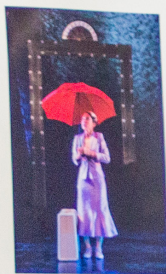


23.

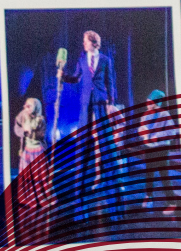
24.



A Need for Tinkers:  
An Ostranenie Approach to Prop Design for  
Nita Marie Faulkner, Advisor: Dr. Joe



"Why are umbrellas so pleasing to watch on the stage?  
The illusion of being outside and under the eternal sky  
is created by a real object. A metaphor of limitlessness  
is created by the very real limit of an actual umbrella  
indoors...  
a real thing creates a world of illusory things"  
- Sarah Ruhl



# Chapman University Student Research Day

Spring Session Abstract Volume

Wednesday, May 9, 2018



CHAPMAN  
UNIVERSITY

Center For Undergraduate Excellence

# Message from the Director

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Greetings and welcome to the Spring 2018 Chapman University Student Research Day! This year's CUSRD is special for us as it marks the first time we have held the event under our new name and office, The Center for Undergraduate Excellence. We envision this Center to be the first stop and the central hub for students to learn about and engage in undergraduate research and creativity activity; and to discover the wide range of prestigious external scholarships available.

Chapman University Student Research Day celebrates and showcases the research and creative projects conducted by Chapman students across the entire campus. Today's posters and student presenters reflect the diversity of academic and creative disciplines thriving within the Chapman community. The wealth of inquiry represented today is expansive, with student posters exploring topics from quantum physics; the study of the politics of bumper stickers; the ecological implications of single-use water bottles; the exploration of artist spaces in Los Angeles; the effect of irradiation on 'Granny Smith' apples, to an analysis of identity development.

Please visit the student's posters to experience the compelling research and creative activity our students are engaged in here at Chapman. Chapman University Student Research Day is education in action, a true example that Chapman students are pursuing anything imaginable!

Thanks for coming and enjoy the day!

Dr. Julye Bidmead

Director of the Center for Undergraduate Excellence at Chapman University

# Keynote Speaker – Anissa Hassouna

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Upon receiving her bachelor's degree in Economics and Political Science from Cairo University, Anissa Hassouna went on to begin her political career serving as a diplomat for the Egyptian Ministry of Foreign Affairs, and later the League of Arab States. No stranger to the public eye, Hassouna has lectured at both the Diplomatic Institute at the Ministry of Foreign Affairs and the Banking Institute of the Central Bank of Egypt. Later holding the position of Director General of International Economic Forum, as well as the Assistant General Manager at Egypt Iran Development Bank, the trajectory of Hassouna's career exudes a passion to serve her country.

Before appointment to the Egyptian Parliament, Hassouna acted as Executive Director of (Sir) Magdi Yacoub Heart Foundation, an organization dedicated to offering the highest quality medical care to Egypt's less privileged. Her unwavering dedication to the well-being of the Egyptian people is further exemplified by her previous position as political advisor to the Chairman of the Information Decision Support Centre, Egyptian Cabinet.

Beyond her accomplished political career, Hassouna is an exemplary role model for young women, as the first woman to be elected on the Board of the Egyptian Council for Foreign Affairs where she held the position of Treasurer, Secretary General, and currently, the Vice-Chair of the Council. Considering her extensive participation in the Egyptian political scene, it is no surprise that Hassouna was named on the annual list of the renowned Arabian Business CEO Middle East magazine as one of the "World's 100 Most Powerful Arab Women" in 2014.

Hassouna's work extends beyond diplomacy and parliamentary service, as she regularly writes on public affairs and is a member of numerous organizations promoting citizenship and equal rights. A member of the Executive Council of the 1995 Nobel Prize winning "Pugwash Conferences on Science and World Affairs," Global Women, USA, 1000 Women for Peace, Switzerland, and the Consultative Board of the "Arab Thought Foundation," Beirut, Lebanon, Hassouna is a prime example of global citizenry.

Additionally, Hassouna is an unparalleled advocate for gender equality as the Founder Chairperson of Enlightened Egypt Foundation which promotes the values of citizenship and gender equal rights. Her service includes her role of founding member of the Think Tank for Arab Women, the Forum for Arab Citizenship in Transition Democracies, the Front for Protecting the Freedom of Creativity and Expression, and the Arab International Women's Forum in London, UK.

# Acknowledgements

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The Center for Undergraduate Excellence gratefully acknowledge the following individuals and program for their support:

- Dr. Glenn Pfeiffer, Provost
- Crean College of Health & Behavioral Sciences
- Schmid College of Science and Technology
- Wilkinson College of Arts, Humanities, and Social Sciences

## Keynote Speaker Co-Sponsors:

Cross Cultural Center	Leatherby Library
Diversity and Inclusion	Student Engagement

# Schedule of Events

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<b>9:30 – 11:30 am</b>	<b>Student Poster Session I</b>	<b>Sandhu Conference Center</b>
<b>12:00 – 1:30 pm</b>	<b>Lunch Keynote Speaker</b> <i>Anissa Hassouna</i> <i>RSVP required</i>	<b>Bush Conference Center</b> <i>Beckman Hall, 404</i>
<b>2:00 – 4:00 pm</b>	<b>Student Poster Session II</b>	<b>Sandhu Conference Center</b>

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# Graduate Students

## Communication Studies

### **1. Overcoming the Barriers of Cyberinfrastructure Development**

**Presenter(s):** Jamie McCain, Alexa Ferrante, and Pat Phornthanavarsit

**Advisor(s):** Dr. Kerk Kee

Over the past decade, the National Science Foundation has been funding the development of cyberinfrastructure (CI) to drive and promote large-scale research. CI consists of a new generation of multiple dimensions including material objects, behavioral practices, and philosophical ideologies (Kee, 2015). Through the lens of the Diffusion of Innovations Theory (Rogers, 2003) and utilizing the Grounded Theory Approach (Corbin & Strauss, 1990), over 40 interviews were analyzed taken from the National Science Foundation (NSF) funded Virtual Organizations as Sociotechnical Systems (VOSS) Project. From analyzing these interviews, major themes were drawn to explain the role of networks on the adoption of CI and the developmental barriers that inhibit CI.

## Computational Science

### **2. Spinal Neural-Network Control of Cardiac Electrophysiology**

**Presenter(s):** Elnaz Lashgari

**Advisor(s):** Dr. Uri Maoz

Cardiovascular disease is the leading cause of death in the US and worldwide. In particular, sudden cardiac death due to ventricular arrhythmias counts for about 12% of all deaths globally. While traditional diagnostics and treatments focused on the heart and arteries, more recent approaches have been increasingly focusing on the role of the nervous system in controlling the heart. Here, we analyze the influence of spinal-cord activity on cardiac arrhythmia. In particular, we are interested in the neural circuit involving the dorsal horn (DH) and intermediolateral nucleus (IML) of the spinal cord and the heart. We hypothesize that the circuit runs from the heart to the DH, then from DH to IML, and finally from IML back to the heart. While it is thought that proper modulation of the neural activity in this circuit could help ameliorate or even prevent cardiac arrhythmia, little is known about the structure and function of this circuit. Our collaborators at UCLA have been using a pig model to investigate the response of neurons in the DH and IML to mechanical and pharmacological perturbations of the arteries leading to the heart. We have been analyzing correlations between neuronal activities in DH and IML to test whether the DH drives the IML, as hypothesized above. While this work is ongoing, we have been preparing machine-learning methods to allow us—in the longer term—to predict whether cardiac arrhythmia will occur after the above mechanical and pharmacological perturbations.

