD INTERNSHIP**

**Rudy Molisho (Dr. Rashmi Assudani)**

### **Department of Entrepreneurship**

Waterfields LLC is a startup that was created two years ago in Cincinnati OH. During the primary stage of the company, Waterfields changed their production method from a concept of aquaponics to hydroponics. A hydroponic system is the cultivation of plants by placing the roots in liquid nutrient solutions rather than in soil. The difference between these two systems is, an aquaponics system integrates a hydroponic system with aquaculture, the process of cultivating fish. Aquaponics combines hydroponics and aquaculture in a controlled environment, to create a balanced ecosystem that benefits crops as well as the fish. Waterfields LLC was created by Dan Divilbiss, bachelor and master degree in engineering and Sam Dunlap bachelor in agriculture and environmental studies. Having two different backgrounds, Sam and Dan had found a way to combine their knowledge and design a system that would help to produce microgreens and lettuce. During my internship at the company, my tasks in the company varied depending on the schedule of the day. Some days my duties were split between working at the greenhouse or warehouse. The type of activity I was involved in included: checking the water quality by making sure the level of PH is normal otherwise it would affect the way plants grow, picking up flowers depending on the order of different customers, checking the growth cycle of different plants and making sure they were healthy and that there were no insects growing in the middle. In the warehouse, depending on the day, my tasks were: deep cleaning which is cleaning the different production channel, the seeding, assisting with the day to day tasks such as making deliveries, working on different projects such as building different hydroponics systems to enhance the production and building an experimental chamber. The biggest take away I have gotten from this internship is a wide understanding of different concepts about creating a successful business and the understanding of the hydroponics system.



## **THE DEVELOPMENT OF FRAMERI**

**Elizabeth Schwab (Rashmi Assudani)**

### **Department of Entrepreneurship**

My main project is currently researching overall optical customer experience. I will be implementing better website experience through the customer research and surveying, surveying customers on style preferences to assist Frameri's product development team as they produce new frame collections, style and colors. With my internship at Frameri I will be completing marketing campaigns for Frameri Spring launches. Including creative planning, PR execution, social media engagement, customer involvement and related events. Assisting Frameri's marketing and social media team at local events, photoshoots, launches and customer engagement activities. I will also be assisting with Business Development as Frameri moves into independent optical shops across the US. This will include creating training materials for opticians selling our eyewear, merchandising our displays in physical stores and communicating our supply chain to the new locations. My responsibilities extend to assisting with Frameri Customer Experience, including Customer Service for our website, customer experience in our Flagship Cincinnati store, UI/ UX development on our website, customer surveying and data collection. The value I will be bringing to Frameri is an understanding of consumer insights which will aid in the continuing development of the company and product. I will also be adding value as I assist in the growth as we appear at local pop-up opportunities and corporate benefits program. The internship is providing me with the chance to grow by giving me the opportunity to take these projects hands on, exploring ways of research and data collection and the impact that will be drawn from this information as we apply our efforts to grow Frameri.



## Finance



### BETA ESTIMATES RESEARCH

**Carina Madoni (Brian Balyeat, Julie Cagle)**

#### Department of Finance

Published betas are frequently used by finance professionals and students rather than calculating their own betas. However, when one searches for published betas, oftentimes large differences in estimation methods exist between multiple sources of available beta estimates. There are five variables used to estimate betas and different choices about these cause dissimilar beta estimates. The five variables are: time horizon, return interval, market proxy, historical data, and calculation method. Previous research (Balyeat and Cagle 2012) indicates that by looking at three popular sources for beta estimates (Yahoo! Finance, MSNBC, and Value Line) and by exploring the effects of varying variables—the return interval (weekly vs. monthly), the market proxy (S&P 500 vs. NYSE), and the return horizon effect (3-year vs. 5-year)—the results suggest that the interval effect and the market proxy have significant influences on beta estimates while the return horizon does not. However, that raises an important question: What makeup of these variables ultimately calculates the best beta estimate for a company, and does this vary with firm size? To examine these two questions, we plan to calculate betas using different combinations of variable inputs for a time period—say the early years of a decade—for different firms and then use those beta estimates to predict future returns for later in that decade. Next, we will compare the predicted returns with the actual returns and calculate the residuals amongst the different beta estimates looking for the estimate with best predictive power. This process will be repeated for other time periods as well. Hopefully, a pattern emerges revealing a certain beta estimate calculation possesses consistent and predictive power. We will also examine if the estimation methodology that produces the best estimates differs based on firm size.



### WEATHER DERIVATIVES

**Brian Murphy (Brian Balyeat)**

#### Department of Finance

I am researching weather derivatives because I have always wanted to apply my financial/mathematical background to weather, a topic that I have enjoyed since childhood. I will be investigating the different types of indices, different types of weather derivatives, and the types of risks involved within the industries that use them. Additionally, I will be providing a brief background of weather derivatives and their significance within a wide range of industries in society. The bulk of my paper will include mathematical analysis on how weather derivatives are priced.



### D'ARTAGNAN CAPITAL FUND

**Alberto Baco, Sean Bard, Bill Berghoff, Joe Beutel, Brandon Bischof, Joseph Bonastia, Danielle Cunha, Santino Gonzalez, Harrison Hensley, Emily Hogya, Jake Hudson, Dalton Imwalle, Zitian Jiang, Lashell Jordan, Andy Kleschick, Michael McCuish, Griffin McKenna, Madeline Meiners, Tung Nguyen, Siti Syarizan Mohd Nizom, Gerardo Panameno, Michael Ryan, Thomas Schultz, Ashley Selers, Brendan Thompson, Michael Hanlein, Will Pearl, Lauren Schott, Mai Pham (Dr. David Hyland)**

#### Department of Finance

D'Artagnan Capital Fund is an actively managed opportunities fund which values large cap equities within the S&P 500, utilizing a bottom-up approach. Our analysts extensively research company financials, management, and industry competitors in formulating financial valuation models, which lead to investment decisions. Our goal as a fund is to continuously outperform our benchmark – the S&P 500 – on a risk-adjusted return basis while remaining compliant in accordance with our prospectus. The D'Artagnan Capital Fund is solely run by Xavier University students. We manage approximately \$2.3 Million of Xavier's Endowment. Per our prospectus, our exposure is limited to large-cap equities, and we currently manage a portfolio of 38 holdings.

## **HAB**

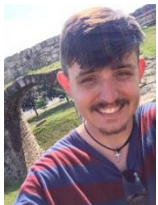


### **SENECA AND THE TRAGEDY OF "TRAGEDY": AN EXPLICATION OF SENECA'S REVISED PHILOSOPHY OF THE TRAGIC**

**Griff Bludworth (Dr. Tim Quinn)**

#### **Department of HAB**

It is easy to overlook Seneca's tragedies due to their excessive, rhetorical speeches and general lack of subtlety, especially when they are compared with the works of his Greek predecessors. This paper endeavors to illustrate, however, that judging Seneca in light of the Greeks is problematic, as Seneca did not write for the same purpose as the Attic tragedians of the fifth century BCE, but rather in service of an original conception of what constitutes tragedy and the tragic. To this end, this paper analyzes the use of traditional components of tragedy drawn from Aristotle's Poetics, for example fate and the hero's hamartia (error or flaw), as they appear in four Senecan tragedies: his Medea, Phaedra, Oedipus, and Hercules Furens. Gradually, a Senecan definition of tragedy materializes with the aid of Seneca's own philosophical prose writings to illuminate key elements of the Stoic worldview. Finally, this paper compares this Senecan definition point by point with the Aristotelian one in order to highlight how Seneca's philosophy of tragedy departs from the older Athenian philosophy. Seneca understands tragedy as an imitation of an action by which some heroic figure, not made to fall because of the whim of "Fate," declares him or herself beyond redemption driven by irrational passion in the wake of apparent misfortune. In essence, Seneca portrays characters who tragically cause themselves to fall because they believe that they must be tragic in the conventional, Greek sense, and therefore have no choice but to place themselves beyond salvation. Such a comprehensive outline of Senecan tragic philosophy may aid not only in better appreciating Seneca's tragic verse in its own right, but also in clarifying his more traditional prose writings in defense of Stoicism.



### **INNOVATION & HOPLITE IDEOLOGY**

**William Henry (Mr. Bryan Norton SJ, Dr. Shannon Hogue, Dr. Thomas Strunk)**

#### **Department of HAB**

The study of Greek hoplites is a thoroughly researched area, but most scholarship regards hoplites as defined by their equipment. This paper challenges this and supposes that hoplitic equipment is reflective of an ideology dictating how Archaic and Classical Greeks thought warfare ought to be conducted. The research suggests this ideology both reflects and reacts against the styles of battle conducted in the Iliad, namely champion warfare. This ideology seems to be based in an understanding of the Greek concepts of agon "contest" and telos "end", which represent the ideas of battle being an end in itself or a means to an end respectively. In this way, the ideology is presented as being focused on the acquisition of glory for both the individual and the polis, the declaration of terms which observe cultural rites, and the intentional removal of advantages by both sides so as to produce an environment where both sides are capable of competing equally. Using this ideology as a lens through which an analysis can be performed on vase paintings, grave stelae, cut gems, surviving bronzes, et al. which depict defensive equipment wielded by hoplites—primarily helmets, torso armor, shields, and spears— it is shown that depictions of equipment changed throughout the studied periods in a way which is consistent with this ideology and subsequent changes to it. The purpose of this analysis is to draw an emphasis on the soldiers of Archaic and Classical Greek warfare as opposed to the technological aspects discussed when armor is analyzed on its own.

## **GIRLS, GIRLS, GIRLS: THE PROSTITUTE IN ROMAN NEW COMEDY AND THE PRO CAELIO**

**Nick Jannazo (Dr. Shannon Byrne)**

### **Department of HAB**

Classists know that Cicero was a skillful orator and lawyer, being able to defend or prosecute anyone, even the elite Romans at this time. What some may not realize, though, is that he was also capable of incorporating comedy into his speeches to support his case. As Katherine A. Geffcken proposes in her monograph, "Comedy in the *Pro Caelio*," he accomplishes this in the *Pro Caelio* through exaggeration and the inversion of Roman social norms, specifically by depicting Clodia as a *meretrix* and Caelius as the foolish *adulescens* in love. In order to accomplish this, Cicero relies on the stock characters and comedic techniques of Plautus and Terence, famous playwrights of Roman New Comedy during the 2<sup>nd</sup> century B.C. Since the case occurred during the *Ludi Megalenses*, festive games in which everyday activity ceased and all would relish in the jovial setting, he could set the scene for the trial as comedic. Then, Cicero was able to mock Clodia, the elite Roman woman who had recently had a relationship with Caelius and who was the sister of Publius Clodius Pulcher, Cicero's political enemy. By including the characteristics of prostitutes from the plays of Plautus and Terence, and by accusing her of incest with her brother, Cicero was able to ridicule Clodia and, at the same time, ruin her reputation and the honor of the Claudian/Clodian *gens* through the notion of the honor-shame syndrome, ultimately weakening her testimony and helping Caelius be acquitted.



