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2018

## 2018 Program

University of Missouri-St. Louis

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# URS

Undergraduate  
Research  
Symposium

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*Research • Scholarship • Creative Works*

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# 2018

April 27th, 2018

University of Missouri—St. Louis

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## Mission

The URS strives to promote undergraduate research by providing a student-engaged, professional-style venue for undergraduates to prepare and present high quality original research, scholarship, and creative works. This multidisciplinary event is intended to help students achieve their educational and professional goals by learning how to communicate their research to a community of scholars. The URS also provides an opportunity for faculty and the broader academic community to express support for these high-achieving undergraduate scholars and recognize their exceptional work through a judging and award process.

## URS History

The URS has been promoting undergraduate research annually since 2002 when a Golden Key International Honour Society member, Kenneth Gunn, proposed that Golden Key sponsor an event to help students prepare for professional life. The Golden Key advisor, Kathryn Walterscheid, encouraged the group and helped them to plan a conference. With the endorsement of the dean of the Pierre Laclède Honors College, Robert Bliss, and the associate dean, Nancy Gleason, the Golden Key members hosted the first URS. Drawing participants from all colleges of the university and financial support from several departments, the URS gives undergraduates the opportunity to learn the workings of academic conferences and present their ideas more effectively. Each year, the URS team of volunteers strives to execute an exciting and rewarding academic conference for undergraduates. We continue to be amazed by the creativity of the participants and the quality of their research.

## The 2018 URS Committee

- Kimberly Baldus, PhD, Teaching Professor, Honors College
- Sharlee Climer, PhD, Assistant Professor, Mathematics and Computer Science
- Geri Friedline, Associate Teaching Professor, Honors College
- Dan Gerth, Interim Dean and Associate Teaching Professor, Honors College
- Nicole Gevers, President, Pierre Laclède Honors College Student Association
- Nancy Gleason, Teaching Professor, Honors College
- Wes Harris, PhD, Associate Dean, Graduate School and Professor, Chemistry
- Cezary Janikow, PhD, Chair and Associate Professor, Mathematics and Computer Science
- Madison Koogler, Student Government Association Representative, PLHCSA
- Tom Meuser, PhD, Interim Associate Dean, College of Arts and Sciences and Director, Gerontology Program
- Ann Steffen, PhD, Professor, Psychological Sciences
- T.J. Taylor, PhD, Associate Professor, Criminology and Criminal Justice
- Ann Torrussio, Assistant Teaching Professor, Honors College
- Kate Votaw, PhD, Assistant Teaching Professor, Honors College
- Patti Wright, PhD, Chair and Associate Professor, Anthropology
- Ari Zakroff, President, Golden Key International Honour Society

## **Financial Support**

The URS committee thanks the organizations, departments, and colleges who helped fund the event and the printing of student posters:

- College of Arts and Sciences
- Department of Psychological Sciences
- Gerontology Program
- Golden Key International Honour Society
- Graduate School
- Mathematics and Computer Science
- Pierre Laclède Honors College
- Pierre Laclède Honors College Student Association
- Office of Student Affairs

## **Additional Acknowledgements**

The URS committee is very grateful for the assistance of many individuals and groups outside the committee. We would like to thank:

- All faculty and graduate students who are judging poster and oral presentations;
- Print Services for assistance with student posters and our program;
- Daisha Smith for Millennium Student Center reservation and set up assistance;
- Sodexo Catering;
- Jodi M. Heaps-Woodruff, PhD, Assistant Research Professor, MIMH, for providing poster workshops for our students;
- Zachary Lee for designing the URS recruitment advertising;
- The faculty mentors who supervised research, reviewed abstracts, edited posters, coached oral presenters, and supported their students in many other ways.
- And a special thanks to Dr. Kathryn Walterscheid for guiding the URS from 2002 until 2017!

## Authors, Titles, Mentors, and Abstracts

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Oral presentations..... Page 18

Because style rules differ between academic disciplines, no attempt has been made to create uniformity in titles, author listings, and abstracts. All program listings are included as submitted by student presenters.

## Schedule

1:00-3:00pm - Posters on display, MSC rotunda, 2<sup>nd</sup> and 3<sup>rd</sup> floor  
12:15-1:30pm - Oral presentations, session A, MSC 313, 314, 315  
1:45-3:00pm - Oral presentations, session B, MSC 313, 314, 315  
3:15 - Oral and poster awards presentation, MSC Century Rooms

## Oral Presentations

### Session A

<b>Presenter</b>	<b>Room Number</b>
Austin Hester, Jianyu Wang	313
Lauren O'Donnell	313
Ella Zakroff	313
Claudia Campbell	314
Marco Pipoly	314
Brian Rainey	314
Dana Channell	315
Amber McDaniel, Sabrina Romine,	315
Nate Oatis, Kathleen Rice	
Sabrina Romine	315

### Session B

<b>Presenter</b>	<b>Room Number</b>
Christopher Aiken	313
Zachary Lee	313
Anna Schmid	313
Rihanna Klein-Fleeman	314
Hannah McInnis	314
Michelle Seymour	314
Dana Channell, Samantha Barnett,	315
Charles Blanton, Erin Long, Maja	
Leonouda, Andrew Quon	
Chandler EuBank, Courtney Taylor,	315
Tori Dieckman, Jasmine Gibbs, Caitlin	
Adams, Edis Niksic, Theodore Hopkins,	
Harlee Custer	
Eva Selph	315

# Poster Presentations

## **Maintaining Group Harmony in Sexist Environments Elicits Cardiovascular Threat Among Women**

Drake A. Anderson

Faculty Mentor: Bettina Casad, PhD

Research indicates sexist environments have negative consequences for women such as lower self-esteem, sense of belonging, and maladaptive cardiovascular reactivity. A marker of negative cardiovascular reactivity is total peripheral resistance (TPR), or the total amount of blood pressure in the cardiovascular system. TPR is an indicator of cardiovascular health and increased TPR in response to stress reflects a maladaptive threat response whereas decreased TPR reflects a healthy challenge response. To further investigate the relationship between experiences of sexism and cardiovascular health, we examined women's reactions to interacting with a sexist or neutral male peer. When experiencing sexism, social norms encourage women to ignore sexist remarks and maintain group harmony despite psychological costs of suppressing the desire to confront. In a lab experiment, female participants (N = 32) engaged in a virtual interaction with a male confederate who gave a scripted response, making a sexist or neutral comment. Before the interaction, women were instructed to either maintain group harmony or be their true selves during the virtual conversation. TPR was collected after the virtual interaction, during a 5-minute recovery period. Results indicated a significant difference between women in the control and threat conditions when instructed to maintain group harmony. When women experienced the sexist comment, but were instructed to maintain group harmony, they showed higher TPR during the recovery period suggesting sustained negative cardiovascular reactivity. These results have implications for how women respond to sexism in important contexts, such as education and workplace environments. If women ignore sexist comments, they may maintain group harmony, but experience negative cardiovascular health consequences.

## **Modern Burial Techniques and Their Effect on the Archaeological record**

Sarah Arbogast

Faculty Mentor: Anne Austin, PhD

The main burial styles today are cremation, green burials, and traditional burials. How much of these styles will be visible later on? This poster will explore these types of burials, who gets them, and their long term effects on the archaeological record. Through this, we can explore what will and won't be visible to future archaeologists, and explore what we may have missed in our own excavations.

## **Neural Effects of Word Expectancy Among Individuals with History of Reading Difficulty**

Samantha Austin-Murphy

Faculty Mentor: Suzanne Welcome, PhD

Nationwide, approximately 20% of school-aged children struggle with reading. However, some individuals who had reading problems as children do not have reading difficulties as adults and approximately 25% of children with dyslexia will compensate for their initial difficulties with reading and attend college. Relatively little is known about how individuals with compensated dyslexia read. This knowledge is important because it might be able to improve strategies used in reading teaching and remediation. One theory is that individuals who struggled to learn to read rely more heavily on meaningful word relationships. In this study, college students with and without self-reported history of reading difficulty completed standardized tests of reading ability and read a series of sentences that ended in expected or unexpected words. We used event-related potential data to measure the brain response to unexpected sentence endings, specifically the part of the electrical signal called the N400. Individuals with a history of reading difficulty showed smaller effects of unexpected endings in the N400 than those without a history of reading difficulties. Self-reported reading difficulty scores were strongly associated with the size of expectancy effects among the entire sample of college students. Surprisingly, students with a history of reading difficulty showed less difference between expected and unexpected sentence endings, suggesting that they are less, rather than more, sensitive to how well words fit in a sentence. Importantly, these results suggest that the brain markers of sentence processing differ between college students with different reading histories.

## **Catalytic Activation of Propargylic Alcohols and Derivatives**

Michael Barnes-Flaspoler, Matthew J. Stark

Faculty Mentor: Eike B. Bauer, PhD

Catalysts are useful for increasing reaction rates and allowing reactions to take place under economically more favorable conditions, such as at lower temperatures. They achieve this by introducing an alternate pathway for the reaction to proceed thereby decreasing the activation energy. The use of catalysts can save time and money. Product yields can also be improved, which saves on starting materials. The goal of the research being performed is to investigate the use of iron-based catalysts in the etherification of propargylic alcohols and derivatives. When propargylic alcohols are reacted with primary or secondary alcohols in the presence of a catalyst such as iron(III) chloride, a propargylic ether is formed. Catalytic efficiency was investigated by conducting gas chromatography on the reaction mixtures. Gas chromatography is a technique for analyzing mixtures by separating the vapors of each component inside a capillary column and using a detector to quantify the amount of each component. Products were also isolated by column chromatography and identified using proton nuclear magnetic resonance. Results of catalysis experiments will be reported.

## Character Assassination: How Comic Book Culture Was Unjustly Disavowed By Society

Keegan Barrett

Faculty Mentor: Scott Peterson, PhD

For this research opportunity, I investigated the historical context of comic book culture, with a particular emphasis on the 1954 Senate Subcommittee on Juvenile Delinquency. Through this cornerstone event, I analyze why and how that culture came to be so ridiculed in modern society. In addition to the subcommittee transcripts, I draw on a variety of academic and commercial sources to evaluate the worth of many common criticisms of comics. Academic sources such as Carol Tilley's *Seducing the Innocent* were referenced in this evaluation, while recent examples such as recent articles from publications as widespread as *The Telegraph* are used to make the claim that the negative reaction to comics has not diminished with time. During the course of my research, it became clear that comics were – and are – not the only cultural commodity to be put on trial in the court of public opinion. I find that the evidence presented by the likes of Frederic Wertham leaves much to be desired and that many of the common critiques of media from authors in the vein of Neil Postman and his contemporaries do not have to be the end of the conversation. There are a growing number of arguments that conclude that the media we consume has in fact become more sophisticated over time. In conclusion, I find that comics were unjustly burned at the stake for crimes they did not commit. I also find that the vicious cycle of moral and intellectual panic will continue without end for as long as we fail to consider the merits of that which we do not understand in favor of self-serving and reductionist logic.