# Interdisciplinary

### **3. Manifold Learning and Electromyography**

**Presenter(s):** Elnaz Lashgari

**Advisor(s):** Dr. Uri Maoz

Improving the accuracy of synthesized human motion is an ongoing challenge in various disciplines such as neuroscience, physiology, biomechanics, brain-computer interface, and robotics. Electromyography (EMG) measures muscular contraction, as part of neuromuscular activation. It can be used in physical therapy, rehabilitation, and kinesiology for cortical neural implants, human motion reconstruction, and interfacing with robots. Thus, finding an effective way to decode neuromuscular activation for accurate modeling and recognition of motion patterns will help convert kinematic variables to smooth motion for robots. Complex, non-linear, high-dimensional data sets—such as neuromuscular activity—are hard to study in their original form. Researchers, therefore, often strive to find meaningful low-dimensional representations of the data that maintain important aspects of the original, high-dimensional data. Principal Component Analysis and Multidimensional Scaling are linear dimensionality reduction algorithms that have proved limited because they ignore the structure of the manifold in which the data is embedded and cannot well handle nonlinearities in EMG signals. Here we used the nonlinear dimensionality-reduction technique of Manifold Learning to analyze and visualize EMG of 5 upper limb muscles in a dataset of 12 human subjects. In each of a total of 3,936 trials, the participants were cued to reach for the object, grasp it with the thumb and index finger, lift it and hold it for a couple of seconds, put it back on the support surface, release it, and, lastly, return the hand to a designated rest position. Object weights were 165, 330, or 660 g and the object surface was coated with sandpaper, suede, or silk to vary friction. We have been comparing the efficiency of linear and non-linear techniques as preprocessing stages before classification of weights and surface materials. Preliminary results suggest that the extreme object weights (165 and 660 g) can be best-classified following preprocessing by a nonlinear dimensionality reduction algorithm named Laplacian.

# English

### **4. Oscar Wilde: Child of the Classics**

**Presenter(s):** Peggy Wood

**Advisor(s):** Dr. Myron Yeager

Oscar Wilde challenged society through his writings. Whether it be in his commentary on aesthetics and fashion or his fictional works, his character and his characters have criticized society's strict standards on lifestyle and morality by creating his own rules or turning the strict ways of the age into something dark or something laughable. He does so with the express purpose of swaying people's minds toward his own ideology. This ideology is heavily influenced by ancient Greek mythology, which is evidenced by his numerous references to their documentation as well as the similarities of his characters to mythic counterparts in classic tales, a prime example being that of Dorian from The Picture of Dorian Gray to Narcissus from Ovid's Metamorphosis. Through an examination of The Picture of Dorian Gray and mythology, particularly Narcissus's tale, I aim to prove that the relationship between myth and novel is more than a simple frame or the inclusion of knowledgeable references within the work. Rather, I believe



that the inclusion of such references and the similarities Wilde creates between his characters and Greek mythic counterparts is intended to lead readers toward a particular lesson or moral. This lesson is a warning against the rising hubris one finds in the Victorian Era. As Julius Caesar is quoted, "It's only hubris if I fail," and that surely fits the urban gothic tale of Dorian Gray. This paper will prove that The Picture of Dorian Gray is another work in Wilde's long list of titles which addresses an issue he sees in the society that might be correctable. This issue is that of the rising hubris found in urban settings of Victorian England.

## **Food Science**

### **5. Physiological Changes Induced by Irradiation Does Not Affect Sensory Properties of Early and Late- Harvested Gala Apples**

**Presenter(s):** Beatrice Michael, Anderson Melo, and Paul Olabode

**Advisor(s):** Dr. Anuradha Prakash

The maturity level, particularly of climacteric fruit can affect its response to irradiation. This study evaluated the impact of phytosanitary irradiation on the physiological response of early- and late harvested 'Gala' apples (*Malus domestica*). 'Gala' apples were harvested three weeks apart and treated with x-ray irradiation at 310 Gy and 1000 Gy. Apples were stored at 0-1°C for one week, then subsequently placed under ambient temperature for 9 days to simulate export from California to Mexico. Respiration rate, ethylene production, firmness, total soluble solids, titratable acidity and electrolyte leakage were measured at three-time points; immediately after irradiation, after 7 days of cold storage and following another 9 days at ambient temperature. Frozen tissue was tested for malondialdehyde, ACC oxidase, sugars, organic acids and polyphenol oxidase. Physiologically, differences between early and late harvested apples were small. Early harvested apples produced higher ethylene, and exhibited lower electrolyte leakage and higher TA compared to late harvested apples. But there were no other significant quality differences between early and late harvested apple. Irradiation had a strong suppressive effect on ethylene production and ACC Oxidase while a transient increase in respiration rate was observed. Irradiation at 1000 Gy impacted electrolyte leakage. All other attributes, including firmness, showed no impact of irradiation. In a discriminative tetrad test, 63% of consumers could not distinguish between non-irradiated and irradiated apples. Our results indicate that while 'Gala' apples exhibit a physiological response to irradiation; sensory quality is not affected. Keywords: ethylene, maturity, phytosanitary, respiration, x-ray

### **6. Optimization of DNA-Based Methods to Identify Elasmobranch Species in Shark Cartilage Pills**

**Presenter(s):** Rowena J. Zahn and Anthony J. Silva

**Advisor(s):** Dr. Rosalee S. Hellberg

Shark cartilage is used in dietary supplements due to its potential nutraceutical benefits, including enhanced wound repair and anti-inflammatory effects. With growing concern over exploitation of global elasmobranch populations, research is needed to improve methods for species identification in shark cartilage pills. The objective of this study was to optimize DNA extraction and amplification techniques to identify species in shark cartilage pills using DNA mini-barcoding. A total of 22 shark cartilage products underwent DNA extraction in duplicate using the DNeasy Blood and Tissue Kit (Qiagen). The impact of a

clean-up step following DNA extraction was analyzed by comparing DNA purity values and polymerase chain reaction (PCR) amplification success rates among samples. Next, five different primer sets were compared based on amplification success with the 22 shark cartilage products tested in duplicate and the three most successful primer sets were used to perform DNA sequencing. The results of DNA extraction showed a slight advantage in using the additional clean-up step as compared to DNA extraction alone. When the results for all three primer sets were combined, 18 of the 22 shark cartilage products could be identified to the species or genus level for an overall success rate of 81.8%. Overall, the optimized methodology developed in this study increased the success rate for identification of elasmobranchs in cartilage products from 36.3% in a previous study to 81.8% in the current study. These optimized DNA-based techniques can contribute to the enforcement of labeling regulations and anti-trafficking laws by enabling the identification of mislabeled and/or vulnerable species in shark cartilage pills.