## **CHALLENGING KLEOS: AN FPDA ANALYSIS OF ANDROMACHE IN THE ILIAD**

**Ayana Rowe (Dr. Kristen Renzi, Dr. Shannon Hogue)**

### **Department of HAB**

Andromache occupies a marginal position in Homer's *Iliad*, which traditionally translates to a marginal treatment in classical scholarship. Typically known as Hector's emotional and mournful wife, Andromache supposedly implores her husband to sacrifice his warrior duties in order to save his own life. After examining her character closely, however, it is evident that this reputation, though partially accurate, does not fully encapsulate who Andromache is. Through her conversation with Hector and her later lamentations Andromache, a woman of noble birth and excellent moral upstanding, asks her listeners to consider the widely held notions of glory from war – *kleos* – at all costs, and to weigh it against the other roles of men, such as husband, father, and provider. Such challenges of the social norm were not expected, nor usually tolerated from a woman. Yet Andromache has maintained a respected reputation, both with the other characters in the *Iliad*, and with audiences throughout time. By analyzing Andromache's three speeches in Homer's *Iliad* using feminist post-structuralist discourse analysis (FPDA), Andromache is established as an example of a proper ancient woman. In each of these passages, Andromache speaks from a place of feminine concern and pity, thus her reputation and status permit her to make these challenges without appearing to overstep her bounds as a woman. Therefore, despite her marginal role in the *Iliad*, Andromache serves as a predecessor for dutiful female characters to make a statement about social norms. This connection is observed by comparing Andromache and Antigone, who appears later in Greek tragedy.



## **THE SEED OF PRINCIPATE: ANNONA AND IMPERIAL POLITICS**

**Joseph Ruter (Dr. Thomas Strunk, Dr. Shannon Hogue)**

### **Department of HAB**

In the late Roman Republic and Principate (100 BCE-284 CE), the Roman government maintained the institution of *annona* or free grain distribution to feed the people of Rome. While archaeologists and historians have documented the mechanisms of *annona* and their evolution extensively, no scholar has analyzed the politics of the *annona* in the Principate. Concerning the ideology, this paper proposes that after an initial reform effort Augustus and his successors in the Principate maintained the *annona* of the late Republican *populares* for political stability. First, this paper will examine the emergence of *annona* politics in the late Roman Republic from a social and economic perspective. In this context, this paper will analyze the *Res Gestae*, Cassius Dio's *Historia Romana*, Suetonius' *De Vita Caesarum*, and Tacitus's *Historiae*. In conclusion, this paper will argue for a greater continuity between the Republic and Principate, reassessing the Augustan revolution in light of *annona*.



## PREACHING CHRIST CRUCIFIED: ORIGEN'S APOLOGETIC STRATEGY IN CONTRA CELSUM

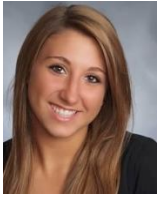
Morgan Thompson (Dr. Thomas Strunk)

### Department of HAB

As a result of the political, cultural, and intellectual challenges to Christianity, the second century AD saw the rise of apologetic works, which today mark the beginning of a rich Christian apologetic tradition. It is with this point in history, when Christians began to offer full articulations of their beliefs in response to the attacks of non-Christians, that my paper concerns itself. In order to examine the clash between Christian and pagan cultures, I examine the treatise of the Greek philosopher Celsus against the Christians, *Λόγος Ἀληθῆς* (ca. 175 AD), and the response given to that work by the apologist Origen in his *Contra Celsum* (ca. 250 AD). After analyzing the major themes of Celsus' treatise, I turn to Origen's *Contra Celsum* in order to observe how Origen chose to combat Celsus' attacks. As he takes Celsus' work point by point, Origen, although clearly arguing against Celsus' criticisms, actually employs the very kind of arguments for the Christian faith that Celsus had criticized in his treatise. As such, Origen's apologetic strategy, as exemplified in the preface and Book 1 of *Contra Celsum*, would not have shown that Celsus' criticisms of Christians were incorrect, but would have actually proven that these criticisms were founded in truth. In particular, I argue that the allegorical interpretation of Scripture, resonances with pagan philosophy, a focus on the common man, and the worship of Jesus as God though he was a man – all things which Celsus criticizes – can be found explicitly in Origen's work. I conclude that Origen's surprising apologetic strategy, which actually shows Celsus to be correct about Christianity in many respects, results from Origen's belief that only the power of God can persuade men about the truth of Christianity and all apologetic efforts of man must be subject to this truth.



## Health Service Administration



### **SEMPER PRO OMNIBUS: HIDDEN ARCHIVES**

**Stacy Hemmerich, Thomas Towers (Dr. Eileen S. Alexander)**

#### **Department of Health Service Administration**

Background: Low immunization rates in U.S. children place them and the general population at risk of contracting preventable and life-threatening infectious diseases. Surprisingly, 28.4% of U.S. children under age 3 are not fully immunized. Underserved communities face increased risk associated with education, language, socioeconomic status, race, ethnicity and access to care. Families in rural impoverished communities are 8% less likely to be fully immunized compared to families above the federal poverty line. Primary Health Solutions (PHS), a Federally Qualified Health Center and Patient-centered Medical Home, serves patient populations in Butler County, Ohio, including Primary Medicaid beneficiaries. Further, PHS utilizes federal immunization programs to provide services to impoverished families and undocumented immigrant families who may otherwise go unimmunized due to lack of access. Local poverty levels reach 78% and PHS serves more than 22,000 insured and uninsured clients. Now in its second year, Xavier undergraduate students in Health Services Administration work with PHS staff and health care providers to improve immunization rates. Ohio ranks 36th in the U.S. with 68% of children immunized appropriately by age 3. To meet Healthy People 2020 goals, we aim to increase the PHS immunization rate to 80% for children  $\leq 3$  years-old by the end of 2016 at all PHS centers. Methods: All children with quarterly data available in NextGen electronic health record at the Bever, West and Middletown health centers were included from June 1, 2013 to December 31, 2015. Summary data from PHS's report to the Health Resources Service Administration meet reporting requirements of uniform data sets and were analyzed for "Combination 3" scheduled immunizations at 3 years of age. Immunizations included: Diphtheria/Tetanus/Pertussis, Polio, Measles/Mumps/Rubella, Haemophilus influenza B, Hepatitis B and Pneumococcal pneumonia. Standard methodologies were used, based primarily on the Institute for Healthcare Improvement's Model for Improvement. Specific tools include detailed process mapping, self-building Pareto charts for gaps and solutions, key driver and fishbone diagrams, Gantt timetables, and p-control charts. Following brainstorming, PHS care providers and leaders were surveyed to identify next steps for student services, using multi-voting in which each member had two votes to "spend," allowing weighting by perceived importance. Results: PHS's overall mean immunization rate at the three centers was 75%. However, the centers' means varied from 59-83% and quarterly variation ranged from 32-100% compliance with guidelines. Bever and Middletown mean compliance increased in 4th quarter 2015 by 11% and 9%, respectively. The frequency of survey responses showed 47% of PHS providers and leaders favored surveying parents of children directly to identify parents' perceived barriers to immunization. Less than 12% favored reminders, educational materials, and internal/external data ascertainment. Conclusion: PHS's rate exceeded the Ohio baseline rate. However, two centers were below Healthy People 2020 goals, creating opportunity for population health improvement. It is notable that immunization rates at two centers improved after one semester of student service. These gains may be attributable to the Hawthorne Effect, and focused attention on quality management principles. By improving immunization rates for underserved children and families in Butler County, OH, herd, or community immunity is strengthened for infants and immune-compromised persons. As a next step, students will collect Spanish-English survey data to identify immunization barriers for patients and parents, including the growing Hispanic population. Iterative Plan-Do-Study-Act (PDSA) cycles to reduce system variation and standardize improved outcomes will be implemented next semester, based on survey analysis. Organization-wide reliable and sustainable processes to meet and maintain herd immunity at  $\geq 80\%$  will be communicated at the state level and through publication. We expect that standardized changes will be scalable to diverse and underserved populations at the state and federal level.



## History



### **SEMPER PRO OMNIBUS: HIDDEN ARCHIVES**

**Ryan DiPaolo (Christine Anderson)**

#### **Department of History**

Support Vector Machines are a unique tool for classification of data and are used for solving real world problems such as image classification and text analysis. This project explores the underlying mathematics optimization problem behind the algorithm in a Support Vector Machine. The original minimization problem is described, and an equivalent maximization formulation is derived. Various two and three dimensional examples are given to illustrate how the optimization gives a useable result. Finally, this tool is applied in a handwritten character categorization problem.



## **JEWISH LIFE IN FRANCE DURING WORLD WAR II: THE VICHY REGIME AND THE RESISTANCE**

**Madeline High (Dr. Alexandra Korros, Dr. Karim Tiro)**

### **Department of History**

The history of the Holocaust often overlooks the story of French Jews during WWII. After the invasion of France by Germany in 1940, France was partitioned into two sections. The southern half which became known as Vichy France was led by a puppet government that collaborated with the Nazis. Under the Vichy regime, thousands of Jews, particularly immigrant Jews faced severe persecution and deportation to Eastern European concentration camps. In effort to save Jews from the fate of the Vichy government many Resistance movements emerged. Some organizations provided financial aid to Jewish families and helped to smuggle children out of the country. The village of Le Chambon-sur- Lignon saved thousands of Jews by hiding them in their town.

Rachel Fradkin was a young woman when France was invaded, and she and her family fled to southern France. Rachel soon joined in the French Resistance to save her family and others from being captured by the Vichy government. Her and her father delivered stolen identity papers to families to hide their Jewish identities. Through all of the danger, Rachel and her family were able to survive the Holocaust and escape deportation through their courage, ingenuity, and the help of kind strangers. The parallels in Rachel's story and other Resistance movements teach the importance of having the courage to stand up and save people from persecution and discrimination.