## Camelina Oilseed Crop Nutrient Uptake

Sarah Bell, Jianwu Li, PhD, Guangqin Cai, PhD,  
Yuan Su

Faculty Mentor: Xuemin Wang, PhD

Camelina (*Camelina sativa*) is a plant in the mustard family that is native to parts of Asia and Europe, and was introduced to North America during the 19th century. It is valued because of the high oil content of its seeds, which is generally between 30-40 percent of dry seed weight. Camelina oil can be used in a wide range of edible and industrial products, including cooking oil and lamp oil, and is also growing in use as a biofuel. Compared with other crops, Camelina is relatively more productive on marginal lands, where there is a lack of nutrients like phosphorus. Phosphorus is very important to plant growth processes including: photosynthesis, root development, stalk length, flower formation and seed production. In conventional agriculture, phosphorus is supplied to plants by applying large amounts of synthetic fertilizers, however this can have negative effects on ecosystems by polluting water and causing algal blooms. Phosphorus fertilizers may also be too expensive or not accessible to farmers in certain regions. Considering these conditions, it is ideal to grow crops like Camelina which do not require high input of phosphorus but have comparable yields as other crops. In this experiment, 23 accessions of Camelina were tested for their phosphorus use efficiency through a

comparison of two sets of the accessions: one set was watered with a nutrient solution containing phosphorus, while the other was watered with a solution containing no phosphorus. After the accessions were grown for four weeks, the above-ground tissue was harvested, dried, and analyzed for phosphate content using an acid digestion method. This comparison of phosphorus content between accessions will potentially lead to discovery of Camelina lines that yield well in low-phosphorus soils, and also identify genomic markers and alleles that are associated with high phosphorus use efficiency and Camelina production.

## Increasing the effectiveness and reach of data collection with MO-HOPE opioid overdose field report

Roderic S. Berry, Kimberly Werner, PhD,  
Sandra Mayen, Liz Sale, Rachel P. Winograd

Faculty Mentor: Kimberly Werner, PhD

The United States is facing a crisis of opioid misuse and deaths from overdose. Across the United States, rates of opioid overdoses during the last 15 years have increased by more than 350%: 11,913 in 2002 to 42,249 in 2016. During that same timeframe, overdoses in Missouri have increased more than 480%, from 189 to 914. The eastern region of Missouri has had particularly high rates of overdoses, with St. Louis City and St. Louis County recording 1,058 opioid related deaths from 2015-2017. The increased incidence of opioid overdose in the United States has brought focus to the utility of harm reduction strategies such as broader access to naloxone – a lifesaving opioid reversal medication - for administration during an overdose event.

The goal of the Missouri Heroin Overdose Prevention and Education (MO-HOPE) project is to reduce prescription drug/opioid overdoses in Missouri through training, education and the distribution of naloxone to qualified individuals. As there is no existing centralized opioid overdose database in Missouri, MO-HOPE established a field report system to track naloxone administration and opioid overdose events and reversals in real-time. This type of database is essential to understand the patterns and issues involved in responding to and preventing overdoses.

From December 2016 to April 2018, 875 field reports have been submitted across the state of Missouri. Of the reported overdoses, 577 were males (65.9%) and 293 were females (33.5%), with 55.3% reported as being 25-44 years old, and the majority reported White (724, 82.7%).

Comparing the raw numbers of statewide field reports and the number of deaths recorded by medical examiners in St. Louis City and County during this same time frame yields large discrepancies in reported numbers and demographic characteristics. This presentation will a) describe characteristics of opioid overdose events and reversals collected via the MO-HOPE field report and b) compare and contrast these reports with characteristics of fatal opioid overdose data reported by the medical examiners. Further discussion pertaining to MO-HOPE strategies to ensure the field report is capturing the most at-risk population and data are representative of the opioid crisis in Missouri will be included.

## **Indications of Gender and Status in St. Louis Cemeteries**

Nicholas Braun, Samantha Barnett

Faculty Mentor: Anne Austin, PhD

This project explores how apparent status and gender is correlated across time in St. Louis from the mid - 19th century to the present. Data collection focused on grave markers and memorials found through various St. Louis cemeteries, including Bellefontaine Cemetery and Memorial Park Cemetery. This included photographing, measuring, and recording what was written for the grave markers. This project analyzes the iconography found in and around burials within the cemeteries. We identified status of individuals through the extravagance, or lack thereof, of grave markers and available information of certain individuals' lives. We also looked for the kinds of materials, such as marble, that were used to erect the tombstones and memorials to help determine the status of the individuals. Gender for the purpose of this project is defined as any expression of masculinity or femininity and was identified by variation in iconography or the wording found on grave markers (e.g., mother of, loved son). By comparing the status of individuals to gender identifiers placed on the grave markers we establish how gender is reflected on grave markers and how status influences this representation. Our analysis demonstrates a clear correlation between status and gender; individuals with higher status have more varied representations of gender in their mortuary record. With a clearer understanding of the relationship between how gender and status is depicted on grave markers in St. Louis cemeteries we can reconsider how status impacted gender in daily life during the 19th century.

## **The effects of love on early and late attention: An event-related potential study**

Lauri Davis

Faculty Mentor: Sandra Langeslag, PhD

It is widely known that emotional stimuli are given attentional priority over less salient stimuli. Likewise, love-related stimuli are highly emotional and the effects of romantic love on cognition may resemble the effects of emotion on cognition. Thus, the current event-related potential (ERP) study investigated whether beloved-related stimuli capture early and late attention during the early stages of love (i.e. infatuation). This study examined the Early Posterior Negativity (EPN) component of ERP that captures early automatic attention, and the Late Positive Potential (LPP) component of ERP that reflects later motivated attention. It was predicted that faces of the beloved will elicit a larger EPN than faces of a friend or unknown person. It was also predicted that faces of the beloved would elicit a larger LPP than faces of a friend or unknown person. Participants who had been in love for less than a year were asked to perform computer tasks in which they passively viewed the faces of their beloved, a friend, and an unknown person while having their brainwaves recorded. Participants performed a fast task to elicit the EPN and a slow task to elicit the LPP. As an-

anticipated, both the EPN and LPP exhibited a larger response to the face of the beloved than to the faces of the friend or stranger. The EPN and LPP response was larger for the friend than the stranger, and larger for the beloved compared to the friend. These findings suggest that the beloved captures early automatic attention and later motivated attention.

## **Love and Mind Wandering**

Brandon Eich, Sandra Langeslag, PhD, Carissa Philippi

Faculty Mentor: Sandra Langeslag, PhD

It is very easy to get distracted during daily tasks (e.g. being in class and daydreaming about things unrelated to the task at hand). Think about the first time you were in love; did this sort of daydreaming happen more often? Past research has shown that motivated attention is directed towards the beloved. Additionally, past research has shown when passionate love increases, task performance decreases. Therefore, we examined how much love distracts individuals when performing unrelated tasks by recruiting 32 college students (26 women, 1 genderqueer) and having them complete a Sustained Attention Response Task (SART). Participants also had to fill out questionnaires measuring constructs such as, love intensity, mind wandering and related constructs. Results from the questionnaires indicated that as people were more in the infatuated stage of love, the more they believed they would do poorer on an unrelated task. However, results from the SART, indicated that people did not perform poorer on an unrelated task when they were more infatuated. There might be a disconnect between what people believe is distracting them and what seems to actually be distracting them during daily life tasks. Therefore, future research should investigate what is actually distracting individuals.

## **Determination of Humulones and Isohumulones in Beer using HPLC Analysis**

Lorna Espinosa

Faculty Mentor: Bruce C. Hamper, PhD, Kurt Driesner

The chemical analysis of hops-derived humulone and isohumulone components in hops and beer will be investigated using HPLC. Comparative analysis of the humulone/isohumulone content of several styles of beer will be accomplished in ten-minute runs. Determination of detection limit for humulones and iso-alpha acids will be made on a microcolumn HPLC. The relative humulone/isohumulone content can be evaluated in a scatter plot that allows profiling of various beer styles provided by Urban Chestnut Brewing Company. This analysis complements sensory analysis data and provides a simple and rapid chemical analysis method to accompany classroom or other social investigations into beer and beer making.



## Brain Markers of Orthographic Similarity

Stephanie Faulkingham

Faculty Mentor: Suzanne Welcome, PhD

The ability to read fluently involves two processes working efficiently together, phonological (word sound) and orthographical (word spelling). Previous studies have shown that orthographic similarity impacts phonological decisions - individuals are faster to recognize that words rhyme when they also look similar (such as cat and bat) than when words sound different (such as rough and dough). However, the impact of phonological similarity on orthographic decisions is less well-known. The current study investigated whether individuals would take longer to recognize spelling similarity in word pairs that did not rhyme (rough and dough) than word pairs that rhyme (bat and cat). Eighteen university students participated in the study, which presented word pairs that sounded similar but looked different (O-P+), pairs that sounded different but looked similar (O+P- pairs) pairs that both looked and sounded similar (O+P+) and pairs that both looked and sounded different (O-P-). Participants were asked to indicate whether the word endings were spelled similarly. We measured the Event Related Potentials (ERPs) of participants when they are presented with words pairs to examine neural markers of word processing and differences based on spelling and sound overlap between word pairs. ERPs revealed processing differences between O-P- and O-P+ pairs and O+P- and O+P+ pairs over central electrode sites 250-500 ms post stimulus onset. This demonstrates that phonological information impacts orthographic decisions, and provides us with a better understanding of the reading process.

## Predicting Crime in the City of St. Louis using Deep Learning

Alberto Flores

Faculty Mentor: Badri Adhikari, PhD

The ability to predict crime trends is invaluable information to law enforcement, it allows police departments to be proactive on crime. We used deep learning, a subset of machine learning to find the complex relationships between the geographical, temporal and features of various crimes to forecast crime in the City of St. Louis. We have used the crime statistics from the Metropolitan Police Department, City of St. Louis to construct are crime models to predict both monthly and weekly crime counts in regions of the city. The city crime counts are partitioned into 81 sections, where 79 are representing neighborhoods organized by the city, and the other two are parks and online crimes. Our models can accurately predict the correct overall crime count of the regions in the high 50%.

## Severing Sugars to Identify Structures

Joseph W. Frye

Faculty Mentor: Benjamin Bythell, PhD

Sugars make up a sizable portion of molecules that are important for life. They are important for a variety of human biological processes and diseases that can affect these

processes. If we understand how these sugars break apart, then we can better understand how these processes occur. Each type of sugar has a specific shape. They do not, however, have to have a specific weight. It is possible to get sugars of the same weight; therefore, it is also necessary to be able to distinguish these sugars apart. This is done by taking advantage of each type of sugar's unique shape. The analysis of the sugars is done using mass spectrometry. The sugars are made into a gas and then put into the machine. The sugars are then smashed into another gas to create collisional diagnostic pieces. This creates experimentally obtained fragments that can be used to rebuild what the sugar is. This is done by measuring the weights of the fragments and how much of each of the fragments. The experimental data needs be backed up with theoretical values to compare with to determine the accuracy of the experimental data. These theoretical values are obtained through calculations. These calculations can be used to predict structures and the likelihoods of different fragments. The calculations are used to support the way the sugars fragment.