Keywords: DNA extraction, species identification, DNA barcoding

## **Physics**

### **7. Topological Barriers for Charged Quantum Systems**

**Presenter(s):** Ismael Paiva

**Advisor(s):** Dr. Yakir Aharonov, Dr. Jeff Tollaksen, Dr. Mordecai Waegell

Cavities are devices commonly used in many quantum experiments. According to its dimensions, a cavity has discrete modes associated to it. The state of quantum systems inside it is given by linear combinations of those modes. Since those states vanish in any region outside the cavity they are called bound states. The objective of this work is to investigate the possibility of the existence of topological bound states, i.e., states that stay confined in a certain region of space but not by the physical presence of walls. First, we study how solenoids create energetic barriers for charged quantum systems and how in principle they can, when combined to a cavity, create the topological bound states we are looking for. Finally, we show computational results. Our results are not conclusive yet, but they provide evidence for at least trapped quantum states.

## **Psychology**

### **8. Does People's General Opinion of Autonomous Vehicles Influence How They Perceive the Quality of Driving?**

**Presenter(s):** Jungsu Pak, Chela Willey, and Nida Akram

**Advisor(s):** Dr. Uri Maoz

Numerous vehicles with some self-driving abilities now occupy the roads, and the number and level of autonomy of these vehicles are growing. Such autonomous vehicles (AV) are at the spotlight of both academia and industry. While many studies focus on algorithmic perfection and optimization of the operating artificial intelligence, less is known about how humans view such AVs. In the current study, we examined how participants viewed driving quality, safety, and other measures for a series of video clips depicting a car driving through city streets and interacting with other cars and pedestrians. Our video is a three-dimensional, internal reconstruction of actual footage of an AV driving in a city, occasionally with human intervention. The video clips were presented in random order, and participants answered

questionnaires about the quality of driving in each video. Questionnaires were presented before, in-between, and after a series of video clips to detect any change in participants' opinion about AVs following the clips. Preliminary results suggest that subjects' opinion about quality of driving was lower when they believed an AV was driving than when they believed a human was driving.

## **9. Making Ethical Dilemmas More Real Using Immersive Virtual Reality**

**Presenter(s):** Jungsu Pak

**Advisor(s):** Dr. Uri Maoz

A common moral dilemma that has been extensively studied in philosophy, psychology, and neuroscience is the "trolley problem". The participant in that experiment is asked to imagine a scenario like the following: "You are walking near railway tracks and suddenly see an out-of-control trolley hurtling towards five workers on the tracks. The only way to save those workers is to pull the lever that is near you and switch the trolley to another track, where one worker is working. Would you pull the lever and reroute the trolley to that one person in order to save other five?" This scenario has been criticized for being artificial and hypothetical. What is more, previous research suggests that what people say they would do is not always what they do when faced with the situation in practice.

We want to test how subjects would respond to this dilemma under more ecological settings. We have therefore constructed a virtual-reality (VR) driving simulator using the game engine Unity3D. As hardware, it relies on a VR headset in conjunction with a motorized chair. The chair's motors offer 3 degrees of freedom (pitch, yaw, and roll) to simulate the acceleration of the vehicle, resulting in a more realistic vestibular experience to avoid simulator sickness. The simulator further mimics the actual driving experience using a motorized, vibrating wheel; pedals, and a shift gear. The virtual environment contains traffic and pedestrians, allowing us to test moral scenarios, like the trolley problem, under more realistic settings.

## **10. Timing the Onset of Deliberate and Arbitrary Choices**

**Presenter(s):** Alice (Sook Mun) Wong

**Advisor(s):** Dr. Uri Maoz

Libet (1985) showed that information about action onset exists in the brain before participants report the conscious intention to act. This led to claims that all decisions are made unconsciously, challenging concepts of free will and moral responsibility. In that paradigm, perceived intention onset and movement onset were timed (W and M time respectively). Importantly, the decisions they studied were arbitrary and had little consequence. Here we investigated the extent to which W and M time generalize to deliberate decisions.

In our study, participants first tasted 10 different drinks and rated their palatability. They were then shown two drinks, asked to make a choice between them, and report W and M times. The experiment included three decision types in a counterbalanced, blocked design. In deliberate-decision blocks, participants drank their chosen drink from a randomly selected trial at the end of the block to motivate deliberation. In arbitrary-different blocks, participants were again shown two different drinks. However, in order to motivate non-deliberate (arbitrary) choice, participants drank both drinks from the randomly selected trial at the end of each block, regardless of their choice. In arbitrary-same blocks, participants were shown the same drink twice, motivating arbitrary selection through a different mechanism. Randomly interleaved memory catch trials throughout the experiment ensured subjects paid attention.

Participants consistently reported earlier W times in deliberate decisions compared to both arbitrary types. M time was reported earliest for deliberate decisions, incrementally later for arbitrary-different, and later still for arbitrary-same decisions. This challenges the generalizability of the Libet results from arbitrary to deliberate decisions. In a planned EEG follow up study, we will be varying the amount of time participants are given to make their deliberate and arbitrary decisions and asking for decision confidence ratings in order to study the correlates and effects of confidence in decision making.

## Undergraduate Students

### Art

#### **11. Rococo: An Artistic and Social Movement**

**Presenter(s):** Caitlin Teoman

**Advisor(s):** Dr. Wendy Salmond

In 1715, when Louis XIV died, the French court whom he had ordered to live in Versailles, relocated to Paris. French Rococo was an art movement inspired by the new social attitudes of the elite classes after Versailles. The aristocracy celebrated in grand fashion for the relinquishing of their strict courtly duties under Louis VIX. They built mansions called Hotels consisting of three apartments, the most important being the social apartment. Here the lines between social status blurred briefly and Rococo society blossomed. Any self-respecting noble built a Salon into his social apartment, and the resulting salon culture of frivolity and open conversation made for a gay and free aristocracy. Furniture and interior design played along with the ideas of open social interaction and fun. The whimsical theology of the Rococo era changed every aspect of life and art. Painting and sculpture took on a fantastical fluidity as well as impressive ornamentation. After 1715, French society utilized art as a tool. This thesis will study the Rococo social eccentricities led by the aristocracy following their artistic freedom. I will focus on the aristocracy's utilization of interior and furniture design which was key in the development of social attitudes and a true Rococo noble.

#### **12. Curatorial Practices in Los Angeles: The Difference between Blue Chip & Artist-run Spaces**

**Presenter(s):** Melissa Gutierrez

**Advisor(s):** Dr. Wendy Salmond

In the art world, to curate is to select artworks to include in an exhibition and make sure they create a sense of flow within the exhibition space and are relevant to the idea or purpose behind the show. The main objective of commercial art galleries is to sell the art displayed, especially if it's by a prestigious Blue Chip gallery, where the priority is the market. However, newer artist run spaces in Los Angeles are exploring new ways of curating that focus on the aesthetics of the show. This paper will focus on acknowledging the difference between curatorial practices in 'Blue Chip' galleries and those in artist run spaces. There's no question that the Los Angeles art scene is undergoing a shift in curatorial practices, however it's important to note where the shift occurs and why.