## **DEROLPH V. STATE: HOW LIMITED GOVERNMENT VS. LARGE GOVERNMENT AFFECT RACE AND EDUCATION IN CINCINNATI**

**Jonathan Hogue (Dr. Christine Anderson)**

### **Department of History**

Government is a necessary institution. There is no other body in civic society that has the ability to defend liberties, provide for the general defense and ensure that citizens' basic needs are met. Government's placement in society is secure. However, while Americans argue that government's existence is necessary, political matters outside of caring for basic needs are cause for intense debate. This philosophical difference between an active, large government and a small, limited government is at the heart of American politics and how citizens allow government to manage civic institutions like education.

In 1997, the Ohio Supreme Court heard arguments for *De Rolph V. State*. The Court examined communities' reliance on property taxes for funding sources and the argument that Ohio violated the constitution's clause mandating "a thorough and efficient system of common schools throughout the state."

The Court ultimately ruled the funding model was unconstitutional and instructed the legislature to reform the state's educational funding system. Almost 20 years later, little action has been taken to implement the Court's ruling.

Today, Cincinnati's communities of color suffer from excessive income inequality. More than 53.1 percent of Cincinnati's children live in poverty. In terms of people of color, out of the 14,000 families that live in poverty, data shows that 76 percent represent Black families. For yearly salaries, Black families in Cincinnati make only \$24,272 compared to the \$57,481 for whites. If school districts rely on property taxes for funding, then communities of color where a majority of the citizens may be below the poverty line will suffer compared to white regions in tristate.

While there has been work to close the funding gap, there is still a level of inequality that impedes public schools from training young students of color about their role in preventing negative social vices from limiting social progression in the Queen City.

## Mathematics

### **BENCHMARK DOSE MODELING WITH COVARIATES FOR NANOMATERIALS**

**Sarah Davidson (Dr. Max Buot)**

#### **Department of Mathematics**

In the last decade, the use of engineered nanomaterials (ENMs) such as titanium dioxide ( $\text{TiO}_2$ ), carbon nanotubes (CNTs), carbon nanofibers (CNFs), as well as a variety of other materials have become increasingly popular in commerce because of their many beneficial properties (i.e. ability to manufacture products that are lighter, stronger, and/or more compact). However, according to the National Institute of Occupational Safety and Health, with the development of new nanotechnology it is prudent to keep the health and safety of workers exposed to these materials at the forefront. For many ENMs, occupational exposure limits (OELs) are not available and the OELs developed for microscale materials may not be adequate for ENMs. In the absence of human data, rodent assays are often used to find a dose estimate which can then be used as a point of departure (POD) to extrapolate to humans. Some bioassays report summary statistics, which can be used to determine benchmark dose (BMD) estimates – the dose that corresponds to a specified level of increased response called a benchmark response or BMR (Crump, 1995). Pooling data across studies with a small number of dose groups (as in many of the studies in this dataset) provides a more robust dataset by increasing the sample size, although also adding variability across different experimental designs (i.e. species, strain, gender). Thus, the aim of this project was to examine the influence of material type on the dose-response relationship using statistical regression modeling in R (statistical software) since the EPA's Benchmark Dose Software (BMDS) does not allow for covariates, and building upon these regression models by adding covariates to account for experimental design features which add variability that may obscure these relationships.



### **PGA TOUR ALTERNATIVE RANKING SYSTEM**

**Matthew Gerard (Dr. Max Buot)**

#### **Department of Mathematics**

The current PGA Tour ranking system uses money earned to determine the best players. The PGA Tour keeps extensive statistics on all PGA Tour players, at every event during the year. With access granted by stats.pgatourhq.com, a ranking process can be derived from these statistics. Data on the Top 25 players in the world during the 2015 season was obtained. Specific variables included in the analysis were: Tournament Average, Driving Distance Average, Driving Accuracy, Green in Regulation, Scrambling, and Putting Average per Green in Regulation. By performing a principal component analysis in the statistical software package R, we developed a player ranking method based on these variables. Our results are compared to the season money list, which is a standard measure of player performance.



### **THE EFFECT OF THE INCIDENCE FUNCTION ON THE EXISTENCE BACKWARD BIFURCATION**

**Drew Philip (Dr. David Geberry)**

#### **Department of Mathematics**

In the field of mathematical epidemiology, compartmental differential equations models are often used to describe disease dynamics. In creating these models, one must decide which form of incidence function to utilize, with mass action and standard incidence as the most common selections by far. While the difference of results obtained from mass action and standard incidence models can be insignificant in many situations, we consider a phenomenon in which the form of the incidence function is quite consequential. In particular, we analyze the effect of the form of the incidence function on the existence of backward bifurcation (the situation where a disease can persist when the basic reproductive number is less than 1) by revisiting two hallmark models in the backward bifurcation literature and analyzing an original model of our own design. Our findings indicate that the standard incidence formation of disease transmission is more conducive to backward bifurcation than mass action, a trend seen in all the models analyzed.

## **THE OPTIMIZATION BEHIND SUPPORT VECTOR MACHINES AND AN APPLICATION IN HANDWRITING CATEGORIZATION**

**Caitlin Snyder (Dr. Minnie Catral, Dr. Liz Johnson)**

### **Department of Mathematics and Computer Science**

Support Vector Machines are a unique tool for classification of data and are used for solving real world problems such as image classification and text analysis. This project explores the underlying mathematics optimization problem behind the algorithm in a Support Vector Machine. The original minimization problem is described, and an equivalent maximization formulation is derived. Various two and three dimensional examples are given to illustrate how the optimization gives a useable result. Finally, this tool is applied in a handwritten character categorization problem.

## **Philosophy**



### **COMBAT TRAUMA AND CATHARSIS IN ATTIC TRAGEDY**

**Edward Hoffmann (Dr. Timothy Quinn)**

#### **Department of Philosophy**

Although PTSD has only recently worked its way into the popular consciousness, psychologists and scholars argue that it is far from simply a modern malady, and that even the ancient Greeks were as intimately familiar with the trauma of war as they were with its horror. My paper argues that tragic drama was intimately connected with the trauma of war and uniquely able to address that trauma.

I first survey several historical sources describing the brutality of classical war, examining brief descriptions of battle through the eyes of Xenophon, Thucydides, and others. Having seen the brutality of war in such notable instances, I turn to a brief examination of the all-encompassing scope of conflict in classical Greece and its effect on the Greek poleis and their culture.

Given the pervasiveness and glorification of war in Greek culture, some authors have argued that Greek warriors would not have experienced PTSD like modern soldiers in a society oftentimes so far removed from conflict. While war was undoubtedly a far different experience for the Greek hoplite than the American infantryman in Vietnam, certain constant elements of conflict endure throughout history. Additionally, warlike aspects of Greek culture, although they may have minimized the effects of combat trauma, indicate not an absence of trauma but an extreme familiarity with it.

I bolster this claim by a survey of Greek lyric poetry by Simonides, Archilochus, Pindar, and Tyrtaeus, indicating that despite their glorification of war, Greeks were still well aware of its horrors. Turning finally from lyric to tragedy, I examine the symptoms of combat trauma portrayed in Sophocles' *Ajax*. Finally, I argue that certain common features of the tragic corpus indicate that the tragic genre as a whole was closely connected with the trauma of war.





## **THE TIMELESS POLITICAL RELEVANCE OF THE DECLARATION OF INDEPENDENCE**

**Chris Schrank (Dr. Frankel)**

**Department of Philosophy**

In the United States, the notion of an American Dream is commonly connected with the inalienable rights of life, liberty, and the pursuit of happiness, explicitly stated by Jefferson in the Declaration of Independence issued to Great Britain. Succinctly, it was a declaration of separation. But what was the dissolution of political ties with Great Britain the total purpose of this declaration? Did Jefferson and the founders intend for the Declaration of Independence to be this transient or was it meant to be the foundation of a novel project in and of itself? One scholarly argument posits that it was simply a written record that was necessary to state official independence and name a new nation. This view rejects that the document has any significant weight in directing current government policy and claims that because the founders quarreled among the particular structure of the state they must have also differed greatly in principle. In studying the drafting of the Declaration of Independence, however, it is evident that this document was intended to be a timeless cornerstone of the new “nation”, which serves as a vault of universal principles that the founding fathers believed were also crucial to the stability of the regime. In the proceeding pages, I will examine John Locke’s Second Treatise of Government in connection to the actual text of the Declaration of Independence and suggest that John Locke was not the sole source of thought in this specific composition. I will also discuss how the philosophical principles of nature Locke addresses were necessary, but not limited by, in crafting the structure and diction of the Declaration of Independence, and were indeed expanded with a greater emphasis place on the public sphere. I will also show that Jefferson and several of the founders saw a well-educated public as the primary means of protection of individual liberties and suggest what the founders believed a political education, which develops a stable and engaged public sphere, would look like.

## **Philosophy, Politics, and the People Honors Program**



### **DISPARITIES AND CONSEQUENCES: RACIAL AND SOCIOECONOMIC DIFFERENCES BETWEEN NEIGHBORHOODS IN ST. LOUIS AND CINCINNATI AND THEIR LASTING EFFECTS**

**Leah Efken (Dr. John D. Fairfield)**

**Philosophy, Politics, and the People Honors Program**

Most residents consider the city they live in a civic space, somewhere they can work, play, raise a family, and fulfill their ideas for being their best, most productive, contributing selves. However, cities throughout the United States often lack ways to meaningfully unify and engage their communities, resulting in citizens being less-informed about local conflicts. Often, these local conflicts arise out of inequalities between adjacent neighborhoods. While problems such as these inequalities are common across America cities, local organizations that research and understand their cities’ troubles are better poised to engage and address the inequalities between residents who, although literally neighbors, may lead drastically different lives. Organizations at the local level who conduct research and publish their opinions often inform the best scholarship on local-level issues. This type of source, in conjunction with pieces of national scope comprise the body of research used to explain the pattern of inequalities found across neighborhood borders of both Cincinnati, Ohio and St. Louis, Missouri. These inequalities are evident in racial and socioeconomic demographics, and the national research speaks to the repetitious nature of the differences; similar discrepancies are found in cities throughout the United States. Analyzing data trends on income and race, spanning both time and location, makes it clear that there is not only a correlation between income and race. In fact, a person’s location alone may almost determine their experiences and achievements during their lifetime. As the frustration with racism and injustice mounts in cities with a history of inequality (as recent events in Cincinnati or St. Louis suggest it has), communities often protest through heated or violent backlash. Linking demographic analysis with an examination of recent events, this study seeks to explain a) the historic rise and policy causes behind the inequalities between two neighborhoods in both Cincinnati and St. Louis and b) the economic, health, social, and other effects of the inequalities. Ultimately, cities with issues like the ones presented in this analysis must address residents’ lack of unity as a civic and philosophical contradiction to the purpose of a city.