## Effects of Reading Interest and Ability on Responses to a Reading History Study

Adriana Givens

Faculty Mentor: Suzanne Welcome, PhD

Reading is a life skill that facilitates learning and provides enjoyment. However, not all adults read equally well. Self-report measures of reading history can be used in addition to or instead of traditional standardized tests of reading to assess these differences in reading skill. This study examines responses to a newly-designed reading history questionnaire, and standardized tests of single word reading, reading comprehension, and phonological awareness. The participants are 27 undergraduate students, 3 males and 24 females ranging from age 18-63, from a mid-western institution. Each participant completed a demographics sheet, the Sight Word Efficiency and Phonemic Decoding Efficiency subtests of the TOWRE-2, the Elision, Blending Words, Phoneme Isolation, Nonword Repetition, Blending Nonwords, and Segmenting Nonwords subtests of the CTOPP-2, and the Nelson-Denny Test of Reading Comprehension. Additionally, each participant completed, a modified version of a reading history questionnaire, which examined Childhood Interest in Reading, Adult Interest in Reading, Childhood Reading Ability, and Adult Reading Ability. We examined relationships between scores on the reading history questionnaire, the Nelson-Denny Test of Reading Comprehension, and the Sight Word Efficiency and Phonemic Decoding Efficiency subtests of the TOWRE-2. We hypothesized that Reading Comprehension and Reading Rate scores would significantly correlate with reading history questionnaire scores on Childhood Interest, Childhood Ability, Adult Interest, and Adult Ability subscales. We hypothesized that Sight Word Efficiency scores would significantly correlate with Phonemic Decoding Efficiency scores. We hypothesized that Reading Rate scores would significantly correlate with Sight Word Efficiency and Phonemic Decoding Efficiency scores. Reading Comprehension scores significantly correlated with Childhood Interest, Childhood Ability, and Adult Ability scores. Reading Rate scores significantly correlated with Childhood Interest, Adult Interest, Adult Ability, and Sight Word Efficiency scores. Sight Word Efficiency scores sig-

(continued) nificantly correlated with Phonemic Decoding Efficiency scores. In conclusion, these findings suggest that the newly developed questionnaire accurately captures variability in the reading experiences and abilities of university students. Findings may reflect the current technology boom impacting how and what students read on their own and how much students enjoy reading when they are younger as opposed to when they get older.

### **The Study of the Release of Parent Volatiles in the Comet C/2015 ER61**

Tyler Hanke, Kelcea Lesinski

Faculty Mentor: Erika Gibb, PhD

This research looks at the abundances of chemicals(CH<sub>4</sub>, HCN, OH, etc.) relative to the abundance of water in the Oort cloud comet C/2015 ER61. C/2015 ER61 was observed during a period of strong outbursts of dust on the comet that are comparable to geyser eruptions, and this event provided a spectrum of the comet's chemical composition and how much of the chemicals present were releasing off of the nucleus of the comet. Through the use of the custom programming language, Interactive Data Language(IDL), reduction algorithms analyzed the data obtained for standard stars and the comet C/2015 ER61 during the strong outburst. The data reduction has shown the density of water and other chemicals(such as OH and HCN) that were released from C/2015 ER61 during the outburst at different wavelengths. The abundances and densities of the release of water and other chemicals can be used to test comet nucleus physics models concerning the method of release of water and other chemicals from nucleus ices. These models assert that water and other chemicals release from the nucleus in icy grains or they release from the nucleus by transitioning from solid ices to gases (also known as direct sublimation).

### **Estimating changes in demographics in 20th century St. Louis**

Brittany Henry

Faculty Mentor: Anne Austin, PhD

The purpose of this research is to find out how St. Louis's demographics have changed over the 20th century. This insight will involve the use of collected data such as age, sex and possible surname origins of a random selection of those buried at St. Louis's Memorial Park Cemetery. I use this collected data, historical census data, and other supporting and comparative material to interpret estimates of life expectancy of the population and a female to male breakdown and the ethnic makeup of the St. Louis Area including patterns in immigration into the city. Using this information, the research tells us that life expectancy calculated from Memorial Park Cemetery does mimic the upward trend in life expectancy for the United States. The same trend also remains true when male and female are divided in our collected data. This research also utilized surname origins to attempt to predict what kind of people made up the St. Louis area and what people made their way to St. Louis through the study of immigration patterns. While this part of the research may do an adequate job of showing the European makeup of the St. Louis area over time, it does not consider other variables. These varia-

bles may include segregation of burial, surname alteration in immigration, and forced surname changes. It is also important to consider how the census goes about collecting its data given there are discrepancies regarding legal versus illegal citizens of the United States. The conclusions found through this research seem to replicate data in the demographics of the St. Louis area in life expectancy; however, this is not the case with the ethnic makeup. This research offers a method to evaluate the demographics in areas beside St. Louis using similar methods and larger sample sizes.

### **Age, Status, and Linage**

Maggie Herberg, Jasmine Gibbs

Faculty Mentor: Anne Austin, PhD

In the Saint Louis area there are more than two-hundred cemeteries, many of which contain graves and monuments that have been left behind by the generations following them. Even when there are living relatives, some graves are abandoned and left to be forgotten. What is it that makes it possible for people to forget deceased relatives? Is this simply the passage of time, or does other factors like lineage, age, or social status influence who is forgotten and who is remembered? In order to explore this question, we assess age, status, and lineage using graves and monuments that have been abandoned. Because information is limited due to families' lack of knowledge of other relatives, lack of males to carry on the family name, or simply families relocating out of the area, data collection consists of comparing death records and cemetery records. Due to such limitations, information in regard to the family's past and present is essential in understanding why once loved ones have been forgotten by their predecessors who at one point cared deeply for them, but over time have become a faded memory in their minds. The abandonment of graves belonging to the affluent Garrison family reveals that social status does not play a crucial role in whether a person will be remembered or not after death.. It is important for us to understand why grave sites are abandoned even with living family because no one wants to be forgotten after death. We need to understand what we can do to keep the memories alive of those that we love.

### **Molecular Production Rates and Abundances in C/2015 ER61**

Melissa Huber

Faculty Mentor: Erika Gibb, PhD

Comets are celestial bodies that are formed from the rock and ice that have formed during the time of planet formation in the solar system. These bodies stay within the outer solar system until some force redirects their orbit close to the sun. From this, we can infer that their composition is largely the same as it was when they were first formed. As such, comets are vitally important to study and probe for information regarding the state and makeup of the early solar system. We analyzed the ice composition of C/2015 ER61. The data were obtained from the ISHELL spectroscopy located at the NASA Infrared Telescope Facility in Maunakea, Hawaii. We reduced the data in order to account for pixel errors, misalignment, and the effect from Earth's atmosphere. From this data, we extracted an emission spectrum from the comet coma. The molecules

analyzed include water, carbon monoxide, methane, methanol, and ammonia. Here presented are the emission spectra and abundances relative to water for the April 16 and 17, 2017 observations. We will compare this comet to others that have been observed and to protoplanetary disk models to infer conditions when planets formed.

## Lab Simulation of Carbon Droplet Cooling in AGB Stars

Tristan Hundley

Faculty Mentor: Philip Fraundorf, PhD

Micron-sized presolar carbon droplets that have unlayered spherical graphene cores and concentric graphite shells surrounding them, are referred to as carbon onions. They are extracted from meteorites and are shown to have likely formed in the atmospheres of red giant stars. We have demonstrated that these particles likely form from carbon vapor into supercooled droplets of liquid carbon, which solidifies slowly enough for the growth of unlayered graphene sheets. To examine the conditions under which this unlayered graphene forms, we attempted to slow cool carbon vapor in the interior of a restively heated and evaporating graphite oven in the lab. The particles produced include core-rim onions, rim-only graphite onions, core only droplets, a variety of irregular shaped graphite flakes and carbon nanotubes. Using diffraction analysis, we compare data from the synthesized onions to presolar data and can confirm the similarities.

## Women with PTSD: Does Negative Self-Related Thought Predict Cortical Volume and Thickness in the Default Mode and Affect Networks?

Miranda N. Jany

Faculty Mentor: Carissa Philippi, PhD

A core feature of posttraumatic stress disorder (PTSD) is increased negative self-focus. Previous neuroimaging research has identified abnormal activity in brain regions involved in negative self-focus, including the default mode network (DMN) and affective network (AN), in PTSD. However, no studies to our knowledge have used a language analysis of impact statements and structural neuroimaging to examine the relationship between negative self-focus and cortical thickness and volume in DMN and AN regions in PTSD. In the present study, women with PTSD due to interpersonal trauma ( $n = 32$ ) underwent structural magnetic resonance imaging and completed a written impact statement (i.e., description of how the trauma has affected their lives) prior to beginning therapy. Statistical associations between cortical thickness/volume in major regions of the DMN and AN and negative self-focus from the impact statements were analyzed using linear regression models. After covarying for depression severity and age, negative self-focus was a predictor of thickness in DMN and AN regions including the left precuneus ( $t(30) = -2.13, p = .042$ ), right inferior parietal ( $t(30) = -2.51, p = .018$ ), left insula ( $t(30) = -2.14, p = .042$ ) and volume in both the left ( $t(30) = 2.45, p = .021$ ) and right amygdala ( $t(30) = 2.17, p = .039$ ) of the AN. These results suggest that network dysfunction within the DMN and

AN may contribute to negative self-related thought in individuals with PTSD. Future research will be necessary to determine whether AN and DMN dysfunction predict changes in negative self-focus after successful treatment.

## Absolute Quantification of Acyl-ACPs by Mass Spectrometry

Lauren Jenkins, Doug Allen, PhD, Bradley S. Evans

Faculty Mentor: Doug Allen, PhD

Acyl carrier proteins (ACP) are an important scaffold protein involved in fatty acid synthesis. Measuring their levels help to understand regulation of lipid biosynthesis in plants. The growing fatty acid is attached to ACP via a serine residue within the conserved amino acid sequence (asp-ser-leu-asp; DSLD). Recently developed methods take advantage of this sequence and digest with aspartate-N endoproteinase (asp-N) to produce a chain covalently attached to a three-amino acid sequence (acyl-DSL) through a 4'-phosphopantetheine arm which is detected using liquid chromatography-tandem mass spectrometry (LC-MS/MS). The objective of this work is to synthesize an isotopically labeled standard for absolute quantification of acyl-ACPs in oilseeds. Our approach is to synthesize a standard using two enzymes separately. The first reaction uses Sfp synthase (4'-phosphopantetheinyl transferase; Sfp) to transfer an acyl group from acyl-CoA to a conserved serine on an isotopically labeled apo-ACP. The second reaction uses asp-N to digest the acyl-ACP at DSLD for detection using LC-MS/MS. Fluorescent-CoA analogue (BODIPY-CoA) was substituted to inspect each enzymatic reaction via SDS-PAGE and fluorescent imaging. SDS-PAGE analysis of the synthesis reaction using BODIPY- and Hexanoyl-CoA shows formation of acyl-ACP. SDS-PAGE analysis shows digestion of ACP and acyl-ACP by asp-N is enhanced by trichloroacetic acid precipitation of the product. Unreacted BODIPY-CoA fluoresces on a gel at a similar mass to the desired BODIPY-tripeptide (BODIPY-DSL) final product. LC-MS/MS methods have detected acyl-ACP products when synthesis and digestion works in tandem. Ongoing experiments focus on improving reaction yield of both steps prior to quantification of acyl-ACP levels in oilseeds.