### **13. Conceptually Incomplete: Exploring the Art of John Baldessari**

**Presenter(s):** Loralynn Ingreso

**Advisor(s):** Dr. Wendy Salmond

In this research project I discuss two series of work by conceptual artist John Baldessari (1931-). The text-paintings in the Goya Series (1997) and Emoji Series (2017) are representative of a common semiotic theme in the artist's oeuvre: the issue of communication through text and imagery, as neither serve as completely adequate forms of communication. The joining of the two (text and image) in Baldessari's Goya Series highlights this inadequacy just as Francisco Goya, the artist whose Disasters of War series (1810-1820) influenced Baldessari's, does in his work. Communication and interpretation are further explored in the later Emoji Series which focuses on the importance of context and how cultural tendencies can affect the interpretation and meaning of images. Baldessari's paintings also play with reality, truth, and existence, creating a new genre that I call "conceptual surrealism." Additionally, I discuss Baldessari's concern for the idea of complete art and the potential lack of completeness in his art. Baldessari's work is "complete" yet vague enough to leave a space of interpretation that the viewer can make for him- or herself. Levels of interpretation are unique to an individual and can be never-ending. I argue that Baldessari's work is, consequentially, never complete.

### **14. Egon Schiele in Search of Connection**

**Presenter(s):** Ellen Joo

**Advisor(s):** Dr. Wendy Salmond

Egon Schiele's Self-Seer and other double portraits from 1910 to 1915 present an ambiguous identity standing next to the artist. Through these double portraits, Schiele emphasizes the impact of eye contact and its power to express emotions. He makes a direct connection between himself and death through the figures' expressions, modernizing the Renaissance death motifs of the Danse Macabre and of Death and the Maiden. His double portraits serve as mementos mori and an attempt to hold onto life as long as possible. Schiele was in constant battle with the idea of death after the passing of his father, who rejected his art work, when Schiele was only fourteen years old. In Schiele's double portraits, such as The Blind series, the manner of the eyes change, becoming an indication of the artist's state of mind. The direct eye contact that Schiele makes with his viewers bring them in and is his way of reaching out for human connection. Schiele usually stood in front of mirrors when creating a self-portrait, making his double self-portraits even more interesting. Are his double self-portraits a representation of how Schiele sees himself, or do they reflect the constant presence of Death that shadows Schiele? What does "blindness" have to do with The Blind series? I argue that the double self-portraits are Schiele's attempt to explore and create a bridge between the dichotomies of life and death, between the connection and disconnection he feels with society, and between his private and public spheres while feeling as if he is in the dark. This project explores what blindness meant to Schiele and the significance of the eyes in his works. While other art historians have looked at the theme of death and the duality of Schiele's double portraits, I will be looking at this work through the lens of the eyes in the double-portrait paintings.

### **15. Modes of Interpretation: Revisiting Velazquez's Las Meninas**

**Presenter(s):** Maguy Michelman

**Advisor(s):** Dr. Wendy Salmond

Diego Velazquez's monumental royal portrait, *Las Meninas* (1656), is likely one of the most discussed works of art in the entire western canon. Over time, as tastes and methodologies within the art historical field change, so too does the reading of works of art. This thesis investigates how interpretive approaches to the painting have changed over time, and how methodology in turn has changed the way the work is read and analyzed. Sources will be presented in a chronological fashion to construct a historiographical study of *Las Meninas* and the literature surrounding it grouped loosely into schools of thought. This thesis sets out to analyze the subtle differences in approach that lead to differing conclusions and to map out a progression in the literature surrounding *Las Meninas*; my research ultimately demonstrates that "meaning" may not be intrinsic to a work of art, but rather it is dependent on the mindset and approach of the author/viewer.

### **16. Art x Accessibility: Unpacking the Elitism of the Art World**

**Presenter(s):** Harrison Wallace

**Advisor(s):** Dr. Wendy Salmond

The goal of my research is to examine the widespread assumption that art history is elitist and inaccessible to those without the proper training and background in the subject. To many outside the art world, art is seen as stuffy, exclusive, and only accessible to those with the background and training to understand it. It is my belief that this broad misunderstanding has led to a general lack of interest in art by our society, and that this, by extension, has real-world complications ranging from the underfunding of arts programs in schools and museums to a disinterest among young professionals in pursuing a career in the art world. My research will examine several initiatives in the art world aimed at making art more accessible to the common person through various avenues like free online videos, career training programs and broader cultural initiatives on a national scale. I will attempt to qualify the elite nature of the art world, and draw links between new approaches to talking about art and the implications it has on our larger visual culture. Additionally, I will attempt to offer solutions for those looking to change the way we think about art on an individual level, and ways for people to see art as an exciting and dynamic part of everyday life.

## **Biochemistry and Molecular Biology**

### **17. Gain-of-Function p53 Mutations in Field Cancerization of Histologically Normal Prostate**

#### **Tissues**

**Presenter(s):** Emily Cauble

**Advisor(s):** Dr. Marco Bisoffi

Field cancerization is defined as the presence of mutations present at the genetic level in otherwise histologically normal tissues. This research project involves determining the frequency and level of expression of mutant gain-of-function p53 in tumor adjacent histologically normal human prostate prostatectomies and biopsies. We will determine if p53 R175H and p53 R273H are frequent mutations in histologically normal and field cancerous prostate tissues. We will also explore whether there is a correlation between the occurrence of the mutations with clinicopathological parameters (i.e. stage and grade) and the occurrence of the mutations between biopsies and prostatectomies. This project will be

completed using independent tissue cohorts and conducting various p53 assays. There is a lack of knowledge and understanding behind the frequency of the p53 gain-of-function mutations that occur in histologically normal and field cancerous prostate tissues. Preliminary data previously conducted showed the occurrence of p53 R175H and p53 R273H in 9 out of 11 (82%) and in 8 out of 11 (73%) of histologically normal tissues resected 1cm from the visible margin of prostatic adenocarcinomas. In addition, 70% of tumor tissues were positive for p53 R175H and 90% of the tumor tissues were positive for p53 R273H. The analyses of these p53 gain-of-function mutations will pertain to both the diagnosis and prognosis of early stage prostate cancer. The most important outcome that could arise based off of this research is the correlation between the frequency and the level of expression of p53 gain-of-function mutations and clinicopathologic parameters. The potential applicability to prognosis can be further explored by analyzing the discrimination between stage II and III and the use of the Gleason grade  $\leq 7$  and  $\geq 7$ .

### **18. Investigating the Effects of Caffeine and Pomegranate Juice Extract on Pancreatic Cancer Cell Inhibition via Regulation of Sonic Hedgehog Pathway**

**Presenter(s):** Un Yong (Kevin) Chung

**Advisor(s):** Dr. Melissa Rowland-Goldsmith

Pancreatic cancer is the fourth leading cause of cancer death in the US. With its ability to metastasize and its resistance to chemotherapy and radiation, it is an especially difficult form of cancer to treat. Thus, the new direction of cancer research has been using naturally-derived botanicals that may have chemopreventative properties. Previous research in our laboratory showed that the combination of Pomegranate Juice Extract (PJE) and caffeine inhibited pancreatic cancer cell invasion. Our lab has shown that PJE alone increased the E-cadherin protein which is known to be involved in promoting cell-cell adhesion. Low levels of E cadherin leads to a lower survival rate for these patients. The Sonic Hedgehog (SHH) Pathway has been shown to downregulate E cadherin. Over-expression of genes involved in this pathway have been observed in a variety of cancers, including pancreatic cancer. It was hypothesized that the combination treatment would work to inhibit some of the genes coding for proteins that are part of the SHH Pathway. By blocking this pathway, it would lead to up-regulation of E cadherin. Expression levels of several genes of the SHH Pathway (SHH, Patched-1 [PTCH-1], Smoothed [SMO] and GLI-2) as well as that of E cadherin were analyzed using qRT-PCR. Preliminary results show that SHH is up-regulated and that PTCH-1 is not regulated. The data thus far is inconclusive for SMO and GLI-2. Although trends show that E cadherin is up-regulated by treatment, results are still inconclusive. Further research needs to be conducted in order to find significant trends in data and to identify the mechanism of action by which the combination is able to inhibit pancreatic cancer cell growth.