## **WORDS AS WEAPONS: GUN CONTROL RHETORIC IN AMERICA**

**Brandon Ellis (Dr. Mack Mariani)**

### **Philosophy, Politics, and the People Honors Program**

A growing number of mass shootings in the U.S. have led researchers to examine how these high-profile events impact public policy and politics. This paper examines an under-developed area of research: the rhetorical effects of mass shootings. I argue that rhetorical patterns present themselves after every mass shooting, in which rhetoric is particularly impassioned for a few months after the event, but eventually dies down, with no legislation or policy change to show for it. Specifically, this project analyses different pieces of rhetoric in the frameworks of rhetoric of reaction, as well as rhetoric of agitation and control. I also argue that gun control speeches and pieces containing these rhetorical devices all tend to follow the same pattern, a pattern that is intrinsically counterproductive.



## **CULTIVATING THE WHOLE CHILD: EFFICACY OF THE COMMUNITY LEARNING CENTER MODEL**

**Rebecca Hollis (Dr. Gene Beaupre)**

### **Philosophy, Politics, and the People Honors Program**

Numerous studies suggest that external factors affect educational attainment. For low-income students, external factors such as absent parents, homelessness, food insecurity, chaotic home life, lack of proper medical attention are all negative influences on student success; however, even after the effects of these factors have become both clear and fairly undisputed throughout the academic community, there is still a lack of reform models that address the multi-faceted problem of poor education performance throughout high-risk students. However, a recent turnaround strategy works to address external factors while simultaneously reforming education from within the school walls. This model is the Community School Model. The Coalition for Community Schools indicated that model has now taken effect in as many as 5,000 schools across the country. Community Schools have become the leading reform strategy for cultivating whole child success across a broad demographic spectrum. This reform model serves as the most effective way to gap close while also ensuring academic success for all students.



## **THE 1964 FREEDOM SUMMER AND THE VOTING RIGHTS ACT: THE EFFECTS OF STUDENT ACTIVISM**

**Jake Tancer (Dr. Christine Anderson)**

### **Philosophy, Politics, and the People Honors Program**

In 1964, the Student Nonviolent Coordinating Committee (SNCC) produced one of the most politically successful protests in the history of modern America, referred to as the Mississippi Freedom Summer. Black students such as Anne Moody, Stokely Carmichael (later known as Kwame Ture), John Lewis (now a US Congressman from Georgia), and Robert Moses (now a mathematician and activist), protested by educating African Americans about their right to vote and helping them register to do so. In the face of violent resistance, racism, and incredible political opposition, these students would ultimately find success with the passing of the Voting Rights Act in 1965. Since then, these students have gone on to stay active in the social justice space and write about their experiences that summer. This essay will analyze those writings in order to understand the students' goals during the Freedom Summer, and their contributions to the 1965 Voting Rights Act. Recent changes to the Voting Rights Act raise important questions about the long and short term effects of ethically-committed activism.



## **TYRANNY OF THE MAJORITY IN AMERICAN DEMOCRACY: MADISON, TOCQUEVILLE, AND KOREMATSU V. UNITED STATES**

**Elizabeth Tate (Dr. John Ray)**

### **Philosophy, Politics, and the People Honors Program**

This thesis will investigate tyranny of the majority in American democracy. The specific question at hand is: how can liberty and minority rights be maintained on the basis of democracy? I will investigate two different theories about tyranny of the majority. The first theory focuses on governmental tyranny and is presented by James Madison in *Federalist 10* and *Federalist 51*. The second theory includes a focus on the sociological dimension of tyranny of the majority and is presented in a multifaceted and complex set of arguments from Alexis de Tocqueville in *Democracy in America*. Both theories offer explanations of the causes of tyranny of the majority and potential solutions to this problem or means of prevention. When applied to the case study of *Korematsu v. United States* and the internment of Japanese Americans during World War II, the legitimacy of Tocqueville's and Madison's concerns about tyranny of the majority is borne out, but the effectiveness of their proposed solutions is not. Tocqueville's sociological preventions did not stop public opinion and the will of the majority from infringing upon the rights and liberties of a minority, and all the constitutional devices proposed by Madison failed to prevent a tyrannical idea from becoming law. If we judge this test case in terms of human passions as discussed by Tocqueville and Madison, then we can assume that such tyranny is an ongoing threat that can be combated with education and exposure to diversity.

## **Physics**



## **COSMIC REIONIZATION: AN ANALYSIS OF VARIOUS CONTRIBUTIVE COSMOLOGICAL FACTORS**

**Adam Bryan (Dr. Marco Fatuzzo)**

### **Department of Physics**

According to the most accepted model of cosmology, the  $\Lambda$ CDM model, the intergalactic medium (IGM) slowly becomes ionized after the period of recombination. This span of ionization, deemed the epoch of reionization, has proven to be a pertinent chapter to the narrative of our evolving universe. Star-forming galaxies have been accredited as the driving force behind reionization, however, recent results suggest that they cannot be the only cause of reionization. The purpose behind this work was to incorporate other cosmological phenomena to reduce the amount of radiation needed from star-forming galaxies, while still meeting the observational criteria of reionization.



## **BROADBAND CHARACTERIZATION OF FREQUENCY-DEPENDENT ATTENUATION OF HISTOTRIPSY TISSUE PHANTOMS**

**Michael Crowe (Dr. Justin Link)**

### **Department of Physics**

Tissue-mimicking phantoms are used for assessing the *in vitro* efficacy of therapeutic ultrasound. Histotripsy, a new modality of focused ultrasound, relies on the formation of cavitation from broadband shockwaves to mechanically ablate tissue. The objective of this study was to use a broadband ultrasound method to determine the frequency-dependent attenuation for histotripsy tissue phantoms. Three agarose-based tissue phantoms were manufactured to mimic the acoustomechanical properties of key targets for histotripsy. The attenuation of these phantoms was measured between 2 and 25 MHz using a through-transmission technique with a pair of PVDF transducers. The density and sound speed of these phantoms were also measured. The broadband techniques utilized provide a straightforward metric for the attenuation spectrum of tissue phantoms developed for shocked insonation regimes.



## **EXPERIMENTING WITH SOAP FILMS**

**Lauren England (Dr. Marco Fatuzzo)**

**Department of Physics**

The purpose of this experiment was to learn and figure out how to use a Fastec IL3 high speed camera. Once an understanding of the workings of the camera were established, a closer look at a particular application of optics was studied, soap films. This experiment of soap films was done in four steps. First, was the observation light being reflected off the surface of the soap and the resulting colors. Second, was to drive the soap film with a speaker at different frequencies, in the hope of finding the fundamental frequency of the soap film. Next, to gain a better understanding of the soap film, Mathematica was used to simulate the different modes of the driven soap film. The last part of the experiment was to connect both the high speed camera and the soap film by imaging the soap film at its fundamental frequency.



## **ALFVEN WAVE PROPAGATION IN GIANT MOLECULAR CLOUDS**

**Raymond Humienny (Dr. Marco Fatuzzo)**

**Department of Physics**

Giant molecular clouds (GMCs) contain a hierarchical interstellar structure that is threaded by magnetic field lines with an hourglass geometry. These fields funnel ionizing cosmic-rays (CRs) into the system. However, the effect is offset by magnetic mirroring. A previous analysis considered how the presence of magnetic turbulence (a superposition of magnetic waves referred to as Alfvén waves) moving outward from the innermost regions would affect the propagation of CRs, and therefore, change the CR ionization fraction occurring within the disk. This work indicated that turbulence reduces the overall flux of CRs at the core level, which has important consequences for both chemical processes and planet formation that occur within these environments. However, the analysis assumed ideal MHD condition in which the gas is perfectly coupled to the magnetic field. We explore here the validity of this assumption by solving the full equations governing the motion of both ions and neutrals within the entirety of the GMC. By doing so, we can demonstrate how certain Alfvén wavelengths are dampened.

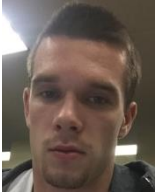


## **EMPLOYING MULTIPLE SPECTROSCOPIC TECHNIQUES SIMULTANEOUSLY TO OBSERVE PROTEIN UNFOLDING**

**Benjamin Kelty (Dr. Justin Link)**

**Department of Physics**

The ability of a protein to fold and unfold correctly is imperative for a protein to function properly. Through our research, we provide a model for how one can study the unfolding of a protein by observing the circular dichroism (CD), fluorescence, and absorbance properties of a protein as it unfolds during a 33-step titration using a chemical denaturant. While other methods have been used to study the unfolding of proteins, our goal was to develop a more cost and time efficient protocol to study this process. A single tryptophan amino acid was used as a probe to monitor specific areas of our protein, horse heart cytochrome c, using the three spectroscopic techniques as the protein was gradually unfolded over the course of 33 steps. Each spectroscopic technique yields different information and we can use all three techniques together to obtain a better understanding of different thermodynamic properties such as the Gibbs free energy of hhcyt c than we could from any of these techniques individually. By using mutations of hhcyt c, where the tryptophan probe was moved to different locations on the protein, along with the native state protein, we were able to monitor different regions and areas of the protein with our protocol and were able to get an idea of how these different regions unfold relative to each other. However, more mutations will need to be studied to obtain a clearer picture of how the protein unfolds as a whole.



## **POSITRON ANNIHILATION AT THE GALACTIC CENTER**

**Braydon Myers (Dr. Marco Fatuzzo)**

### **Department of Physics**

The galactic center is a highly turbulent and dynamic region surrounding a supermassive black hole 2 million times as massive as our sun. When observing the galactic center in Sagittarius A\* we see an energy peak corresponding to the rest mass of an electron. This is the product of positron annihilation; the result of highly energetic particles colliding, creating a series of particle decays. By creating a Monte Carlo simulation of the particle collisions that create these positrons, the subsequent particle decays, and finally annihilation, we can get a better idea of where we can expect to find these particles when imaging the galactic center. This model includes a combination of nuclear and relativistic physics, randomized particle decays, and probabilistic interactions. The end result is a histogram showing the distance in parsecs where we are most likely to find these positron annihilations.