## Glycoprotein detection on nanoporous gold by electrochemical methods

Anastasia Jensen, Keith Stine, PhD, Dharmendra Neupane, Jay Bhattarai

Faculty Mentor: Keith Stine, PhD

The main purpose of this research project was the detection of glycoprotein in nanoporous gold (NPG). Research shows that detection and separation of glycoproteins plays a key role in the discovery of treatment and diagnosis against many diseases. In this research, we explored the detection and separation of fetuin1, a glycoprotein in the blood that is an important component of processes such as bone metabolism regulation, insulin resistance, protease activity control and many others (Mori, K.). We used modified gold wires and nanoporous gold wires to detect this glycoprotein2. A number of experiments were performed including: dealloying of gold and silver alloys, measure-

(continued) ment of electrochemical impedance spectra (EIS) and cyclic voltammograms (CV) of boronic acid modified NPG wire; study of metallic and metal oxide sponges of different compositions. In conclusion we found that 4-mercaptoboronic acid (4-MPBA) showed high selectivity in the capture of fetuin (an N-linked glycoprotein). We were not able; however, to detect glycoprotein from nanoporous gold.

### **Black Mental Health: Barriers and Community Level Interventions**

Jasmine Jones

Faculty Mentor: Julie Bertram, PhD

The purpose of this literature review is to identify factors that contribute to mental health crisis and to consider community level interventions to improve mental health in the black community. In this community, mental health stigma is perpetuated culturally through the attitudes of close relatives and friends. A vital aspect of mental health disorder treatment is the establishment of a support system. However, if family members are not supportive or have negative perspectives of mental health, there are significant impacts on the individual, creating a barrier against the seeking of and compliance to treatment. To shift cultural attitudes and ultimately, increase the desire to seek mental health services, education implemented at the community level with emphasis on the household or the family unit can have lasting and effective impacts on mental health within the community. To support this claim, contributing factors, cultural attitudes, and perpetuating factors will be discussed. Furthermore, community level interventions will be considered and analyzed for effectiveness and relevance.

### **Indole-3-butyric acid resistance in *Arabidopsis thaliana* enhancer mutants**

Danielle Karraker, Bethany Zolman, PhD, Rachel M. Manno

Faculty Mentor: Bethany Zolman, PhD

Auxins are an important class of hormones that play a critical role in mediating plant growth and development. The most abundant form of auxin, indole-3-acetic acid (IAA), is involved in many aspects of plant maturation, including primary root inhibition and lateral root initiation. Another key regulator of root development is indole-3-butyric acid (IBA). Though similar to IAA in structure and function, IBA is superior at inducing lateral roots. Furthermore, IBA is converted to IAA in the peroxisomes via a process similar to fatty acid  $\beta$ -oxidation. *Arabidopsis thaliana* plants possessing a mutation that inhibits this conversion exhibit increased resistance to IBA, but remain sensitive to IAA. The IBA-resistant phenotype (*ibr*) is marked by lower root density, shorter primary roots, and longer hypocotyls. To further understand the mechanism underlying IBA to IAA conversion, mutants from the *ibr1-1* and *ibr3-1* backgrounds were mutagenized and screened for increased IBA resistance. Here we subjected enhancer mutants to phenotypic assays to confirm the phenotype. Two enhancer mutants, Z343 *ibr3-1* and HRI #41 *ibr1-1*, were characterized by subjecting wild type, *ibr* controls, and enhancer

mutants to varying levels of IBA and IAA. Primary root length, lateral root density, and hypocotyl length were quantified after 7-10 days. Our results indicate that both enhancers are defective in an IBA response gene.

### **Besides impairing academic performance: the relationship among gender stereotypes, stigma consciousness, and health**

Kevin Loo

Faculty Mentor: Bettina Casad, PhD

Previous research found that perceived gender stereotypes and stigma consciousness were associated with psychological and physiological stress responses that often led to poorer academic performance (Doyle, & Molix, 2017; Sawyer, Major, Casad, Townsend, & Mendes, 2012; Steele, 1997). While research had shown a negative impact of social stress on health (Pearlin, Schieman, Fazio, & Meersman, 2005), the relationships among perceived gender stereotypes and stigma consciousness on health are uncertain. The current study was a secondary data analysis aimed to investigate the associations among perceived gender stereotypes, stigma consciousness, and health-related behaviors among women undergraduate students majoring in science, technology, engineering, or mathematics (STEM). It was hypothesized that women with higher levels of perceived gender stereotypes in math and science, gender stigma consciousness, and perceived gender discrimination would be more likely to engage in risky health behaviors. Simple linear regression analysis was conducted to analyze the data. Results indicate women students who perceived more gender stereotypes in math and science were more likely to take non-prescription/over-the-counter medications than women who perceived less gender stereotypes. In addition, students who reported higher levels of gender stigma consciousness consumed alcoholic beverages and fast food more often than students who reported low levels of gender stigma consciousness. Although the data are correlational, the results suggest relationships between gender stigma for women in STEM fields and risky health behaviors. These relationships are likely related to perceived stress. These results have implications for university-level interventions for stress and health among vulnerable student populations like women in STEM.

### **The temporal distribution of grave monuments and how they affect religion and relationships with death in the 20th century.**

Abigail R. Marler

Faculty Mentor: Anne Austin, PhD

The 20th century was a time of change and growth throughout St. Louis and the rest of America. Are any of those expanding cultural views represented in our cemeteries? This poster explores the temporal distribution of grave monuments and how they reflect changing ideas about religion and relationships with death during this period of history. I analyzed how grave monuments located in Memorial Park Cemetery changed in terms of design, style, and details throughout the 20th century to see if they are reflections of these ideals. The results of this research

not only provide a better understanding of evolving cultural views on death and religion during this particular era, but also shed light on how a society's responses to death and religion can be preserved in material artifacts.

### The Association between Sexual Narcissism and Sexual Coercion Perpetration: Gender as a Moderating Variable

Joseph A. D. McBride

Faculty Mentor: Zoe Peterson, PhD

Identifying factors associated with sexual coercion perpetration (i.e., obtaining sex from an unwilling partner through use of verbal pressure or manipulation, incapacitation, or force) can help in the development of interventions aimed at reducing sexual coercion. Despite evidence of an association between sexual coercion perpetration and personality traits, such as sexual narcissism, among men, the relationship between personality traits and sexual perpetration has not been well studied among women. To address that gap in the literature, the current study examined differences in the relationship between sexual narcissism and sexual coercion perpetration among men and women. It was predicted that the four facets of sexual narcissism (sexual exploitation, sexual entitlement, low sexual empathy, and perceived sexual skill) would be higher among those who endorsed a history of sexual coercion perpetration than among those that did not. Furthermore, it was predicted that men would score higher than women on all four facets of sexual narcissism. Nevertheless, we predicted no interaction between gender and sexual coercion perpetration in relation to the facets of sexual narcissism; in other words, we expected that sexual coercion perpetration would be associated with sexual narcissism to the same degree for men and women. Participants ( $N = 454$ ) were recruited from across a college campus and completed a sexual perpetration questionnaire along with a validated Sexual Narcissism Scale consisting of four subscales — Sexual Exploitation, Sexual Entitlement, Low Sexual Empathy, and Perceived Sexual Skill. Results showed that perpetrators were significantly higher than non-perpetrators on all four subscales of the measure. Men were significantly higher than women in terms of low sexual empathy and exploitation, but there was no difference for sexual entitlement and perceived sexual skill. Additionally, there was a significant interaction between perpetration history and gender for low sexual empathy and exploitation. Low sexual empathy was associated with perpetration for men, but not women. Exploitation was associated with perpetration in both men and women, but the relationship was stronger for men. These results provide evidence that there are both gender differences and similarities in the personality factors associated with sexual coercion perpetration.

### Density Functional Theory Studies of the Thermodynamic and Structural Properties of Silicon-Based Borohydrides

Tianna McBroom

Faculty Mentor: Eric Majzoub, PhD

The storage of hydrogen for proton exchange membrane

fuel cells for transportation applications requires the use of very high pressure compressed gas, or chemical storage of the hydrogen in the form of solid or liquid compounds. Light metals are desirable for solid hydrogen storage to maximize the energy content by weight. Hydrides containing anion complexes include  $\text{NaAlH}_4$ , and  $\text{LiBH}_4$ , where  $[\text{AlH}_4]^-$  and  $[\text{BH}_4]^-$  anions are counterbalanced by cations. Experiments suggest that silicon-based borohydrides may be a viable candidate for hydrogen storage. Utilizing first-principles density functional theory (DFT) combined with the prototype electrostatic ground state (PEGS) approach to predicting crystal structures, we examined over 2,500 prototype structures for one- to two-formula units in the composition space of  $\text{Al}_v\text{Si}_w\text{Cl}_x\text{B}_y\text{H}_z$ , where  $v, w = 1$ ,  $x, y = \{1, 2, 3, 4\}$  and  $z = \{8 - 18\}$ . The lowest energy structures were found to be unstable against decomposition to known compounds, suggesting that experimentally prepared materials using mechanical milling are metastable, in agreement with the slow decomposition seen in X-ray diffraction experiments. Interestingly, the low energy structural landscape consists of a tendency toward Si- and Al-based polymeric structural units with a flat energy landscape giving rise to a multitude of polymorphic structures with low symmetry. Common structural motifs included  $\text{Al}_2\text{Cl}_2$  forming a diamond shaped ring with the aluminum additionally coordinated with one or two  $\text{BH}_4$  units or a single borane, as well as  $\text{BH}_3\text{-SiH}_2\text{Cl}$  structurally similar to ammonia-borane. Using these metastable structures, we focused on hypothetical desorption reactions that occur if reaction pathways to the elements were restricted. A discussion of the thermodynamics of these reactions is also presented.

### Observations of Order and Disorder: A Comparison of Two St. Louis Neighborhoods

Fatema Medhat

Faculty Mentor: Lee Slocum, PhD, Stephanie DiPietro, PhD

This was driven by the Broken Windows theory proposed by Wilson and Kelling in 1982 and explained further by Skogan in 1990. The theory suggests that ignoring public order violations and disruptive behaviors leads to community neglect, which fosters further disorder and crime. According to the theory, there is a strong correlation between disorder and crime. Crime develops from disorder and that if disorder was eliminated, then serious crimes like rape, robbery and murder would not occur. To test the theory, I compared signs of disorder and order collected using systemic social observations of 50 street segments in two neighborhoods, one in the north and one in the south. I compared demographics and crime rates using official data to be able to theorize possible links between neighborhood disorder/order. Additionally, data I used for my research were provided through the St. Louis Metropolitan Police Department, the American Community Survey and the 2010 Decennial Census. The data gathered from the two neighborhoods were analyzed using descriptive statistics and Chi squared tests of independence to assess the differences in order and disorder across the two neighborhoods. My findings through the research were: 1) Physical and social disorder are not necessarily linked to crime in the two neighborhoods, and 2) even though one of the neighborhoods had more signs of

(continued) disorder, it had a lower crime rate than the neighborhood that had less disorder. Finally, I concluded my research by giving some explanations to why, contrary to Broken Windows Theory, the neighborhood with less disorder has more crime. The first explanation is that this one of the neighborhoods had a higher level of poverty. Second, the neighborhood with the higher crime rate had more gang activity. Third, the neighborhood that had more crime was located geographically near highways.