### **19. Combining Proteasome Inhibition and Caspase Inhibitor for the Purpose of Ovarian Tumor Cell Rescue and Immunotherapeutic Advancement of Dendritic Cell Based Therapies**

**Presenter(s):** Claire Godenzi

**Advisor(s):** Dr. Cedric Owens

The destruction of proteins via the ubiquitin-proteasome system is a multistep process that plays role in maintaining cellular homeostasis. When combined with cancer immunotherapy, proteasome inhibition in cancer cells has demonstrated significant benefit to humans as resultant cellular alterations stimulate potent anti-tumor effects. As proteasome inhibition threatens cell proliferation, blocking caspase-mediated apoptosis may maintain tumor cell viability for enhanced tumor cell immunogenicity. Combining

caspase and proteasome inhibition by the drug Bortezomib for the purpose immunotherapeutic advancement has not been fully delineated in previous literature. Within this study, bortezomib-treated tumor cell rescue by the pan caspase inhibitor Z-VAD-FMK was explored in order to address the efficacy of the approach. Preliminary in-vitro cultures of commercial ovarian cancer cell line OV-CAR-3 indicated a working concentration of bortezomib and Z-VAD-FMK caspase inhibitor of 0.1 - 1.0 nM/mL and 20  $\mu$ M/mL, respectively. Immunohistochemistry analysis indicated Bortezomib treatment alone increased intracellular protein content relative to the control, however decreased content with increasing concentration. Use of Annexin V for flow cytometric detection of apoptosis indicated concurrent exposure to 20  $\mu$ M/mL Z-VAD-FMK and 0.1, 0.5 and 1.0 nM/mL bortezomib maintained cancer cell viability and apoptosis, across all bortezomib concentrations. Markedly, concurrent exposure to Z-VAD-FMK and bortezomib also promoted a dose dependent increase in intracellular protein content. Taken together, the results of provide a significant rationale for combination of proteasome and caspase inhibition for the rescue of cells from proteasome inhibitor-induced apoptosis. Thus, the combination of bortezomib and Z-VAD-FMK shows great promise as a novel therapeutic addition to dendritic cell based vaccine formulation for the treatment of ovarian cancer.

## **20. Investigating the Interaction of Calmodulin with the HIV-1 Matrix Protein Peptide**

**Presenter(s):** Jason Groegler

**Advisor(s):** Dr. Jerry LaRue, Dr. Zeynep Ataman, and Dr. Cedric Owens

Human immunodeficiency virus type-1 (HIV-1) has caused over 35 million deaths, since 1981, and is the main cause of acquired immune deficiency syndrome (AIDS), which has led to over 34 billion dollars, globally, being invested in HIV-1 research per year. HIV-1 hinders the immune system's ability to fight infections by attacking T cells, which are a central component of the immune system. HIV-1 infects T cells and uses their components to rapidly replicate, and can make about 10 billion copies of itself per day. The Gag protein of HIV-1 is crucial for the virus's replication, and utilizes its essential matrix protein (MA) component to target the plasma membrane so that budding and assembly of the virus can occur. Calmodulin (CaM) is a calcium sensor with over 100 targets in eukaryotic cells. It is composed of a N-terminal and C-terminal domain, each of which can bind up to two calcium ions, however CaM is able to function in the absence of calcium. MA forms two alpha helices upon binding to CaM, as opposed to one, making it a unique CaM-binding target with interactions that are not fully understood. MA consists of a myristoyl group which assists in targeting the plasma membrane, and it has been suggested that when CaM binds to MA, the myristoyl group of MA becomes exposed and is then anchored to the membrane. Previous studies have shown that calcium levels may affect the binding affinity between CaM and MA. Through fluorescence spectroscopy the binding of CaM to the matrix protein peptide in the presence and absence of calcium was studied.

## **21. Calmodulin's Interaction with $\alpha$ -Synuclein as it Relates to Parkinson's Disease Patients**

**Presenter(s):** Joeli Reim

**Advisor(s):** Dr. Jerry LaRue, Dr. Zeynep Ataman, and Dr. Cedric Owens

60,000 people in one year diagnosed, 1 million in the United States, and over 10 million worldwide have Parkinson's disease, which is the 2nd most common neurodegenerative disease. Parkinson's is usually prevalent in males than women and starts around 60 years old, but can appear in patients as young as 40. The most notable symptom of Parkinson's disease is the degeneration of neuronal control, especially in the hands. It is estimated that over \$156 million is spent on researching this disease and about \$25 billion



is spent on direct and indirect costs for diagnosed patients each year. Aside from managing the financial burdens of Parkinson's disease, patients also acquire physical burdens. Most patients develop tremors and have difficulties writing, eating, and can degenerate quickly to being wheelchair dependent. The degenerative disease has been previously attributed to the lack of the neurotransmitter, dopamine, in the patient's brain; however recent biochemical studies have surfaced other biomolecular mechanisms that attribute to Parkinson's disease, such as the interaction between Calmodulin and  $\alpha$ -Synuclein. Calmodulin (CaM) is a normal protein found in the brain of healthy patients and is an intermediate calcium binding messenger with over 100 different targets in eukaryotic cells.  $\alpha$ -Synuclein is a protein found mainly at the ends of neurons in the presynaptic terminals in healthy patients, suggesting involvement with neurotransmitter signaling, however the exact function of  $\alpha$ -Synuclein is still being investigated. Recent studies have shown  $\alpha$ -Synuclein and CaM interact, resulting in protein aggregation. Calcium binding to CaM enhances this aggregation, which functions as the structural center of Lewy bodies. Lewy bodies are known to develop in cranial nerve cells of Parkinson's disease patients and interrupts neuronal function. By using fluorescence spectroscopy, I will study the interaction between  $\alpha$ -Synuclein and CaM, and explore calcium's role in the interaction that promotes the mental degenerateness of Parkinson's disease patients.

## **22. Computational Analysis of Microgel Particles**

**Presenter(s):** Aly Baughman

**Advisor(s):** Dr. Andrew Lyon and Dr. Molla Islam

Microgels are polymer networks that become swollen in solvent. In order to better understand advanced microgel particle architecture for artificial platelet research microgels can be made in various ways and then analyzed. ULC pNIPAm particles with 5% acrylic acid are microgels with an ultra-low amount of cross linking between branches of polymer. pNIPAm particles with 2% BIS cross linking have a higher amount of cross linking than ULC particles and are known as a "traditional" microgel. By finding a correlation between the interparticle spacing and  $\log \pi$  along with the correlations between particle cage size and  $\log \pi$ , insight can be given into properties of the particle and how it would act in a fibrin matrix, to mimic the environment of a natural platelet. Osmotic pressure control is an approach in the lab used to study ULC and BIS particles at different packing fractions. What we found when comparing the ULC interparticle spacing data with the BIS data using Fast Fourier Transform (FFT) calculation is that the ULC microgels persist as crystals at low and high concentrations, as opposed to the traditional BIS microgels which go through fluid-crystal-glass transitions as expected in a more "normal" fashion, getting jammed together and becoming more immobile as they are compressed. Work in MATLAB will allow for the particle cage size to be found and compared with the FFT results to learn more about how the particles act.