## **APPLIED MAGNETIC FIELD EFFECTS ON PLASMA PHOTONIC CRYSTALS**

**Joseph Schuessler (Dr. Heidrun Schmitzer)**

### **Department of Physics**

A plasma photonic crystal is a periodic array composed of alternating thin metal and dielectric layers. For this research, gold and nickel as the plasma and Tris(8-hydroxyquinolinato)aluminium as the dielectric material were studied. The dispersion relation in this one-dimensional plasma photonic crystal displays multiple periodic photonic band gaps at given wavelengths and widths of the plasma photonic crystal. In a photonic band gap, light cannot propagate through the material. If it were possible to shift this bandgap, an optical switch for a photonic circuit could be created. Applying a magnetic field to the photonic crystal varies this photonic band gap. We calculated that an external magnetic field widens the photonic band gap but not at achievable magnetic field strengths. However, our model can be utilized to study other metal/dielectric combinations which might display a larger effect. If a measurable effect can be achieved, it will have applications in a wide range of photonic devices in optics and optical engineering.



## **SIMULATING THE EFFECTS OF FILM COOLING ON GAS TURBINE BLADE HEAT TRANSFER**

**Vincent Shaw (Dr. Haider Raad, Dr. Marco Fatuzzo)**

### **Department of Physics**

With applications extending beyond the aviation, marine, and power generation industries, gas turbine technologies have a vast impact. As a result, improving the performance and efficiency of gas turbine engines has been a substantial area of research over the last half century. The most direct method for increasing performance and thermal efficiency is by increasing combustion temperatures. However, temperatures downstream of the combustion chamber can exceed the melting point of downstream components, specifically the turbine. This has brought about the need for cooling techniques to prevent material failure of turbine blades. Turbine blade film cooling is a common technique that involves pumping cool air bypassed from the compressor through small holes in the blade, forming a cool protective film from the hot mainstream flow. By lowering the temperature at the surface of the blade, the overall heat transfer into the blade is reduced. Though film cooling of turbine blades has been implemented since the 1970s, optimization of this technique was done primarily through trial and error. With the recent development of powerful computational fluid dynamic software, realistic engine environments are simulated to provide quick and affordable data for optimizing film cooling efficiency. This research uses ANSYS Fluent CFD to determine optimal mass flux ratios and cold flow injection angles for a simple two-dimensional geometry.



## **ESTIMATING THE NUMBER OF HABITABLE EARTH-LIKE PLANETS USING DISTRIBUTIONS OF LONG-LIVED RADIOACTIVE NUCLEI**

**Aaron Slattery ( Dr. Marco Fatuzzo)**

### **Department of Physics**

With the discovery of earth-like planets throughout the Milky Way, astronomers have started to focus attention on the issue of habitability. It has long been known that habitability requires a rocky surface and a circular orbit that allows for all three phases of water. It also appears that another requirement for planet habitability is the presence of plate tectonics, which in turn requires the presence of long-lived radioactive nuclei located in the planets' interior. The main goal of this research is to determine whether these radioactive nuclei can be produced within an embedded cluster or if they must accumulate over time within the Milky Way.





## **GERMANIUM GAMMA SPECTROSCOPY AND QUANTIZATION**

**Matt Witte (Dr. Justin Link)**

### **Department of Physics**

Germanium is a highly utilized material for use in gamma radiation detection and isotopic identification. As a desired alternative to scintillation detectors, this semi-conducting material possesses specific properties that allow for precise measurements of gamma energies; i.e. lower energy band gaps than many common detectors, and higher electric fields resulting in larger depletion regions, thus making the detector more geometrically sensitive to gamma detection. The objective of this research is to repair and then calibrate a high-purity Germanium (HPGe) detection system using radioactive sources with known activities. From this, we will then be able to quantize the gamma interactions and confirm activity levels of other common isotopes (Cobalt-60 and Cesium-137).



## **COSMIC REIONIZATION AND EARLY STAR-FORMING GALAXIES: NEW CONSTRAINTS ON THE EPOCH OF COSMIC REIONIZATION**

**Pengfei Xu (Dr. Macro Fatuzzo)**

### **Department of Physics**

According to Big Bang cosmology, the formation of stars that marked the end of the “dark ages” in the early Universe began re-ionizing the intergalactic medium, representing an important era of evolution in our Universe. Observation from high redshift galaxies indicates that reionization ended at redshift  $z \approx 6$ , but many of the properties of the physical environment that affect the process of reionization remain uncertain. However, recent observations of the integrated optical depth  $\tau$ , of Thomson scattering to the cosmic microwave background reported by the Planck collaboration provide important constraints on the physical parameters that defined the state of the early Universe. We perform a simple analysis of reionization informed by these new observations to set new constraints on those parameters.

## **Political Science**



## **RELIGION AND GUN OWNERSHIP**

**Matthew Kelly (Dr. Mack Mariani)**

### **Department of Political Science**

Previous research finds that there is a positive relationship between being Christian and owning a gun. In this paper, I will use the General Social Survey to assess the relationship between practicing Christianity and owning a gun. I argue that religion does not cause gun ownership. I hypothesize that gun ownership is caused by an outside source, which is the region in which you live, rather than religion.



## **ASSEMBLING THE ARMIES OF COMPASSION: STATE-LEVEL FAITH BASED ORGANIZATIONS AND STATE-LEVEL GOVERNMENTS**

**Calum Latham (Dr. Mack Mariani)**

### **Department of Political Science**

Since the Bush Administration launched its Faith-Based Initiative in 2002 there has been considerable debate about whether faith-based organizations should receive government funding to provide social services to people in need. Supporters argue that faith-based organizations are able to interact with poor communities on a more personal level and are more effective at helping people out of poverty. Opponents argue that faith-based organizations are less effective and accountable than government bureaucracies. Others raise concerns that government money comes with strings attached, and the arrangements undermine the faith-based organizations independence from government. There are also concerns about government support for organizations whose goals are, ultimately, religious ones, and questions about whether faith-based organizations can truly separate their religious mission from the social service activities that they perform. This study looks at the state level support for state level faith based organizations comparing states with and without FBOs to see what approach is more effective in lowering the poverty rate. The study will look at two similar states and it will compare the two states on how much support they give to their faith based organizations.



## **OBAMACARE WITHIN THE NATION**

**Robert McCray (Dr. Mack Mariani)**

### **Department of Political Science**

Research within these past couple years shows that The Affordable Care Act, also known as Obamacare, has played a large role in society today. It reduces out-of-pocket medical expenses, which has been statistically proven to be the leading cause of bankruptcy. In this paper, I use the General Social Survey and WalletHub to compare the support between states in favor and states against Obamacare. I argue that Blue states were more in favor of supporting Obamacare than Red States. I hypothesize that people who are adults have a higher uninsured rate than children. Age plays a major rule due to the fact that children don't have the ability to decide whether or not they want to pay for health insurance.

## **NO FOOD? NOTHING TO LOSE: HOW FOOD PRICES MAY CAUSE POLITICAL INSTABILITY**

**Andrew Michels (Dr. Mack Mariani)**

### **Department of Political Science**

Throughout history, nations have fallen for a variety of reasons: inadequate bureaucracy, incapable leaders, or economic hardships. The study into the reasons as to why a nation may be unstable or in the process of becoming destroyed (internally) is not often looked at from certain perspectives. There may be hundreds of volumes on the inquiry of the downfall of the Roman Empire, but not so much on why the modern African state is failing or why there have been revolts in the Arab world, only to fail shortly thereafter. Some may be quick to say that it is a lack of development or a lack of economic prosperity. I, however, offer a more simple explanation - the price of food is directly related to a state's stability, thus the state's ability to govern effectively. Food prices in this study refer to a basket of goods that is common within that state. A kilogram of rice is not a suitable measurement for Mexico as it would be for China. Thus, for this study, we shall be looking at the main staples of each country and monitor the prices of said staples in relation to political turmoil. We shall utilize the Arab Spring as a case study to see whether or not an increase of food prices resulted in instability. It is important to note that instability can be caused for a variety of reasons, and that food prices can be directly related to government mismanagement. But we ought to account for such inconsistencies and be able to ascertain a meaningful correlation between political instability and food prices.



## **GENDER, POWER AND RELATIONSHIPS IN AFRICA**

**Sarah Ochieng (Dr. Mack Mariani & Dr. James Buchanan)**

### **Department of Political Science & Brueggemann Center**

When talking about child marriage, many people will be shocked to find out that such a practice exists since even the idea of its existence is disturbing. Despite the existence of international collaborations and national laws against child marriage, the marriages of girls < 18 years of age still exist. Child marriage is a violation of human rights and negatively affects many girls by denying them childhood experiences, disrupting their education, putting them at risks of domestic violence and abuse, and threatens their health due to early sexual intercourse, sexually transmitted diseases, and childbirth. This article presents data about the practice of child marriage and examines factors that contribute to the practice, its consequences, strategies that can be used to end child marriage and the design in which the offered strategies can be implemented. In order to fully address the child marriage issue, the article is divided into sections of introduction, literature review, research question, design, and conclusion. The article also recommends an action of prevention by recommending that in order to end the practice, the organizations fighting against child marriage need to work closely with community members.



## **REDUCING SEXUAL VIOLENCE ON COLLEGE CAMPUSES: AN ANALYSIS OF BRINGING IN BYSTANDER INTERVENTION PROGRAMS**

**Chloe Storm (Dr. Mack Mariani)**

**Department of Political Science**

The increasing attention to sexual assault on college campuses by the legislature, Department of Education, and the media have raised the question of what needs to be done to prevent sexual violence from happening. One of the main prevention-based techniques schools are using is bystander intervention programs, the idea that students can be taught to intervene in cases where sexual assault may occur. This study examines the effectiveness of bystander intervention programs in preventing sexual violence and raising awareness of Title IX policy. I hypothesize that bystander intervention programs will initially lead to an increase of reporting, due to visibility of the issue, but will eventually decrease the number of sexual assaults.



## **EDUCATION SPENDING'S EFFECT ON CRIME RATE**

**Hussain Tariq (Dr. Mack Mariani)**

**Department of Political Science**

Violent crime has been on the rise in recent months, and many different factors exist that contribute to it. Likewise, there are many remedies for addressing violent crime, one of the most notable being education. There have been many previous studies conducted on the relationship between education and crime, ranging from educational attainment to opportunities that are available following education. The topic that I have chosen for this study is whether or not increased spending on higher education has an effect on crime rate, as well as how other variables, such as the percentage of the youth population in college, public tuition, family income, poverty rate, race, unemployment rate for young people, and inequality, affect the education spending-crime relationship. The purpose of this study is to explore deeper into how certain policies on education will reduce the crime rate on a state-by-state level for all fifty states between the years 2009 and 2014.