### **Spatial and non-spatial memory performance following inhibition of the 5 $\alpha$ -reductase enzyme**

Robert J. Moreland, Kayla M. Kapral, Laura E. Nedderman, Lynzee L. Edwards

Faculty Mentor: George Taylor, PhD, Jacob N. Huffman

The current literature suggests the sex hormones Testosterone (TS), Estradiol (E2) and dihydrotestosterone (DHT), play an important role in memory performance in female rats and humans. Despite general dogma that females have low levels of the androgens TS and DHT, the question has been raised whether E2 synthesized from TS is a main contributor to memory performance, rather than E2 produced in the ovaries. TS is metabolized into E2 via the aromatase enzyme, or DHT via the 5 $\alpha$ -reductase enzyme. Thus, higher levels of TS in females will often lead to higher levels of E2 and DHT. Building from previous work in our lab on E2 and suppressing the aromatase enzyme, the current study aims to investigate the impact of DHT on memory performance by blocking the 5 $\alpha$ -reductase enzyme from converting TS to DHT. Treatment groups for this study include ovariectomized (OVX) female rats receiving vehicle, TS, Dutasteride (a potent 5 $\alpha$ -reductase inhibitor), or both TS+Dutasteride. An additional group of non-OVX females receiving vehicle were included to control for the OVX procedure. All animals underwent a series of behavioral tests designed to examine spatial and non-spatial memory, anxiety, and general locomotor activity. Results show 5 $\alpha$ -reductase blockade does not significantly improve memory performance in spatial memory tasks but does increase anxiety-like behaviors in Dutasteride treated animals.

### **Unpredictable chronic mild stress induces anxiety- and depression-like behaviors in mice**

Robert J. Moreland, Kayla M. Kapral, Laura E. Nedderman, Lynzee L. Edwards

Faculty Mentor: George Taylor, PhD, Jacob N. Huffman

Stress-based paradigms are commonly employed to examine anxiety- and depression-like behaviors, as well as neurochemical changes in rodents. In rats, specifically, this is often accomplished using the chronic mild stress (CMS) paradigm. The paradigm applies a number of mild stressors to the animal's home cage environment. These stressors, albeit mild, often create a maintainable state of stress persistent for many weeks but is particularly difficult to

replicate in the more stress-resilient mouse. Mice are used across a wide range of biomedical research, making them an important resource for stress-based research and pharmacotherapy development. As such, the proposed experiment investigated the behavioral and neurochemical effects of unpredictable CMS (UCMS) in mice, in which the stressors are applied at random to avoid habituation. Mice were exposed to a series of randomized stressors for 8-weeks, with various behavioral tests taking place at baseline, week-4, and week-8. Results show a significant increase in anxiety- and depression-like behaviors throughout UCMS, suggesting the random application of stressors overtime worked to mimic the effects of CMS in rats. Further, levels of brain-derived neurotrophic factor (BDNF) were measured in the hippocampus, a brain region widely implicated in depression and stress disorders. Behavioral results showed a significant increase in anxiety-like behaviors from baseline to week-4 and week-8. Animals also exhibited a significant increase in depression-like behaviors from baseline to week-4, modeling greater learned helplessness which plateaued between weeks 4 and 8. Results of the ELISA showed a qualitative, but not statistically significant, decrease in hippocampal BDNF between non-UCMS controls and UCMS animals. This suggests UCMS can be effective at modeling depression- and anxiety-like behaviors in mice, as well as creating an avenue of approach to examine neurochemical changes typical of stress-based disorders.

### **Mind Wandering in Children: A Multimodal Approach**

Laura Nedderman

Faculty Mentor: Carissa Philippi, PhD

Mind-wandering (MW) is a ubiquitous activity that has been defined as the process by which one's attention turns inward to focus on thoughts instead of remaining focused on the external task at hand. A significant amount of research has examined the disadvantages of MW in adults, including diminished performance on executive functioning (e.g. working memory) tasks, inferior reading comprehension, and poorer academic performance. However, there is little research examining MW in children. The current study aimed to examine the frequency and content of MW in children aged 8 to 13 through self-report, experience-sampling, and eye-tracking measures. Results revealed a positive correlation between self-reported mind-wandering and increased reaction time on a running memory task as well as a greater number of errors on the Sustained Attention to Response Task. Regarding the content of MW, the average self-reported focus of MW thoughts was nearly evenly split between thoughts about the past and thoughts about the future. However, self-focused MW thoughts were significantly greater than other-focused thoughts. Pupil dilation measures will also be discussed. Understanding how often children MW will aid in the development of interventions to mitigate MW in situations in which it may be detrimental, such as in class. Aside from the disadvantages of MW, it will be important for future work to explore situations in which it may be beneficial to MW, such as for creative problem solving.

## Music, Daily Productivity, and Trauma: A Literature Review

Leana O'Connor

Faculty Mentor: Janeece Woodson

Music is the universal language that brings everyone together, no matter their race, background, or gender. It naturally produces certain emotions and feelings, and affects human levels of productivity during certain cases that occur in everyday life. It can also be a physically healing mechanism in extreme cases. Music is able to influence stroke, lesion, and other brain damaged patients who have either lost their ability to speak or see, and return both of those back to them. The testimony of one particular individual, a coma patient, will serve as an example for this phenomenon. In more typical circumstances, music helps by reduce cortisol, a chemical in your brain that causes stress. The body over time recognizes certain types of music, such as classical or chorale music, as a stimulus that improves the immune system. Thus, the literature review will also examine the effects of various genres. Classical, jazz, and soft rock are the most effective background sounds to calm stress and relieve tension, causing individuals to get more work done in possibly a smaller amount of time. Even though music is sometimes looked at as something extraneous, it affects the human body deeply.

## The Role of Identity Integration and Intergroup Threat in Anti-Immigrant Attitudes and Perceptions of the Future After Brexit

Savannah Mae Price, Paul A. Greenley, Sarah R. Davis, Samantha R. Lewis, Anne M. Manwaring, Melinda M. Siebert, Bettina Casad, PhD

Faculty Mentor: Bettina Casad, PhD

Recent political events in the European Union (EU), including the influx of refugees and migrants in 2015 and the vote for the United Kingdom (UK) to leave the EU (Brexit) in 2016, create a unique opportunity to examine issues of social identity, threat perceptions and attitudes toward immigrants, and perceptions of the future after Brexit. English citizens ( $N = 262$ ) completed an online questionnaire to assess relationships among these variables. Results indicated threat perceptions mediated the negative relationship between European-national identity integration and anti-immigrant attitudes, such that less identity integration predicted greater threat, which in turn predicted more negative attitudes toward immigrants. The direct effect indicated greater identity integration predicted more positive attitudes toward immigrants. Threat perceptions also mediated the negative relationship between identity integration and perceptions of the future after Brexit, such that less identity integration predicted greater threat, which predicted positive perceptions of the UK's future, presumably due to Brexit. The direct effect indicated greater identity integration predicted more negative perceptions of the UK's future, suggesting English citizens with identity ties to the EU believe Brexit is bad for the UK. The results help us better understand intergroup relations in times of political turmoil in the EU and UK. Perceptions of immigrant threat and anti-immigrant attitudes provide insight into why the UK voted to leave the EU.

## On the Cusp of Industry: A Look at the Quality of Dental Health in 19th Century Saint Louis, Missouri

Kathleen Rice, Shawn Edghill

Faculty Mentor: Patti Wright, PhD

This undergraduate thesis takes a look at the teeth of settlers in the early decades of Saint Louis's inclusion to the United States, approximately 1790-1850. The data considered comes from human remains excavated from the now defunct Second Catholic Cemetery, an urban graveyard that was discovered during development in 1990. We evaluate the quality of dental health by comparing scores of carious lesions, tooth wear, and periodontal disease both within the population reviewed as well as against comparable populations from the same time period. The variables recorded to assess the oral health of the population replicate the data collection codebook of The Global Health Project. We compared the SCC population by age and sex. Within the results, we found osteological evidence exhibiting abnormally poor dental health in both females and elderly populations due to high rates of caries. The research addresses the issue of transition of diet at a time of rapid urbanization from the late 18th century to mid 19th century Saint Louis.

## Anxiety, Depression, and Physical Pain in Adults with Congenital Heart Disease

Trent Ruckman, Kamila White, PhD, Philip Ludbrook, MD, Ari Cedars, MD

Faculty Mentor: Kamila White, PhD

Congenital heart disease (CHD) is the most prevalent birth defect, impacting approximately 1% of the population (Van de Linde et al., 2011). This population of adults with CHD is increasing. The physical sensations of activities may be anxiety-provoking for those with CHD because the symptoms are similar to those of a cardiac episode (i.e., palpitations, shortness of breath) and the symptoms may elicit catastrophic thoughts and interpretations (i.e., fears about heart health, pain, safety, mortality). As a result, individuals with CHD may avoid experiences and activities (i.e., exercise, saunas, strong emotions) because the physical sensations produced during these activities may be frightening or uncomfortable. Furthermore, anxiety and depression in general may be elevated among adults with CHD than compared to individuals without the disease. An improved understanding of the relationship between negative emotions and physical health is needed, and further research is necessary to investigate the relationship between these factors in CHD samples. We examined the associations between emotions of anxiety and depression and physical pain in a sample of 106 adults with CHD (mean age=45.04 years,  $SD=16.08$ ). The participants were assessed via self-report measures of anxiety, depression, and physical pain. Data analyses indicate a statistically significant correlation between anxiety and physical pain ( $p=.006$ ), and depression and physical pain ( $p<.001$ ). These results suggest that in the CHD population, those with higher levels of pain tend to also have higher levels of anxiety and depression.