## **23. Swelling Mechanisms: Ionic Effects on Swelling of Mucin Vesicles from Hagfish Slime**

**Presenter(s):** Sara Siwiecki

**Advisor(s):** Dr. Douglas Fudge and Dr. Gaurav Jain

When under stress, Pacific hagfish (*Eptatretus stoutii*) release slime as a defense mechanism to clog the gills of a predator, allowing it to escape. Hagfish slime consists of two main types of secretory products: mucous vesicles from gland mucous cells and thread skeins from gland thread cells. Mucous vesicles expand in seawater to form a complex gel network, although this swelling mechanism is poorly understood. Previous research has suggested that vesicles contain negatively charged mucins that remain

in a condensed state due to their interaction with divalent cations. Our current hypothesis suggests that when vesicles are exposed to seawater,  $\text{Ca}^{2+}$  is exchanged for less-effective shielding ions such as  $\text{Na}^{+}$  and  $\text{Cl}^{-}$ , causing electrostatic repulsion and swelling. We predict that exposing vesicles to high concentrations of divalent ions should cause de-swelling. Therefore, this project aimed to analyze the effects of various ionic solutions on mucin vesicle swelling to better understand the charge and composition of mucin vesicles that cause swelling. Varying concentrations of  $\text{CaCl}_2$ ,  $\text{MgCl}_2$ , sodium citrate, and  $\text{NaCl}$  were exposed to the mucin vesicles using a flow-through assay. Differential interference contrast (DIC) and fluorescence microscopy were used to follow changes in vesicle swelling when exposed to different concentrations of  $\text{CaCl}_2$  and  $\text{MgCl}_2$ . Fold change in area was calculated for each vesicle, where each vesicle was position-locked to individually track vesicle size. We observed that  $\text{CaCl}_2$  and  $\text{MgCl}_2$  both initially caused swelling of vesicles at low concentrations, but then caused shrinking of vesicles at high concentrations. The shrinking effect may be due to crosslinking with negatively charged glycoproteins. Further experimentation with other solutions needs to be performed to determine the mucin vesicle swelling mechanism.

## **Biological Sciences**

### **24. Stabilizing Effects of Trimethylamines in Skein Unraveling of the Pacific Hagfish (*E. stoutii*)**

**Presenter(s):** Marie Starksen and Kashika Singh

**Advisor(s):** Dr. Douglas Fudge and Dr. Gaurav Jain

Hagfish defend themselves by releasing large volumes of gill-clogging slime. The slime consists of two major components: mucus cells and thread bundles. These thread bundles are kept from unraveling via a seawater soluble protein adhesive. Previous analyses revealed that the gland has a high concentration of trimethylamines with kosmotropic, or protein stabilizing properties. The threads are originally packaged into coiled skeins, or balls of thread, which unravel in the presence of seawater due to the dissolution of the glue holding the thread bundles together. We hypothesized that the trimethylamines (TMAO and betaine) have stabilizing effects that inhibit skein unraveling. We investigated slime skeins of the Pacific hagfish to estimate the amount of unraveling in the presence of these stabilizing components. Slime exudate was collected from hagfish and exposed to different concentrations of betaine, TMAO, and a trimethylamine mixture containing salts. The proportion of skeins unraveled was calculated. Our results have shown that there are strong inhibitory effects of both solutes supporting our hypothesis. Researching how these stabilizing kosmotropes affect the skein unraveling will contribute to our understanding of how hagfish produce slime. Comprehending the role of the stabilizing proteins may help with the development of future biotechnological advances.

### **25. Locomotion in Atlantic and Pacific Hagfishes**

**Presenter(s):** Lauren Friend, Stacey Zuppa, and Justin Nako

**Advisor(s):** Dr. Douglas Fudge and Dr. Charlene McCord

Hagfishes are jawless marine craniates that display unique locomotor capabilities by burrowing into the ocean floor and moving through tight spaces. They play a crucial role in benthic ecosystems and utilize their locomotor abilities to prey on invertebrates, avoid predators, and feed on carcasses. However, little is known about hagfish movements. We recorded Pacific hagfish (*Eptatretus stoutii*) locomotor behaviors

using an HD digital video camera to record hagfish movements from a dorsal view through a custom-built plexiglass chamber that mimicked various tunnel widths hagfish may encounter in their natural habitat. We used the computer program Stereomorph to quantitatively analyze the behavioral repertoire of hagfish. Positioning landmarks were plotted at equal distances along the hagfishes' body in every other frame in each video. Using custom R code and the program Tracker, the landmarks were used to calculate full body movements and head and tail wave dynamics. Various yet to be defined gaits were observed. At large channel widths, lateral undulation was observed in which muscular waves traveled along alternate sides of the animal's body and generated swimming forces that propelled it forward. At moderate channel widths, small amplitude full body and site-specific undulations were observed in addition to lateral undulation. In channel widths slightly larger than the diameter of the hagfish, the animals either used the chamber walls to brace themselves and push forward, or rapidly beat their tails at a small amplitude to generate forward propulsion. These results are consistent with research previously conducted on legless amphibians (i.e. caecilians), and accentuates the complexity of hagfish locomotion while moving through narrow tunnels. This research provides insight into the behavior and ecology of hagfish, as well as the evolution and biomechanics of burrowing in elongate animals.

## **26. Anesthetic Induction and Recovery Rates in Pacific Hagfish with Tricaine Methanesulfonate, 2-Phenoxyethanol and Clove Oil (Eugenol)**

**Presenter(s):** Emma Whiteley

**Advisor(s):** Dr. Douglas Fudge and Dr. Charlene McCord

Hagfish (Myxiniiformes) are ancient eel-like and slime-producing marine animals. The unique material properties and deployment mechanism of hagfish slime have implications for use as a valuable biomaterial. In order to explore the slime's potential applications, exudate is collected by electrically stimulating a sedated Hagfish's slime glands. There are a number of anesthetics used on marine animals, however no published studies have examined the use of these anesthetics on hagfish. Three commonly used anesthetics are tricaine methanesulfonate (MS-222), 2-phenoxyethanol (2-PE) and clove oil (eugenol). This research aims to determine the optimal anesthetic agent and anesthetic dosage for reducing induction time (the time required to reach stage V of general anesthesia) and induction variance, while minimizing distress in Pacific hagfish (PHF). Hagfish were considered fully anesthetized when they stopped responding to a caudal fin pinch indicating a complete loss of motor reflex and muscle tone. Anesthesia recovery time, marked by a physical response to a caudal fin pinch, was also documented for each anesthetic agent and dosage. Dose-response curves were generated for clove oil (n=28), 2-PE (n=21) and MS-222 (n=22) anesthetic solutions with concentrations ranging from 50-400mg of anesthetic per 1 L of artificial seawater. The anesthetic solutions were prepared using a standardized mixing protocol to optimize anesthesia induction times. Our results rule out 2-PE as an effective PHF anesthetic mainly because of unpredictable induction times and no clear trend between dosage and induction time, whereas clove oil and MS-222 both present different advantages at their optimal dosage depending on the operational needs of the hagfish handler. Future research will explore the potential effects of anesthetic tolerance and the physiological mechanisms that influence anesthetic uptake and excretion in Pacific hagfish and their relatives.