## **STOKING THE EMBERS OF CIVIL WAR: CONFLICT RECURRENCE AND ETHNIC DIVISION IN INTRASTATE CONFLICT**

**Nicholaus Welch (Dr. Mack Mariani)**

**Department of Political Science**

Intrastate conflict often leaves behind a lasting atmosphere of unease, paranoia and tension between former belligerents within the conflict. These factors occasionally lead to a recurrence of the conflict, resulting in more bloodshed and a collapse of potential reconciliation between actors. One of the most potent of these destabilizing factors is lasting ethnic tensions between former belligerents, producing a mutual distrust and enmity between actors during the post-conflict peace-building process. In several cases, such as the Northern Ireland Civil War, these ethnic divisions were the most significant factors in preventing reconciliation and further prolonged the civil war. Another significant factor in determining success in post-conflict peace-building is the way in which the conflict is brought to a close. Using Zagare and Kilgour's (2000) model of conflict settlement, conflicts can be settled in three distinct ways: Imposed Settlements, Negotiated Settlements and Stalemates. The manner in which a conflict is settled has an impact on post-conflict relations between belligerents and the potential for conflict recurrence. An analysis of intrastate conflicts displaying ethnic division between belligerents and the type of settlement that ends the initial conflict as factors leading to conflict recurrence will help expand the "new war" literature on intrastate conflict, while also bringing to attention factors within the post-conflict period that have the potential for causing civil war recurrence.



## Psychology

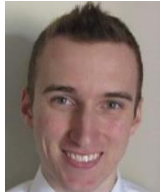
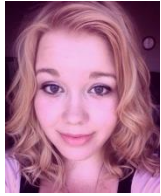


### **AN EXPERIMENTAL METHOD FOR STUDYING BYSTANDER RESPONSE TO CYBERBULLYING ON TWITTER**

**Amber Bolin, Chelsea Esmeier, Michael Poggioli, John Witry (Dr. Jennifer Gibson)**

#### **Department of Psychology**

The majority of research on bystanders' responses to cyberbullying via social media has been limited to survey and focus group studies. Due to the nature and possible negative impact of cyberbullying, it is difficult to design an experimental study on the subject. In order to capture how bystanders would actually respond to a cyberbullying situation, and not just how they think they would respond, the experiment must involve deception. Only two previous studies have utilized an experimental procedure and deception to study bystander response to cyberbullying via social media. Fries and Gurung (2013) used Facebook and Dillon and Bushman (2015) used a chat room to simulate a bullying scenario and assess participants' responses. In consideration of the strengths and limitations of these studies, the current study utilizes an experimental procedure and deception to simulate a bullying scenario on Twitter. Female participants, who think they are participating in a study of body image, view a bullying interaction between two confederates and are then given an opportunity to intervene. It is expected that participants will intervene more often when the victim of bullying is part of the in-group compared to when the victim is part of the out-group. A funnel debriefing technique is used to assess plausibility of the deception. This poster will describe the innovative methodology used in the current study. In addition, the poster will present findings from the funnel debriefing that suggest the extent to which the deception was successful in masking the true purpose of the study. The poster will conclude with implications for the design of future studies on bystanders' responses to cyberbullying.



### **PERCEPTIONS OF MENTAL AND PHYSICAL DISABILITIES IN THE ELDERLY POPULATION**

**Emily Bowman (Dr. Dalia Diab)**

#### **Department of Psychology**

Although there are stigmas and misperceptions of mental health in general, the elderly community is rarely discussed when it comes to psychological disorders. Depression is the most prevalent mental health disorder that affects the elderly population, and it also increases with age. Moreover, as people get older, they are more likely to face physical disabilities, which can impair their daily activities. The field of occupational therapy can provide the necessary adaptive skills for both mental and physical disabilities. The purpose of this study was to examine how physical disabilities and receiving occupational therapy affect college students' perceptions of mental health problems in the elderly population. After participants saw two graphs and a list of general facts about the elderly population, they were randomly assigned to one of four conditions, which differed on severity of a hypothetical older person's physical disability (wheelchair vs. walker) and whether that person received occupational therapy or not. Then, participants filled out measures regarding their perceptions of the older person's depression as well as their personal attitudes towards older people. Findings from this study will shed light on millennials' perceptions of the elderly population and the field of occupational therapy.



## **ATTITUDES TOWARD AND WILLINGNESS TO INTERACT WITH INDIVIDUALS WITH IMPAIRMENTS**

**Leeah Calderon (Dr. Tammy Sonnentag)**

### **Department of Psychology**

Individuals with impairments experience great social stigmatization (Reinhardt et al., 2011). Specifically, people are less willing to interact with and help individuals with impairments than with individuals with no impairments, and this is especially true when the task involves high effort. (Ungar, 1979). The current study extends previous research by examining undergraduate students' attitudes toward and willingness to interact with individuals across four impairment conditions (i.e., mental, physical, layered [both mental and physical], or no impairment). A total of 126 students read one of four vignettes, paired with a photograph, of a Xavier student with either a mental impairment (i.e., depression), physical impairment (i.e., leg paralysis), layered impairment (i.e., depression and leg paralysis), or no impairment. Participants then completed the Overall Impression questionnaire, adapted from Reinhardt et al. (2011) and Gough (1979), and the Willingness to Interact questionnaire, adapted from Kelly et al. (1987). Results revealed that participants reported more negative impressions of students with impairments (i.e., mental, physical, and layered) than the student with no impairment; however, participants reported a greater willingness to interact with the student with the layered impairment than the student with no impairment under both high and low effort conditions. The findings suggest that people may hold negative perceptions of individuals with impairments, yet experience a sense of responsibility to help individuals with layered impairments relative to individuals with no impairments.



## **PERCEPTIONS OF WOMEN IN ADVERTISING**

**Emma Costello (Dr. Cynthia Dulaney)**

### **Department of Psychology**

Previous research has demonstrated that young, educated women in present-day society feel less offended by sexually explicit advertising compared to the past (Zimmerman & Dahlberg, 2008). The current study investigated the opinions of the sexualization of women in advertising held by both older and younger women. Young women (college students) and older women (age 60 or older) completed a questionnaire about general opinions of advertising and then were shown a sexually explicit advertisement. The participants then completed another questionnaire about the advertisement. I hypothesized that younger women would be less offended and less concerned by sexually explicit advertisements compared to older women because of the present-day sexualized society. The analysis indicated that older women ( $M = 5.54, SD = .92$ ) were significantly more offended and concerned about sexualization of women in advertising compared to younger women ( $M = 4.26, SD = .95$ ),  $t(66) = 4.84, p < .001$ . These results indicate that younger women are less offended by the sexualization of women in the media, which suggests that over time, women may have become increasingly immune to the sexualization of women. This immunity of sexualization of women can lead to harmful effects like objectification of women, gender violence, pay gap, and discrimination.

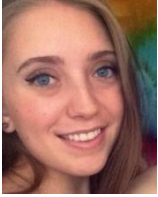


## **HOW WEIGHT AND GENDER AFFECT A COMEDIAN'S PERCEIVED FUNNINESS AND LIKABILITY**

**Madeleine Fahlbusch (Dr. Tammy Sonnentag)**

### **Department of Psychology**

Self-deprecating humor involves denigrating or belittling one's own characteristics to elicit laughs (Janes & Olson, 2000). Although self-deprecating humor is common, it risks drawing attention to "stigmatized characteristics" and diminishing the self-deprecator's status in the eyes of others (Lundy et al., 1998). The current study examines the effects of comedians' characteristics on the perceived funniness of self-deprecating humor. Using advertisements for an on-campus comedy show, comedians' characteristics (i.e., gender and weight) was conveyed through self-deprecating jokes, and undergraduates rated how funny and likable they anticipated the comedians to be. Overweight female comedians are expected to be less funny and less likable, (reflecting their "layered stigma") than their male or non-overweight counterparts. Results suggested that the use of self-deprecating humor by female comedians caused participants to perceive them as more funny than male comedians because society is accepting of a female belittling herself but is not as accepting when it is being done by a male. The results generalized to the understanding for why some comedians are perceived as more funny and likability than others.



## **THE EFFECTS OF NOSTALGIC MEMORIES ON MORAL COERCION**

**Jordyn King (Dr. Cynthia Dulaney)**

**Department of Psychology**

Nostalgia has several benefits that are central to morality, such that nostalgic childhood memories elicit a sense of moral purity. As a result, individuals are more likely to act in a manner that is consistent with their morals and values. The present study examined whether reflecting on a nostalgic childhood memory may temporarily strengthen individuals' sense of the five moral foundations: Purity/Sanctity, Harm/Care, Fairness/Reciprocity, Ingroup/Loyalty, and Authority/Respect, such that the participants would choose not to violate these moral foundations. After reflecting on either a nostalgic childhood memory or a neutral memory, participants recorded how much money it would take for them to perform, or not perform, several actions that violate each of the moral foundations. It was predicted that the participants who recalled a nostalgic childhood memory would be more resistant to coercion to violate each of the moral foundations than the participants who recalled a neutral memory. The hypothesis was not supported; there were no significant differences between the childhood memory condition and the neutral memory condition for Harm/Care  $t(83) = 1.35, p < .18$ , Fairness/Reciprocity  $t(83) = 1.19, p < .24$ , Ingroup/Loyalty  $t(83) = 0.81, p < .42$ , Authority/Respect  $t(83) = 0.69, p < .49$ , and Purity/Sanctity  $t(83) = 0.21, p < .83$ . These findings indicate that reflecting on a nostalgic childhood memory does not strengthen individuals' resistance to moral coercion, specifically when offered money in exchange for violation of the moral foundations.



## **COLLEGE STUDENTS' PERCEPTIONS OF CELIAC DISEASE: MEDICAL ISSUE OR TREND?**

**Mary Maddox (Dr. Dalia Diab)**

**Department of Psychology**

Celiac Disease (CD) is an autoimmune disease that affects about 1% of the world's population. The only known way to control the symptoms of CD is to consume a strict gluten-free diet. Given that a multitude of people who do not have CD have embraced a gluten-free diet in an effort to stay healthy, having a gluten-free diet seems to have become trendy. Because of that, there have been misconceptions about CD. The purpose of this study was to examine college students' perceptions of CD and a gluten-free diet as well as to investigate if perceptions change when participants are given more information about what CD is. Participants were randomly assigned to one of three vignettes, which contained information about a hypothetical college student. The first vignette described a student who eats gluten-free to be healthy; the second vignette described a student who eats gluten-free because the person has CD; and the third vignette described a student who eats gluten-free because the person has CD, providing a description of what CD is. After reading the vignette, participants were asked to fill out a measure assessing their perceptions of the hypothetical student, focusing on their perceptions of the student's eating behaviors. Findings from this study will shed light on whether college students perceive CD to be trendy or a legitimate medical issue, and whether educating students on what CD is might reduce any misconceptions about CD.