## Archaeology of Death in the 21st century

Amber C. Schroeder, Francesseca Nelson

Faculty Mentor: Anne Austin, PhD

How will changing practices surrounding body treatments of the dead in the United States impact St. Louis? What are some of the new movements taking place within human society today? How do these new ideas impact how the body is treated after death? Are people gaining or losing the respect for the dead? Throughout time the dead has been treated various ways. Some more elaborate than others. Sometimes the grave size and the grave goods found within the grave does not always reflect the status of the individual. In the future would we see more of these humble grave sites? How will society deal with the lack of space for the dead while dealing with the continuous need for space for the living? This ever lacking space will always burden humanity as the population grows. Wars were fought over space way before the industrial revolution and the population boom that came after, how will humanity keep up? Does humanity today only choose cremation for economic reasons? With cremation not only is there the loss of bones but the knowledge that could be learned as well. With the increase in interest of eco-burials how will this affect the formal disposal areas exclusively for burial? It is easy to plant a tree but once the tree is there nothing else can be buried on top or too close since trees have their own need for a radius of ground around them needed to survive. To best answer these questions I will first, put together an inventory of the artifacts found in the Second Catholic Cemetery (1820-1850). Secondly, I will document grave markers in the Memorial Park cemetery (1920-present). I will analyze the change of trends throughout the century and evaluate the trends we see today in the way the dead are treated. I will quantify the practicality of these new and upcoming practices and assess potential complications. By using actual field work and researching the topics relevant to this study this research will help us find a better understanding of what lies ahead for modern funerary practices.

## Effects of Aggression on Self-Agency

Jamie Sims, Ashley Kampschroeder

Faculty Mentor: Carissa Philippi, PhD

Previous research has provided evidence for an indirect relationship between self-control and aggression. Several other past studies investigated the effects of loud noise on aggressive behavior, and how aggression moderates the relationship between ostracism and self-control. However, to our knowledge no studies have yet examined how aggression affects self-agency across stressful and non-stressful situations. This study aims to expand upon past indirect research by focusing on how aggression impacts the perception of self-agency using a novel computer task, the self-agency box task. Twenty-eight undergraduate students completed an experiment where they were randomly assigned to take part in a stress task or non-stress task, immediately followed by the completion of a self-agency box task. Note, the effects of stress were not considered in the present study. Participants were placed into either the high aggression or low aggression groups based on a median split of scores on the aggression questionnaire. We hypothesize that participants in the high aggression group will report significantly lower ratings of control on the self-agency box task

than the low aggression group.

## The Effect of Noise on Synchronization in Hindmarsh-Rose Neurons

Harper E. Smith

Faculty Mentor: Sonya Bahar, PhD

Neurons exhibit intrinsic variability. This can be demonstrated simply by repeatedly applying the same stimulus to the same neuron: a range of responses are possible, especially in cortical sensory neurons. Variability is also observed in vitro for cortical circuits, implying intrinsic synaptic stochasticity. Many physical explanations for these phenomena exist, including Brownian motion, non-uniform connectivity distributions, and the probabilistic nature of synaptic release. In non-linear systems, extrinsic and possibly intrinsic noise can increase the signal-to-noise ratio of a periodic stimulus (stochastic resonance), but intrinsic noise may also serve to suppress or distort a signal. For example, it has been argued that Autism Spectrum Disorder (ASD) individuals may detect stimuli differently due to the strength of endogenous neural noise. Furthermore, the effect of local noise on global noise in ASD has been debated. Based on these considerations, custom MATLAB code was written to investigate the effect of noise on the activity of a ring of  $N$  coupled Hindmarsh-Rose neurons. Each neuron is assigned a pseudo-random starting state defined by three dynamical variables: a voltage variable, a recovery variable, and a slow-varying current (which represents ion transfer efficiency). Several control parameters are kept constant at biologically realistic values: the membrane input current, an adaptation parameter, a bursting/spiking switch, and an adaptation parameter. The neurons are coupled in the distance-dependent Kuramoto scheme, which grants the highest coupling strength to a neuron's nearest neighbors. After including an additive Gaussian white noise to the voltage, the time-evolution of phase differences between pairs of neurons is calculated based on their voltage time series. These are used to determine the stochastic phase synchronization index between all pairs of neurons. Hence quantitative comparison of synchronization between groups of neurons is possible. As the amplitude of the Gaussian white noise is varied, the stochastic phase synchronization index for each neuron and its neighbors is compared to the average global synchronization index in order to determine the effect of noise on local and global synchronization.

## The Rise of the Nones: Parental, Political, and Educational Values in America's Growing Secular Population

Julia Sperry

Faculty Mentor: David Kimball, PhD

One of the largest demographic shifts the United States is facing right now is sometimes colloquially referred to as the "rise of the nones." Americans are less and less likely to affiliate themselves with any religion at all, choosing to select "none" on surveys and censuses. Since secular individuals have never made up a significant amount of the U.S. population until now, we have never had to look at this group with the keen eye we are called to today.

To better come to understand this demographic group, their attitudes and values, this work analyzes their responses to



childhood obedience, childhood autonomy, levels of education and political ideology. What do these secular individuals value as parents? How do these values differ from their religious counterparts? As a group, how do they span the political ideological spectrum? How educated are they?

Results suggest the levels of education vary little and that while the political leanings of the nones tend to be more liberal than their religious counterparts, all groups maintain a consistent level of moderate voters. It is in parental views however, that we find the largest divergence. Nones are significantly more likely to value a child's ability to think for themselves, and half as likely to value obedience. Interestingly, strength of religious affiliation does not appear to moderate the relationship between the group differences on obedience and ability to think for themselves. It is simply whether or not an individual affiliated with a religion that we see these differences occur, not how strongly they adhere to their religious principles.

These findings shed light on the growing demographic of secular Americans, how they learn, vote, live and raise their children. As almost a quarter of the U.S. identify as "none" the attitudes and values that they hold will become more and more prevalent. If we are to create relevant, effective policy over the coming years, paying attention to the dynamics that surround this secular demographic is going to be both wise and necessary.

## Reconstructing the buried identities of the individuals from the Second Catholic Cemetery of St. Louis

Courtney Taylor, Claire McCroary

Faculty Mentor: Anne Austin, PhD

St. Louis' Second Catholic Cemetery had long been forgotten about until 1991 when it was re-exposed by accident. With the names of the individuals buried there lost to time, how can the analysis of burial goods help reconstruct their identities? This poster identifies trends in the burial goods found in the coffins at the Second Catholic Cemetery with original research. We establish broad identities based on gender and age. We then explore using outliers to nuance how St. Louisans in the 19th century could express their identities in death. We analyzed the inventory of artifacts found at the Second Catholic Cemetery in conjunction with biological data from skeletons recovered in the coffins. Our analysis of grave good distributions identifies overall trends of the burial goods as well as historical information on goods for the mid 1800's to shed light on who these individuals were in life. The results of this research help us to comprehend St. Louis' citizens identities in the early 19th century through the thorough analysis of the burial goods.

## Fear the Madness: The Damaging Effect of Gothic Literature on Mental Health Stigma

Alyssa Ward

Faculty Mentor: Kim Baldus, PhD

Gothic literature contributes to the creation of a dangerous trope about psychological illness. The genre links mental illness to criminality or evil through film, litera-

ture, and other media. This trope of the evil and insane protagonist or antagonist creates a negative portrayal of mental illness, and those who suffer from these illnesses. This trope allows for the misrepresentation of several mental illnesses, including schizophrenia. Several scholars have looked more broadly at popular culture's influence on mental health stigma, but I aim to explore the influence of Gothic on the negative stigma surrounding mental health since there is limited research that looks at the Gothic genre's role in this association. It is important to examine how Gothic authors link madness and evil so that those in the mental health field can better understand why people fear mental illness, and why they may be hesitant to seek help. This study examines the Gothic genre's representations of one specific mental illness, schizophrenia. Drawing on an understanding of the illness from psychologists' definition in the DSM-V, as well as critical scholarship on schizophrenia, this study combines those perspectives with analysis of popular Gothic texts' portrayals of schizophrenic characters. Specifically, I will be looking at *The Strange Case of Dr. Jekyll and Mr. Hyde* by Robert Louis Stevenson, along with "The Yellow Wallpaper" by Charlotte Perkins Gilman and the films *Shutter Island* and *The Devil Inside*. These Gothic works are important to examine because they misrepresent schizophrenia by framing it as defined by drugs, demonic possession, or other mental illnesses.

## Lizards, Warming Climate and Body Temperature: How Hot is Too Hot?

Ari Zakroff

Faculty Mentor: Godfrey Bourne, PhD, Thomas Meuser, PhD, Dan Gerth

It is evident cold-blooded animals (ectotherms) native to equatorial environments are adapted to relatively stable temperatures, and so may be threatened with extinction by even slight increases in temperature due to in global warming. This expectation prompted my project, whose goal was to record the first year of neotropical collared lizard (*Tropidurus hispidus*) body and air temperatures for a multiyear study to examine the effects of global warming. Daylight hours were divided into experimental treatments such that four 3-hour time blocks, starting at 6:00AM and ending at 6:00PM, were created. I recorded body temperatures using an infrared thermometer on lizards with defined territories at Karanambu Lodge in the north Rupununi savannas of Guyana. Ambient air temperatures were also recorded with a digital thermometer. These data were used to test the following: if mobile ectotherms can elevate and lower body temperatures by behavioral means, then body temperatures of the lizards will significantly differ from ambient temperatures. This generated three predictions (i) body temperatures will always differ from ambient (air) temperatures, (ii) lizard temperatures will be relatively stable throughout the day, and (iii) positive correlations between ambient and body temperatures should be evident. For the most part, these predictions held true. However, because lizards maintained temperatures lower than ambient for most of the time blocks, the lizards appear to be shade seeking, consequently reducing activity time available for foraging, mate seeking, and territorial defense. Overall, my results suggest rising global temperatures could already be having serious negative effects on *T. hispidus*.

# Oral Presentations

## **The Flowers That Fall**

Christopher W. Aiken

Faculty Mentor: Scott Peterson, PhD

In my work, "The Flowers That Fall", I researched the Victorian flower language that occurred in the mid 1800s. After discussing how the Victorians sent messages using flowers, I then looked at modern day usage of floriography. I discuss how using floriography today can actually help improve communication.

## **Children's Perception of Coping Efficacy and Symptoms Following Trauma**

Claudia Campbell

Faculty Mentor: Rachel Wamser-Nanney, PhD

Childhood trauma can have a profound impact on children's subsequent functioning, including posttraumatic stress symptoms (PTSS) and other difficulties. In the aftermath of trauma children often implement a variety of coping strategies in an attempt to reduce their distress. Furthermore, while evidence suggests that active coping is likely more beneficial in the long-term, some children may utilize more passive strategies, perhaps perceiving the methods to be effective in the present. The associations between children's perceived efficacy of their coping strategies and their level of difficulties are unclear. The current study analyzed the relationship between children's reported perceived efficacy of passive and active coping strategies and their current PTSS, internalizing, and externalizing symptoms among 174 treatment-seeking children (6-18;  $M = 9.91$ ,  $SD = 3.44$ ). In contrast with expectations, efficacy of active or passive coping was not associated with either child- or parent-reported PTSS, internalizing, or externalizing symptoms. Perceived efficacy of coping strategies may be unrelated to current levels of difficulties, or children may have limited insight regarding the efficacy of their coping strategies. A greater understanding of children's perceptions regarding coping effectiveness may be useful in promoting adaptive long-term functioning following trauma.