## **27. Physiological Traits Predict Plant Survival in Herbaceous Coastal Mediterranean Plant**

### **Species**

**Presenter(s):** Megan Blair

**Advisor(s):** Dr. Jennifer Funk

Drought is a leading cause of plant mortality in coastal Mediterranean ecosystems. With increased climate change and the potential for drought in the future, it is important to know which physiological plant traits are correlated with drought survival. The following experiment investigated which physiological traits predict drought survival in herbaceous species in a drydown experiment. Physiological trait data were collected on 18 native California plant species and five invasive plant species grown in potting soil at Chapman University (Orange, CA). Physiological traits included: photosynthetic rates, water use efficiency (WUE), total leaf mass, leaf mass per area (LMA), root mass fraction (RMF), standard root length (SRL), root tissue density (RTD), and leaf nitrogen concentration (N). We deprived plants of water for six weeks, initiating a drought condition, and recorded the number of days until death. Results showed that plants of a greater leaf mass and RLD were the least drought resistant, possibly due to an increased rate of dehydration. Results also showed invasive plant species had the least resistance to drought, suggesting that native plant species have adaptations more beneficial for low-resource environments. Future experiments should investigate the trade-offs between plant size and plant survival in low resource conditions and the effects of low resource environments on native and non-native plant species in coastal Mediterranean ecosystems.

## **28. Importance of Methylo trophic Methanogenesis in Three Northern Minnesota Peatlands**

**Presenter(s):** Emily Hanna

**Advisor(s):** Dr. Cassandra Zalman and Dr. Jason Keller

Peatlands store one-third of the terrestrial soil carbon and release substantial amounts of greenhouse gases, such as carbon dioxide (CO<sub>2</sub>) and methane (CH<sub>4</sub>). In these wetlands, CH<sub>4</sub> is thought to be produced through two dominant microbial processes: acetoclastic and hydrogenotrophic methanogenesis. However, prior research suggests that CH<sub>4</sub> can also be produced from a variety of methylated substrates (i.e., methylo trophic methanogenesis). The process of methylo trophic methanogenesis has been understudied in peatlands but could be a hidden, yet very important, source of CH<sub>4</sub> in these globally significant ecosystems. In order to determine the importance of methylo trophic methanogenesis in northern peatlands, we added <sup>13</sup>C-labelled methylated substrates (methanol, dimethylsulfide, and trimethylamine) to soils (0-25, 25-50, 50-75, 100-150, 150-200 cm depths) from three different peatlands in northern Minnesota. Over the course of anaerobic laboratory incubations, we traced the production of <sup>13</sup>C-CH<sub>4</sub> to quantify the use of the methylated substrates in these soils. In this study, we demonstrated that methylated substrates can be used by peatland methanogens, with methylo trophic methanogenesis occurring in all sites at all depths. Methanol was the favored methylated substrate and was converted to CH<sub>4</sub> in each site at all depths. Trimethylamine was used in only one of the peatlands and the importance of this substrate increased with depth. Dimethylsulfide was not converted to CH<sub>4</sub> in any soil during this experiment. For the first time, we have calculated contributions of methylated substrates to the total CH<sub>4</sub> produced in northern Minnesota peatlands. Methanol contributed up to 10% of the total CH<sub>4</sub> produced at depth, but that the contribution of methylo trophic methanogenesis to overall CH<sub>4</sub> production was minor at shallower (< 200 cm) depths. Ongoing work exploring the in situ concentrations of methylated substrates will help to better describe their importance in CH<sub>4</sub> cycling in northern peatland ecosystems.

## **29. An Investigation into Commercial Shark Products using DNA Barcoding**

**Presenter(s):** Rachel Isaacs

**Advisor(s):** Dr. Rosalee Hellberg

Sharks are particularly vulnerable to overfishing and many are considered protected or endangered. However, the demand for shark products has risen significantly over the years. The objective of this study was to identify species in various commercial shark products and to assess the effectiveness of three different DNA barcoding primer sets. Thirty-five products were collected for this study, including fillets, jerky, soup, and cartilage pills. All products underwent DNA barcoding using two full-length DNA barcode primer sets and one set of mini-barcode primers. Successfully sequenced samples were then analyzed and identified using sequence databases and character-based analysis. When the results of all three primer sets were combined, identifications were obtained for 74.3% of the products. Mini-barcoding resulted in the highest success rate (54.3%) and allowed for a wide range of identification capability. Six of the 26 identified products were found to be mislabeled or potentially mislabeled, including samples of shark cartilage pills, shark jerky, and shark fin soup. Six products contained species listed in the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) Appendices and 23 products contained near-threatened, vulnerable or endangered species according to the International Union for the Conservation of Nature (IUCN) Red List. Overall, this study revealed that a combination of DNA-barcoding primers can be utilized to identify species in a variety of processed shark products and thereby assist with conservation and monitoring efforts.

## **30. Do Nitrogen Fixation Strategies Align with Plant Growth Strategies?**

**Presenter(s):** Nilsha Khurana

**Advisor(s):** Dr. Jennifer Funk

Leguminous plants are remarkable because of their ability to convert atmospheric nitrogen into plant-available forms of this nutrient through symbiotic relationships with microbial partners. This gives legumes a competitive advantage over non-legume plant species in arid and low nutrient environments. Because they are able to assimilate large amounts of nitrogen, legumes differ from non-legume plant species in fundamental leaf trait relationships. For example, high leaf nitrogen content does not translate into high rates of carbon assimilation and growth in some legume species. However, there are three nitrogen fixation strategies used by legumes - obligate, facultative, and over-regulators – and little is known about how these strategies differ in their leaf trait relationships. The purpose of this experiment was to determine the influence of nitrogen fixation strategy on leaf trait relationships. We grew eight herbaceous legume species in a common environment and measured five leaf-level traits: leaf mass per area (LMA), photosynthetic rate (Photo), nitrogen concentration (N), water-use efficiency (WUE), and light-use efficiency (PsiII). We saw that facultative legumes exhibited more optimal behavior than obligate legumes, while the over-regulators were variable in their behavior. In the leaf-trait relationship of Photo and N, we saw that all three strategies functioned similarly biochemically. However, the facultative species were on the high resource acquisition end of the leaf economic spectrum, meaning that they exhibited faster growth. Also, we saw that across species, most relationships among traits showed predictable patterns. For example, leaf N concentration was strongly correlated with photosynthetic rate, but inversely correlated with LMA. Future work should go beyond leaf-level traits to understand how species with different nitrogen fixation strategies differ with respect to root and plant-level physiology.