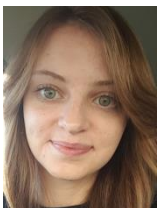


## **WHO SHOULD GET AN ORGAN TRANSPLANT?: THE EFFECTS OF ABLEISM AND AGEISM ON DECISION-MAKING**

**Cierra Milton (Dr. Cynthia Dulaney)**

### **Department of Psychology**

Although it is difficult to gauge the percentage of Americans who have faced discrimination, discrimination is especially prevalent for older adults (Palmore, 2001) and persons with disabilities (Ali, Scior, Ratti, Strydom, King & Hassiotis, 2013). Much discrimination takes place implicitly by subconscious cognition. The current study examined the effects of implicit discrimination on decision-making tasks. Participants ( $N = 77$ ) read descriptions of two different heart transplant candidates and selected one candidate to give the heart transplant. In one condition participants read descriptions of a neutral candidate and an older adult candidate. In another condition participants read descriptions of a neutral candidate and a persons with disabilities candidate. After selecting one candidate for heart transplantation, participants rated the confidence level in their selection. Of the 38 participants who read descriptions of a neutral candidate and an older adult candidate, 26 participants selected the neutral candidate. Of the 39 participants who read description of a neutral candidate and persons with disabilities candidate, 27 participants selected the neutral candidate. Results indicated that participants more frequently selected the neutral candidate for heart transplantation in both conditions,  $X^2(1) = 10.92, p < .001$ . Therefore, participants more frequently selected the neutral candidate for heart transplantation than the older adult candidate and the persons with disabilities candidate. However, there was no difference in confidence rating as a function of selection in the older adult condition versus the disabilities condition. The present study highlights the prominence of implicit discrimination in decision-making task.



## **HOW COWORKERS' AGE AND WILLINGNESS TO ADAPT TO TECHNOLOGY AFFECTS WORKPLACE PERCEPTIONS AND BEHAVIORS**

**Theresa Mokrzan (Dr. Tammy Sonnentag)**

### **Department of Psychology**

Age demographics in our society are shifting as the baby boomer generation approaches late adulthood. It is expected that by 2020 almost half of the workforce in the United States will be over 55 years old (Toossi, 2009). Ageist stereotypes in the workplace are common and include the belief that older adults are unable or unwilling to perform workplace tasks effectively. Prior research has reported that younger adults perceive older employees as more stubborn than their younger counterparts (Rosen & Jerdec, 1976), and that older adults are less likely than younger adults to want to, and successfully, learn technology (Ryan, Szechtman, & Bodkin, 1992). The current study extends prior research by experimentally examining the perceptions of younger and older coworkers who are either willing or unwilling to adapt to technology in the workplace. Participants included 145 undergraduate students (105 female, 40 male,  $M_{age} = 20.0, SD = 1.11$ ). Participants read a brief scenario describing a 25- or 75-year-old coworker who was willing or unwilling to adapt to technology. Participants then rated the coworker on various personality characteristics (e.g., stubborn) and various performance attributions (e.g., lack of ability influenced this coworker's attitude toward technology). Results revealed that for coworkers described as unwilling to adapt to technology, younger coworkers were perceived less positively and attributed less positive performance attributions than older coworkers. In contrast, there was no difference in the perceptions and performance attributions of younger and older coworkers who were willing to adapt to technology. Results suggest one domain where stereotypes about older adults may be less negative than younger adults. Directions for future research will be discussed.



## THE EFFECTS OF MEDIA BIAS ON CREDIBILITY

Lauren Morris (Dr. Daila Diab)

Department of Psychology

Often, media outlets can be seen as biased or hostile towards different parties, which could make them lose their credibility as a future reliable source. When different media sources favor a party, they end up attracting an audience who shares beliefs and supports them as a credible source, thereby disengaging the other side of the audience who no longer perceives them as a reliable source of information. In the political world of the United States, this mainly relates to whether the media's viewers are seen sided with one of two main parties: Democratic or Republican. The purpose of this study, therefore, was to examine if media outlets lose their credibility as a reliable source the more they become biased towards one of these two political parties. Participants were randomly assigned to one of eight news stories about a hypothetical congressional candidate. The eight conditions differed based on media source (Fox vs. CNN), political party of the candidate (Democratic vs. Republican), and the state's political ideology where the candidate resided (conservative vs. liberal). After reading the news story, participants were asked to complete measures that addressed their perceptions of the news story, focusing on the credibility of the media outlets and if they would vote for the candidate. Findings from this study will shed light on how people view different media sources, and should also help media sources be able to communicate their news stories better in order to gain viewership and credibility as a trusted news outlet.



## EFFECTS OF ACTIVE, AVOIDANT, AND PASSIVE REGULATING STRATEGIES ON MOOD AND STRESS

Carmina Nicolas (Dr. Tammy Sonnentag)

Department of Psychology

Mood management strategies (MMSs) are important in regulating the stress and mood of individuals, yet undergraduate college students, who are highly stressed, sometimes are not aware of effective strategies to regulate their mood and stress. This study examined the effectiveness of the MMSs of active journaling, avoidant journaling, passive music listening, and the absence of a MMS on stress and mood. In this study, 207 students were randomly assigned to one of the four MMSs. After exposure to a mild stressor prompting the students to think about an upcoming test, participants completed the Positive and Negative Affect Schedule (PANAS) and the State Anxiety Inventory (Time 1) followed by one of the four MMSs. Once participants completed their assigned MMS, they again completed the PANAS and the State Anxiety Inventory (Time 2). Results revealed that active journaling, passive music listening, and the absence of a mood management strategy produced a positive change in mood from Time 1 to Time 2, while avoidant journaling produced no change in *mood*. Additionally, passive music listening and the absence of a mood management strategy produced a significant decrease in *stress* from Time 1 to Time 2. It appears that listening to music or the mere passing of time are two effective MMSs for stressed undergraduate students.





## **EFFECTS OF GAMBLING FREQUENCY AND GAMBLING BELIEFS ON INDIVIDUALS' PERCEPTIONS OF OTHERS' GAMBLING HABITS**

**Alexis Pitzer (Dr. Tammy Sonnentag)**

### **Department of Psychology**

The prevalence of gambling addictions is increasing in the United States. Gambling destinations like Las Vegas offer some of the largest casinos in the world, where people imagine the opportunity of winning more money than they could ever imagine. Previous research on perceptions of gambling has demonstrated that when the *benefits* of gambling are salient, an individual's likelihood of partaking in gambling activities increases (Wickwire et al., 2007). In contrast, when the perceived *risks* of gambling are salient, an individual is less likely to partake in gambling activities. To date, no research has "teased apart" how an individual's beliefs about gambling (i.e., risks, benefits) and frequency of gambling influences perceptions of their gambling activities. The current study extends previous research by examining the independent and interactive influence of gambling frequency and gambling beliefs (i.e., risks, benefits) on others' perceptions of an individual's gambling habits. A total of 165 participants (112 female, 45 male,  $M_{age} = 19.96$ ,  $SD = 1.10$ ) read a scenario manipulating the gambling frequency (i.e., no gambling, occasional gambling, or frequent gambling) and gambling beliefs (i.e., risky or beneficial) of a target. Participants then rated the personality qualities of, and their anticipatory response to, the target. Overall, participants attributed more positive personality qualities (but did not anticipate responding more favorably) to the target that did *not* gamble because he knew the risks versus focused on the benefits of gambling. In contrast, for targets that occasionally or frequently gambled, there were no differences in the personality qualities assigned to the target regardless of the target's beliefs in the risks or benefits gambling. In sum, individuals who choose not to gamble because of the perceived risks are perceived positively. Implications of and future direction for the current findings will be discussed.



## **THE EFFECT OF RELATABILITY ON UNIVERSITY STUDENTS' ATTITUDES TOWARD THE ELDERLY**

**Noor Saeed (Dr. Tammy Sonnentag)**

### **Department of Psychology**

Previous research has demonstrated that college-aged students hold ageist attitudes (Schwalb and Sedlacek, 1990), but increased knowledge, personalization, and relatability can foster positive attitudes toward older people. The current study extends previous research by examining the effects of age and relatability on college-aged students' anticipated positive attitude responses and positive personality qualities attributed to the elderly. A total of 129 students read one of four vignettes in which scenario target age and relatability were manipulated, relatability through presence or absence of technology and social media use. Participants completed the measures Anticipated Positive Attitude Responses and Positive Personality Qualities. Participants reported more anticipated positive attitude responses to the elderly target than the young target, but attributed significantly more positive personality qualities to the young target. There was no main effect for relatability on either dependent variable, and there were no significant interactions.



## **PERCEIVED SELF-ESTEEM, COMPETENCE, AND EMPLOYABILITY DERIVED FROM FACEBOOK POST CONTENT AND FREQUENCY**

**Stephanie Schaeper (Dr. Tammy Sonnentag)**

### **Department of Psychology**

Previous research has demonstrated that individuals accurately perceive the actual personality traits of Facebook users by examining the users' Facebook profiles (Goodmon, Smith, Ivancevich, & Lundberg, 2014). Given the popularity of social media outlets, like Facebook, as a means to share almost every detail of individuals' lives, Facebook has become a resource for employers to acquire personality information when considering a prospective employee. Consequently, the content posted on Facebook can meaningfully influence the real-world opportunities available to some Facebook users. The current study experimentally examined how professional versus unprofessional content posted on Facebook, as well as the frequency of the posted content, affects the perceived personality characteristics and employability of the Facebook user. A total of 151 undergraduate participants viewed one of six hypothetical Facebook profiles where the content reflected professional (e.g., studying) or unprofessional (e.g., drinking) "college student behavior" posted at a low, moderate, or high frequency. The participants then completed questionnaires assessing their perceptions of the Facebook users' self-esteem, competence, and employability. Results revealed that viewing a Facebook profile with unprofessional rather than professional content consistently led to less positive perceptions of the users' self-esteem, competence, and employability. When examining the competence of the Facebook users, results revealed that for posts of high and moderate frequency, a Facebook user's competence was perceived as higher for professional content than unprofessional content. There was no significant difference in the perceived competence of Facebook users who posted professional or unprofessional content at a low frequency. Results suggest Facebook users should be educated about the ways the content they post on Facebook may limit their real-world opportunities. Future direction for the current findings will be discussed.