## **Uncharted, Unraided, Understood: An Argument Against Neo-Colonialist Narratives in Video Games Featuring Archaeologist Tropes**

Dana Channell

Faculty Mentor: Jennifer Nolan, PhD

The Tomb Raider and Uncharted video game series both feature main characters which fall under the archaeologist trope. Recent public discourse around the games have criticized them for their apparent neo-colonialism and the supposed imperialist agenda of their adventurers, who

exploit native populations for cultural treasures and glittering trinkets. Media portrayal of archaeology has long been under scrutiny since before the birth of Indiana Jones, and archaeologists today are well aware that these portrayals are incredibly inaccurate to the ethical standards of modern practices. However, this project aims to present an optimistic counter-argument using anthropological research methods, proposing instead that game mechanics and the main narratives of these game series serve the purpose of presenting an enlightenment journey for the main character. Rather than falling into the trap of exploitation and cultural imperialism, the characters in Tomb Raider and Uncharted instead subvert these tropes through native contact and interaction, ultimately leaving empty-handed, but with respect for the cultural treasures they initially sought. By directing the actions of these characters, players also experience this enlightenment. The games thus become catalysts for contemplating the ethics of looting and cultural theft, both forms of neo-imperialism.

Original research in this project will include surveys of game perception, semi-structured interviews with players and game developers (including writers and composers), and a statistical analysis of perceived themes within each game. Current academic discourse on video game studies, cultural imperialism, ethics in archaeology, ethnomusicology and other related subjects will be put in conversation with this original research. The presented product of this research will highlight the player experience of a single game from each franchise, acting as a case study. Captured through transcript and screenshots, these abridged narratives will be presented with commentary and discussion on research and findings, focusing on player perception of narrative through survey results and analysis of game mechanics which explicitly subvert notions of neo-colonialism.

## **An Examination of Museum Disaster Readiness in St. Louis**

Dana Channell, Samantha Barnett, Charles Blanton, Erin Long, Maja Leonoudakis, Andrew Quon

Faculty Mentor: Susan Brownell, PhD

Many museums and cultural institutions are at risk when it comes to natural disasters, which are becoming more frequent with climate change. Those in the St. Louis area are particularly prone to damage from earthquakes, flooding, and tornadoes. This risk necessitates having plans in place for protection and salvage of museum collections, which often include tangible cultural heritage and resources in the form of artifacts and historic documents. The goal of this project is to determine disaster readiness and recovery preparedness of museums and cultural institutions in the St. Louis area. Preliminary research to determine natural disaster risk types and levels in St. Louis has been conducted in addition to surveys of museum disaster readiness, to identify St. Louis area museums without an adequate plan in place. What are the disaster readiness and mitigation plans of artifacts in museum collections for natural disasters in the Saint Louis area, and how can current disaster plans improve?

Research methods include survey questionnaires sent to contacts at St. Louis area museums and cultural institu-

tions for determining disaster readiness, observation of current plans through visits to St. Louis area institutions, and photographic documentation of these existing plans. In addition, semi-structured interviews have been conducted with museum conservators, curators, and directors, as well as environmental experts including a seismologist. Information on natural disaster risk types and levels in the St. Louis area has been compiled with data collected from surveys and mapped to illustrate museum risk levels, and necessity for disaster preparedness plans. All of the above methods will inform a proposal for natural disaster preparedness and potential salvage. St. Louis' cultural heritage is preserved day-to-day within the collections of its museums and other cultural institutions, but this presents only the first step in protecting these cultural materials. They must also be protected from natural disasters in the short and long term through disaster preparedness plans that show commitment to preserving cultural heritage for future generations.

### **Something in the Water? Residents' Awareness of Coldwater Creek Radiation and its Health Risks**

Chandler EuBank, Courtney Taylor, Tori Dieckman, Jasmine Gibbs, Caitlin Adams, Edis Niksic, Theodore Hopkins, Harlee Custer

Faculty Mentor: Susan Brownell, PhD

Coldwater Creek, located in North St. Louis county, is the site of radioactive contamination due to the processing of uranium ore that occurred there from 1942-1957 by the Mallinckrodt Chemical Works company. The influence of this environmental disaster has already affected (but is not limited to) the following: peoples' health, water quality, the environmental equilibrium, and soil contamination. The residents who live in this contaminated area experience a myriad of serious health complications. The purpose of this research is to evaluate the awareness of residents regarding the potential risks associated with living in this area, where they receive that information, how accurate that information is, and to determine to what extent they are able to deal with the situation (e.g. are people able financially to leave the area, or access adequate health care). This research group is divided into three teams that will utilize different research methods based on the expertise of the researchers: 1) surveying and interviewing of residents living in the area and reviewing social media, 2) photographs, mapping via ArcGIS (including data from a Geiger counter), and digital research, and 3) environmental research such as physical and species surveying and specimen collection. In combination, these diverse research methods will demonstrate how the radioactive waste in the creek is affecting the people and the environment in North County. This information could potentially be utilized in educational programs and community outreach efforts in the affected area.

### **Private Blockchains for Internet of Things Control and Organizational Management**

Austin Hester, Jianyu Wang, Jianli Pan, PhD

Faculty Mentor: Jianli Pan, PhD

Blockchain has emerged as a decentralized, distributed ledger for security and privacy. Utilizing the blockchain for managing private networks gives system administrators access to more detailed logs and a more autonomous mechanism for access control. Our work involves private network blockchains, whereas more research has been done on public blockchains. These private blockchains are more secure and less susceptible to attack than their public counterparts due to the need for privately obtained keys and explicit peer additions. Our research focuses on how private blockchains can be used to aid an organization in managing devices on its network. We use a private version of the Ethereum blockchain in our demonstrations. The Ethereum Virtual Machine (EVM) executes and enforces smart contracts deployed on the blockchain. Smart contracts act as user accounts on the network, but they are managed by code rather than a human user. Smart contracts can trigger real world activities using event listeners. We can utilize these event listeners in order to open new network connections, access IP camera streams, control physical motors, and interact with Internet of Things (IoT) devices. We have devised demonstrations of the power of smart contracts and event listeners. One example is the use of an Edge Server (ES) to process video streaming from a RaspberryPi3 (RPi3) on the same network. Using smart contracts, each separate instance of a connection to the Edge Server is logged on the blockchain database and confirmed as legitimate based on the concept of Proof of Stake (PoS).

Keywords – Blockchain, Ethereum, Smart Contract, Internet of Things (IoT), Private, Control, Proof of Stake (PoS)

### **More Than Just *Judith*: An Exploration of Giorgio Vasari's 1554 Figural Work**

Rihannah Klein-Fleeman

Faculty Mentor: Maureen Quigley, PhD, Susan Waller, PhD

Over the centuries, few stories featuring female figures from the Christian Bible have fascinated artists and historians as much as the figure of Judith, the pious widow of Bethulia, who, through cunning and valor, defeated the invading Assyrian General Holofernes and saved the people of Israel. Though this story is considered apocryphal by a predominant number of Christian authorities, and so excluded from most common copies of the Bible, the story remains resonant as a source of artistic inspiration – with images of Judith herself preserved as popular objects of analysis and interpretation for art historians the world over. In continuing with such a storied academic tradition, so too will this paper seek to delve into some of the many nuances present in the figural work of art entitled *Judith and Holofernes*, created by the Italian Renaissance artist Giorgio Vasari circa 1554. Specifically, this paper will argue that the iconographical elements of Vasari's work are clearly connected to other images of the female heroic figure dated to around the same time as Vasari's *Judith* – and that these elements are further connected to images of the goddess Aphrodite/Venus. In seeking to explore these topics, this paper will touch upon Vasari's choice to depict his *Judith* in an actively masculine way. (A technique traditionally reserved for male heroes.) Conjecture will also be given as to the possible reasons Vasari might have had in choosing to portray *Judith* in such a way, and the meaning he sought to represent in doing so.

## Not "Haha" Funny: Exploring Comics' Dissonant Potential in Satrapi's *Persepolis* and Shaw's *Bottomless Belly Button*

Zachary J. Lee

Faculty Mentor: Kim Baldus, PhD

Scott McCloud, in his seminal work *Understanding Comics*, writes about a continuum of realism and abstraction in comics drawings. The more realistic an avatar's drawing is, the harder it is to see oneself reflected in the narrative; the more abstract the drawing, the easier this recognition becomes. This principle helps explain why cartoons and comics are so popular, especially the closer a drawing is to the ubiquitous smiley face. In recent decades, however, comics artists have been more adept in subverting this continuum. When comics writer-artists employ cartoon styles to portray more personal – and often darker – topics, they create dissonance between a comic's style and its content while inviting readers to take part in these narratives. Marjane Satrapi and Dash Shaw, among myriad others, have displayed how comics writer-artists can take on these more serious stories in comics form. Satrapi's work *Persepolis* (2000) details her upbringing in Iran and Europe during the Islamic Revolution, and Shaw's work *Bottomless Belly Button* (2008) discusses the loneliness, alienation, and turmoil a family experiences when its parents divorce. This paper, with the help of McCloud's *Understanding Comics* and the work of other prominent comics theorists, analyzes the specific formal conventions Satrapi and Shaw utilize, such as pacing, the use of panels and gutters, and artistic symbolism. This analysis explores how these writer-artists create dissonance when using a form originally reserved for simple, comical stories as a medium for their decidedly less-comical narratives, and how simpler avatars and art styles allow these writer-artists to amplify their narratives to a wider audience.

## How Community Gardens Impact Underserved Areas: A Comparison of Yeatman-Liddell Middle School and Flance Early Learning Center

Amber McDaniel, Nate Oatis, Kathleen Rice, Sabrina Romine

Faculty Mentor: Susan Brownell, PhD

The purpose of this project is to establish what gardening tools and other resources are necessary to implement and maintain a community vegetable garden in an underserved community and what benefits community gardens have for populations living within food deserts. A food desert is an area with low income and low accessibility to diverse food resources such as fresh vegetables, fruits, and whole grains. This lack of dietary diversity is associated with higher risk of heart disease, low cognitive ability, and obesity. Low food access and low income have also been linked to noticeably lower achievement scores across science, English, and math in the classroom. Research done on community gardens shows that community gardens in food deserts can improve overall access to healthy food options and human health in general. Based on our research, we propose a model of a community vegetable garden to aid in the revitalization of a previously established, yet nonfunctioning garden at Yeatman-Liddell Middle School in St. Louis city.

We analyzed the factors that go into making a productive and successful community garden by comparing the functioning, high-yielding community vegetable garden at Flance Early Learning Center, also located within a food desert in St. Louis city, to the non-functioning, non-yielding vegetable garden at Yeatman-Liddell Middle School. Our research methods will include reviews of the literature about food deserts and the impact of an unbalanced diet on children and their ability to learn, mapping of the available food resources (E.g., supermarkets and grocery stores) within the area using Google maps, photographs of foods in four of the mapped food resources to determine types of produce available near Yeatman-Liddell garden space, a census data review of the comparable populations, and interviews with relevant participants. Through the interviews and observation we will also describe the food culture in the areas. We believe this research will not only help reduce the negative effects experienced by these students and their families due to the nature of living within a food desert, but will also help provide an engaging and educational experience for the students participating.

## Traveling Shamrocks

Hannah McInnis

Faculty Mentor: Peter Acsay, PhD

The Great Famine chased Irish immigrants from their homeland in to a new land with strange customs. There, they faced the important decision: assimilate to blend in with these fresh-faced neighbors, or hold on to the culture from the homeland? In their established Little Irelands, the immigrants found themselves preserving their culture in poems, prose, and play writing. They may be in a place of strange customs, but the descendants of bardic satire did not lose the ability to find themselves in their age old traditions of storytelling. From Mr. Dooley, to Yeats, to John Wallace Crawford – the Irish Identity has continued to stand out against the mold.

## The Personal is Political on Facebook: Women Autobiographers and the Internet Age

Lauren O'Donnell

Faculty Mentor: Geri Friedline

At its best, social media challenges the relegation of women to the domestic sphere. As the Internet blurs the distinction between private and public selves, women's active participation in social media is an ongoing defiance of our traditional obscurity in the literary canon. This project asserts that Facebook status updates are memoirs-in-progress, and that social media has led to a renaissance in raw and intimate life writing. Women's unprecedented access to instant self-publication is doubtlessly revolutionary. Meanwhile, readers have been forced to consider the paradox of virtual new sincerity and the curatorial role of the author as Twitter's iconic 140 character limit has reshaped the way we conceptualize the form of emergent autobiographical literature.

I've collected fifteen contemporary autobiographies by women at the intersection of creative nonfiction and Twitter, and I've written my own. My writing is primarily con-

cerned with Midwestern suburbia, pop culture, girlhood and tomboyhood, postmodernism, and contemporary Americana; stylistically, it mirrors the segmented inundation of social media in a sprawling, chaotic flood of commentary and daily minutiae. This presentation will include a reading of my work alongside an analysis of the field.

## Mapping the Neurobiology Behind the Impulsive Brain

Marco Pipoly

Faculty Mentor: Deanna Barch, PhD

Impulsivity is thought to be strongly associated with such pathologies as suicidality, attention deficit disorders, and substance use. A heightened time frame of risk for the onset of these pathologies is adolescence. However, no major study has yet sought to examine how individual variation in pre-adolescent brain structure might predict emergent patterns of impulsiveness. In order to understand how pathology develops later in life, it is vital that a study first establish the degree to which the brain contributes to impulsiveness at a pre-adolescent stage. A multi-site longitudinal effort focused on mapping the developing brain, the Adolescent Brain and Cognitive Development (ABCD) study, has utilized advancements in science to understand the neurobiological contributions to the emergence of pathology. This project proposes leveraging three behavioral measures of impulsivity and structural magnetic resonance imaging metrics acquired by ABCD. The current project develops a research approach to consider impulsivity as a multidimensional construct with unique physiological profiles. Within ABCD, impulsivity measures will represent: impulsive choice, measured as the discounting of delayed rewards; impulsive action, measured as the degree to which one responds to a prepotent motor response; and trait impulsivity, measured through self-report questionnaires. Structural areas of interest will focus on previously highlighted subregions of the frontal cortex, striatum, and anterior temporal lobe. In order to understand whether each impulsive measure has a distinct anatomical profile, white matter integrity and grey matter volume will be used in a correlative analysis with behavioral indexes. These measures are known to reflect the structural composition of the brain and the degree of connectedness among areas. Findings are expected to provide transformative insight on the relationship between individual variation in the pre-adolescent brain and separate facets of impulsivity.

## A Multifaceted Exploration of the Factors Associated with Youth's Risk of Experiencing Violent Victimization

Brian E. Rainey

Faculty Mentor: TJ Taylor, PhD

Violent victimization of youth presents a serious social problem. Several examinations have been proffered (e.g., the code of the street, fear of victimization, perceived risk of victimization, and unstructured socializing), but seldom have all of these concepts been examined in a unified study. The present study examines the interrelationships between these concepts using survey data collected from a sample of more than 3,000 middle school students attending St. Louis County public schools. Results indicate that perceived risk, un-

structured socializing, and the street code are salient predictors of the likelihood that youth will experience serious violent victimization while fear of victimization is less salient once other factors are taken into account. This study provides both theoretical and policy implications to help scholars and criminal justice practitioners better understand the mechanisms that affect the risk of violent victimization in order to devise more effective treatments and programs to reduce the likelihood that youth will experience serious violent victimization.

## Housing Rights and Domestic Violence

Sabrina Romine

Faculty Mentor: Patti Wright, PhD

My presentation, completed in cooperation with the St. Louis Metropolitan Equal Housing and Opportunity Council, is focused on the current housing protections for victims and survivors of domestic violence in Missouri and nearby areas. Information about the housing protections, employment protections, recent amendments, and the future of Housing Rights is covered. The importance of protective rights for marginalized communities is discussed and the impact of current state laws is mentioned. I presented the materials to several groups of women living in St. Louis area shelters. Some of their responses are included. Explanation of the utility of this information and the necessity for workshops to be held across the city, state, and country is given.

## Fahrenheit 451 and the Modern World: An Analysis of Technological Barriers and What Sets Us Apart

Anna M. Schmid

Faculty Mentor: Kim Baldus, PhD

Dystopian fiction has always served as a lens to evaluate and understand the current state of society. The recent rise in dystopian fiction on television and in print signals an increasing anxiety with issues like technology. These anxieties surrounding technology make the study of dystopian fiction, such as the novel *Fahrenheit 451*, more important now than ever before in order to understand the ramifications of our current technological climate and discern where our society has overcome the technological barriers that are presented in *Fahrenheit 451*.

*Fahrenheit 451* features a future dystopian society where reading and having books is illegal and firemen burn books. Recent scholarship has analyzed the novel using philosophical approaches, such as those by James Filler and Hassan Abootalebi. Filler uses Plato to examine the concept of knowledge throughout the novel, while Abootalebi uses philosophers Jean Baudrillard and Michel Foucault to analyze the issue of television and surveillance. Although such scholars discuss technology in *Fahrenheit 451*, they have not connected those issues to modern society or considered how technology actually creates the censorship depicted in the novel.

This paper will discuss how the technology present in *Fahrenheit 451* has created communication barriers and diminished happiness. These barriers parallel modern technologies, such as social media and cell phones, that have

(continued) also created barriers to our social functions and well being. This paper will analyze the technology presented throughout the novel as well as real-world examples where social media and cell phones have created barriers to our society's communication. Furthermore, this paper will answer how our current society has been able to surpass some of these technological barriers whereas the society in *Fahrenheit 451* was unable to do so. This approach to *Fahrenheit 451* can improve our awareness of technology's implications in today's world and therefore help strengthen our communications as we become more technologically advanced.

## **Addressing the Increased Fear of Crime in Female College Students Through Campus Communications**

Eva M. Selph

Faculty Mentor: Kim Baldus, PhD

Through multiple attempts to discover the difference between fear in men and women, research has persistently shown that women experience higher fear of crime than men. These results create a challenge for universities attempting to educate students about crime and sexual harassment on campus. As prior research has indicated, attempts to decrease fear in women can easily be compromised if the wording of the message is not presented clearly. This study examines how universities should assess ways which communications with their students may be inadvertently contributing to this increased fear of crime in their female student population. This research assesses the communications by the University of Missouri-St. Louis to inform and educate its students through campus-wide emails in the event of a crime and through the requirement that all students watch a sexual harassment video. Campus-wide emails on reports of crimes, as mandated by the Clery Act, do not only include information of the act, location, and time of the incident, but also additional information on safety precautions. Additionally, incoming students are required to watch a sexual harassment video comprised of true events of rape and sexual harassment. While the university attempts to decrease fear in students, it may be unintentionally adding to the fear of its students—especially females—by showing videos that can trigger unwanted thoughts. The university attempts to include helpful tips within pamphlets and at the end of the video that use phrases such as “don't walk alone at night” and “be aware of your surroundings.” These strategies may indirectly suggest that wrongdoings are committed by strangers when, realistically, acts of crime and sexual misconduct are usually committed by someone known to the victim. To determine if the university's attempts to decrease fear of crime are inadvertently increasing it, interviews with two campus supervisors were conducted, pamphlets regarding sexual misconduct and crime on campus were reviewed, and the mandatory sexual harassment video related to the Title IX act was assessed. By identifying improper strategies that heighten female fear, changes can be made to better the education of universities nationwide.

Key Words: Clery Act, Title IV act

## **Fueling the Fire: How the East St. Louis Daily Journal Sparked the 1917 East St. Louis Race Riot**

Michelle Seymour

Faculty Mentor: Peter Acsay, PhD

This paper examines causes leading to the July 2, 1917 race riot in East St. Louis, Illinois, specifically the influence of the local newspaper, the East St. Louis Daily Journal. It analyzes the newspaper's use of language regarding African Americans living in East St. Louis, as well as the types of stories published, and where the stories appeared in the paper compared to those of similar behavior of white residents. I also researched the St. Louis Post Dispatch during the same weeks and months leading up to the riot, which provided context and contrast in tone and placement of stories regarding African Americans. In addition, this paper examines stories that may have made white East St. Louisans anxious of the future, such as stories of strikes, the war in Europe the United States had recently entered, and housing shortages. Specifically analyzed were the contribution and influence of the owner, manager, and editor of the Daily Journal, James W. Kirk. He demonstrated a deep distrust of Germans and German sympathizers, African Americans, and anyone he did not see as a true patriot. Overall, the research determined the Daily Journal sowed unrest, fear, and distrust in white readers which, combined with justification of mob rule and violence against oppressors and invaders, directly incited the massacre on July 2, 1917.

## **Awakening**

Ella Zakroff

Faculty Mentor: Ramsey Wise, PhD

In the early 1990s, in a Victorian style mansion, two teenage sisters (Sarah and Lizzy) are babysitting their younger, pre-teen cousins. To relieve their frustrations and boredom, the sisters decide to play a few harmless pranks on their gullible cousins, namely, into believing their creaky, eerie old house is haunted. As Sarah and Lizzy debate on the best area to set up their "haunting", they remember the one door that is always locked in their home, a door they were told to leave alone because that part of the house is falling apart and is unsafe. But, by opening the door, they will awaken something darker than they could possibly imagine.

Despite faint feelings of dread, the sisters begin their pranks, all of which go off without a hitch. As unplanned, frightening events begin to escalate, the sisters reluctantly debate whether to accept the reality of their situation and turn to the younger kids for help (due to their easy acceptance of the supernatural and willingness to face it). But when one trick goes a little too far (and the entity is fully revealed), Sarah and Emily are forced to confess everything to David and Emily.

The group will find help in the form of a seemingly creepy old lady who lives next door named Rosemary. Rosemary knows the secrets of the house as she was childhood friends with a little boy who lived and died there long before the sisters' family moved in. The boy, Thomas, loved practical jokes, but was seldom able to play them as he spent most of his time isolated and alone, much like the sisters. His anger has turned him into a malevolent, vengeful spirit who delights in causing pain for his own amusement. The children must work together to find a way to lay the angry spirit to rest once and for all. The final climatic battle between Thomas and the group occurs and he is defeated. Ultimately, the sisters have learned how much they need loved ones in their lives and realize that those people need them just as much.



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