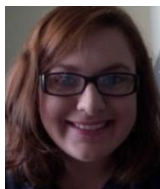
## **FINGERS CROSSED!: THE ROLE OF SUPERSTITIOUS BELIEFS AND BODY GESTURES ON PERCEPTION OF HONESTY**

**Frankie Terrones (Dr. Tammy Sonnentag)**

### **Department of Psychology**

Superstitions establish a causal link between an action and an outcome when no real causal relationship exists (Matute et al., 2011). Whether deception goes undetected by crossing one's fingers or sincerity is earned by putting one's hand over one's heart, superstitious beliefs can affect how nonverbal behaviors are perceived. The current study examines the effects of superstitions and body gestures on perceptions of honesty. Undergraduates, primed or not primed to think about superstitions, evaluate the honesty (and sincerity) of a man with his fingers crossed or with his hands at his sides. It is predicted that the fingers crossed gesture will be perceived as more dishonest, and this will be especially true for those primed with superstitious beliefs. If superstitions influence perceptions of nonverbal behaviors, the fingers crossed gesture will be perceived as an action to "control" lie detection. Implications for how superstitious belief influence person perception/impression will be addressed.

## **Social Work**



## **SOCIAL WORK PRACTICE WITH UNACCOMPANIED MINORS**

**Meredith Beamer (Shelagh Larkin)**

### **Department of Social Work**

This poster session will discuss the emerging immigration trend of unaccompanied minors arriving at the United States/Mexican border from the Northern Triangle (Guatemala, Honduras, and El Salvador). This presentation defines Unaccompanied Minors, presents statistics on the number of immigrants arriving, and discusses relevant literature about the challenges of practicing with Unaccompanied Minors. The second part of the presentation (learning objectives 3 & 4) comes from my personal experience as a bilingual Student Social Worker at Su Casa Hispanic Center (a branch of Catholic Charities of Southwestern Ohio in Cincinnati, Ohio). My supervisor and I serve the unaccompanied minor population at Su Casa. For the past year, I have been working with and serving this population, while simultaneously learning about the specific needs of these clients. I will highlight Su Casa's program, launched a year ago, and the successes and well as the challenges of practicing with this population. I will finish by talking about the continuing need for services and what the largest needs of this population are based on our conversations and interactions with the Unaccompanied Minors.



## **THE CRIMINALIZATION OF HOMELESSNESS**

**Jai'La Nored (Dr. Jaylene Schaefer)**

### **Department of Social Work**

The criminalization of homelessness significantly impacts those who experience homelessness and the service providers of that demographic. Several studies and movements have already determined that the criminalization of persons experiencing homelessness exist. This study will answer the question, "Has criminalization decreased for StreetVibes distributors that were previously or currently homeless?". The purpose of this study is to describe what the criminalization of homelessness looks like through the lens of a program that serves people who at one point or another experienced homelessness. Distributors of the StreetVibes street newspaper were on their experience with criminalization. The study uses a survey instrument that will be used to describe how criminalization impacts people who were homeless if not currently homeless based on sex, race, military background and economic status.

## Sociology



### **ASSESSMENT OF INFORMAL SOCIAL SUPPORT NETWORKS AMONG FOOD INSECURE OLDER MEN**

**Anronette Black, James Farr, Mindy Pike, Alayna Romer, Christine Valdivias, Lee Weeks (Dr. Kandi Stinson, Ms. Michelle Early)**

#### **Department of Sociology**

Food insecurity in older men is a critical but neglected issue that affects a substantial portion of the older male Cincinnati population. The purpose of this research is to study the relationship between informal social support systems and food insecurity in older males. The role of informal social support networks during times of food insecurity has been studied in previous research (Wotil, 2012 & McIntosh et al., 1989). However, most attention surrounding food insecurity focuses on households with children, especially single mothers, leaving a significant gap in knowledge about food insecurity in older men. This research addresses this gap by focusing specifically on food insecure older men and how they are affected by social support networks. A survey was administered to older male clients of the FreeStore Food Bank in Cincinnati to assess their informal social support networks and food security status. Results illuminate the relationship between informal support networks of older men and food insecurity. In addition, the FreeStore Foodbank can use findings from this research to aid its effort to alleviate food insecurity in older men and help them understand the social support networks that their clients have or do not have.





## THE RELATIONSHIP BETWEEN FUNCTIONAL LIMITATIONS AND FOOD INSECURITY IN OLDER MALES

Jason Cook, Kaitlin McGeeney, Phranci Williams (Dr. Stinson)

### Department of Sociology

The United States population aged 65 years and older will make up one fifth of the population by 2040 (Sattler & Lee, 2013). Previous studies have shown that elderly individuals are particularly vulnerable to food insecurity, and given the expected boom in this population demographic, this is a significant area of concern (Lee & Frongillo, 2001). Food insecurity has been linked to multiple health conditions. According to one study, participants who were recognized as being food insecure were likely to have self-reported fair or poor health (Alvarez, 2015). Adult males 50 and older who are food insecure may experience functional limitations, such as physical or mobility complications or physiological diseases (e.g. obesity and hypertension). These daily impairments may limit their ability to prepare, obtain, and have access to a variety of food. This research attempts to identify the relationship between functional limitations and food insecurity among adult males aged 50 and older who live in the Cincinnati community. A survey distributed to older male clients at the Freestore Foodbank included questions about physical and mental disabilities, health, and experiences with food insecurity. The study adds to our knowledge pertaining to the relationship between food insecurity and functional limitations. This will aid the ability of the Freestore Foodbank to meet and understand the needs of their clients in the future.

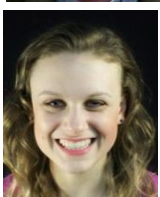


## THE EFFECTS OF MASCULINITY ON MENTAL AND PHYSICAL HEALTH AMONG FOOD INSECURE ELDERLY MEN

Fatoumata Diallo, Onya Edwards, Michael Schreiber, Laura Whyte (Michelle Early, Dr. Kandi Stinson)

### Department of Sociology

Food Insecurity is a growing issue in America. According to Feeding America, food insecurity affects 46.5 million Americans each year. Of those affected by food insecurity nearly 7 million are seniors aged 60 or older. Prior research has largely focused on single mothers and large families. Consequently, the older male population has often been overlooked. This research explores the interactions between masculinity, health, and food insecurity in older males. Previous research has indicated that when faced with food insecurity, an adherence to masculine ideals can have a detrimental effect on both mental and physical health (Springer & Mouzon, 2011). The goal of this study is to help bridge the gap in research by exploring the effects of masculinity on how men experience food insecurity. A quantitative survey administered to male clients of the Freestore Foodbank included questions about masculinity, mental health (anxiety), and physical health. The results of the study will aid the Freestore Foodbank in addressing the issue of food insecurity by providing a better understanding of the unique issues facing older men.





## Spanish



### **COMBATING CRIME AND CORRUPTION IN PACO IGNACIO TAIBO II'S NOIR DETECTIVE FICTION**

**Victoria Mairal-Cruz (Natalia Jacovkis)**

#### **Department of Spanish**

This presentation will examine the work of noir detective fiction writer Paco Ignacio Taibo II, particularly his novel *No Habrá Final Feliz*. We will explore the world of independent detective Belascoarán Shayne as he treks the streets of Mexico City, piecing together crimes, catching corrupt officials and chasing down foes. Taibo's work inspires critical thinking about the powers of a corrupt government and police force, and how individuals and a society can stand up and fight against such forces of popular abuse and oppression.

## Sports Medicine



### **BILATERAL HIP INJURY IN A COLLEGIATE MALE RUNNER**

**Erica Argentati (Lisa Jutte)**

#### **Department of Sports Medicine**

**Background:** After conservative treatment for a hip flexor strain, a nineteen-year-old, male, track runner was diagnosed with a right CAM lesion. He underwent surgery and began rehab. Two months into his rehab for his right hip, he reported left hip tightness and pain while standing or sitting for long periods of time. He experienced sharp lateral hip pain (9/10) during all hip PROM. Past medical history included surgery on his right tibia for an avulsion fracture at age 13 and bi-lateral hip avulsion fractures at age 15. Due to the patient's history, the athletic trainer referred the patient to team's sports medicine physician. **Differential Diagnosis:** Hip flexor strain, CAM lesion with femoral acetabular impingement (FAI), hip labral tear, detached hip labrum, pincer lesion with FAI, iliopsoas bursitis, hip arthritis, cartilage damage, hyperlaxity, ischiofemoral impingement, mixed lesion with FAI and labral tear **Treatment:** Upon the physician's exam, the patient denied pain with palpation throughout the anterior hip, lateral hip, and gluteal regions. He had full hip PROM and AROM, but experienced pain (9/10) with hip flexion greater than 90° and hip flexion combined with abduction and internal rotation. Patient's pain while sitting was 4/10 and he complained of "stiffness and achiness". After reviewing the patient's history, the physician ordered an MRI of his left hip. The patient was diagnosed with a left hip mixed CAM/pincer lesion and labral tear. Arthroscopic femoroplasty and acetabuloplasty were recommended and performed on the left hip. Two weeks post-surgery, the patient was out of his brace and full weight bearing (FWB). During the first month, the patient's rehabilitation plan focused on the left hip and included: gluteal activation, resisted four-way hip exercises, hip flexor stretch, piriformis stretch, and hip PROM in all directions. After the left hip function was deemed equal bilaterally, the second month of rehabilitation included: bilateral side-steps, resisted double-leg bridges, double-leg mini squats, and a running progression program. Patient completed his rehabilitation at home over the summer and was cleared to run unsupervised four months post-surgery. **Uniqueness:** Hip impingements are common in both men and women, especially in elite athletes, and symptoms can start as early as age 15. Bilateral hip impingement is common in runners, ice hockey players, and other sports that demand excessive hip flexion. Sixty percent of people who undergo hip arthroplasty will also require contralateral hip arthroplasty. CAM lesions are more common in males, while pincer lesions are more common in females, but isolated CAM or pincer lesions are rare. Seventy percent of FAI is caused by a mixed CAM/pincer lesion. This patient is unique since he had a unilateral mixed lesion in his left hip and an isolated CAM lesion in his right hip. **Conclusion:** Despite the difference in FAI surgical repairs, this patient was able to follow the same rehabilitation protocol for both hips. The patient's left hip was repaired in the middle of rehabilitating his right hip, resulting in a plateau of the right hip's progression. Both hips were progressed together, once their functional level was similar. **Clinical Application:** Eighty-five to 90% of patients that receive hip arthroplasty return to similar pre-injury activity levels. It is important that athletic trainers are able to identify the FAI symptoms, allowing early repair and minimizing tissue damage. Bilateral FAI should be suspected if the patient performs repetitive and excessive hip motion including hip flexion, abduction and internal rotation. Therefore, athletic trainers should perform a bilateral screening when a patient is suspected of having an FAI because of the prevalence of bilateral diagnosis.