### **31. Effects of Early-Life Copper Water Exposure on Dendritic Spine Morphology of J20 Mouse Model of Alzheimer's Disease**

**Presenter(s):** Amanda Lac

**Advisor(s):** Dr. Elaine Schwartz

Exposure to environmental copper has been found to increase risk of developing Alzheimer's disease (AD). However, the longitudinal effects of early-life and chronic copper water exposure from copper plumbing on cognitive impairment associated with AD are unknown. Since cognitive impairment is correlated with changes in dendritic spine morphology and loss of dendritic spines, we analyzed dendritic spine morphology on neurons of exposed mice to assess the effects of early-life copper exposure on synaptic degeneration. In this study, wild-type (WT) and transgenic mouse model of AD (J20) mice were treated for 3, 5, or 9 months with either water or environmentally relevant copper water, starting at 1 month old. Mice were then euthanized to collect their brains for Golgi-Cox staining and dendritic spine analysis. Spine density and morphology were analyzed from dendritic spines on pyramidal neurons in the cornu ammonis I (CA1) region and on granule cells in the dentate gyrus (DG) region of the hippocampus, which is the one of the earliest regions in the brain to be affected in AD. At the CA1 region, we observed insignificant modulation in the dendritic spine morphology by copper water exposure at all time-points studied. However, at the DG region, we found significant reduction of percent branched spines by copper water treatment on WT and J20 mice upon 9 months exposure. Our data revealed that early-life and chronic exposure of environmentally relevant copper water to WT and J20 mice significantly reduced the percent branched spines on the granule cells, but not on the pyramidal cells. Such reduction might contribute to cognitive impairment as the number of branched spines is correlated with long-term potentiation, a cellular mechanism of learning and memory.

### **32. Effects of Temperature on Humic Substance Reduction in a Northern Minnesota Peatland**

**Presenter(s):** Jessica Rush and Emily Hanna

**Advisor(s):** Dr. Jason Keller and Dr. Cassandra Zalman

Peatlands store one-third of terrestrial soil carbon and play an important role in the global carbon cycle. In addition, peatlands are responsible for a significant fraction of the global flux of the potent greenhouse gas methane; and, understanding controls of methane flux from peatlands has important implications for the global climate. Recent work suggests that the microbial reduction of humic substances can suppress methane production and may constrain peatland methane flux in response to ongoing climate change. To determine the direct effects of temperature on humic substance reduction, soil cores were collected from a peatland in northern Minnesota as part of the Spruce and Peatland Responses Under Changing Environments (SPRUCE) project. Soils from 10-20, 75-100 and 175-200 cm depths were incubated anaerobically at 5°C or 18°C for 84 days. Humic substance reduction potential (measured as electron shuttling capacity) occurred faster, and methane production occurred earlier at warmer temperatures. The potential for indirect effects of temperature through changes in soil quality were explored in the same peatland in plots which had been experimentally warmed to +0, +2.25, +4.5, +6.75 and +9°C (above ambient conditions). There was no impact of ~2 years of experimental warming on humic substance reduction potential measured in soils incubated at a common temperature (18°C) for 42 days. Additional indirect effects of temperature through changes in water table were investigated in the SPRUCE plots by measuring in situ humic substance reduction through the depth profile. Humic substances were oxidized in soils above the water table and drier conditions in warmer plots increased the potential for humic

substance reduction at the ecosystem scale. Taken together, these experiments suggest that in the short-term, direct effects of warming will diminish the potential for humic substance reduction to suppress methane production and indirectly increase the availability of oxidized humic substances by lowering the water table.

## **Chemistry**

### **33. Phase Behavior of Osmotically Compressed Colloidal Microgel Assemblies Introduction**

**Presenter(s):** Rachel Nguyen

**Advisor(s):** Dr. Andrew Lyon and Dr. Molla R. Islam

We have investigated how synthetic polymer microspheres deviate from classic hard sphere behavior via osmotic stress induced particle packing. Colloidal phase behavior was observed using light microscopy. These studies were inspired by previous research published by Douglas et al. (2017), which demonstrated that tissue scaffolds containing microgel-filled channels permitted significantly increased cell proliferation rates. Our results indicate that soft, ultra-low crosslinked (ULC) microgels crystallize over a broad range of applied stress, which shows that these highly deformable particles are more capable of adapting to and withstanding the restrictive environments encountered within the fibrin tissue scaffolds, as compared to more rigid microgels. Furthermore, the range of pressures examined spans the relevant range of mechanical environments found in biological tissues. This is vital to the eventual translation of these composite matrices to regenerative medicine applications.

### **34. Analytical Determination of Methylamine Concentration in Northern Peatland Porewaters**

**Presenter(s):** Jessica David

**Advisor(s):** Dr. Warren de Bruyn

Methane (CH<sub>4</sub>) is an important greenhouse gas that is released in large quantities by northern peatland ecosystems. There are currently two established methanogenesis pathways; the first is an acetoclastic pathway where acetate splits to yield carbon dioxide and methane and the second is a hydrogenotrophic pathway-carbon dioxide is reduced to methane using hydrogen as an electron donor. There is also some evidence that methane can be produced in these systems via methylotrophic methanogenesis using methanol, methylamines, or dimethylsulfide as a substrate. The goal of this work was to develop analytical methods to measure the levels of methylamines in northern peatland pore waters. A solid phase microextraction (SPME) gas chromatography mass spectrometry (GCMS) method was developed to measure mono, di, and trimethyl amine at the nanomolar level in porewater samples. Samples are acidified in the field to convert all the amine to its more stable protonated form. Nanomolar levels of isotopically labelled internal standards are also added in the field. Back in the laboratory the pH of the samples were adjusted to pH 12 to convert all the amine to its volatile form and amines are extracted from the headspace. The methylamine concentrations were determined from the natural methylamine-internal standard mass ratio. The internal standard accounts for any loss of methyl amine in transit and storage and any instrument drift. Methylamine concentrations were measured at all levels at most sites. There was a higher concentration of monomethylamine at all depths compared to dimethylamine and trimethylamine. Trimethylamine concentrations were higher at higher depths while dimethylamine concentration was found at higher concentrations at higher depths for two samples. Monomethylamine concentrations were varied among the depths.

### **35. Gold Nanoparticles and Microgel Scaffold Analyzed by Raman Spectroscopy**

**Presenter(s):** Alyssa Hardy-Russell and Amy Lam

**Advisor(s):** Dr. Jerry LaRue

Catalysts are essential to create more efficient and selective chemical reactions. In doing so they decrease the amount of energy required for a reaction to occur as well as decrease the amount of pollution created. Hydrogel microparticles (microgels) were used as scaffolds to synthesize gold nanoparticle (AuNP) structures which can act as catalysts due to their plasmon excitations. The AuNPs allow electric field hot spots to be generated which provide energy to catalyze the reactions. The microgels provide control over the electric field hot spots by adjusting the inter particle distance of the AuNPs. Once the electric field hot spots have been tuned the microgels will be etched off through the use of a plasma etcher, leaving the AuNPs to facilitate reactions using the plasmon hot spots. In this research the synthesis of microgels, AuNPs, and AuNP loaded microgels was performed through collaboration with Dean Lyon's Lab. Raman spectroscopy of the microgel and AuNP samples was performed and the plasmon excitation was measured. Surface enhanced Raman spectroscopy (SERS) allows for the molecule under study to be coupled to the localized surface plasmon resonance (LSPR) increasing the Raman activity. In future studies, we will test the plasmon-enhanced reactivity of the microgel-scaffolded AuNP structures with specific reactions, such as CO oxidation, CO hydrogenation, and NxOx formation.

## **Communication Studies**

### **36. Key Steps to Adopting Cyberinfrastructure at Research Universities**

**Presenter(s):** Jack Atkinson, Shaun Chin, and Jennifer Rulon

**Advisor(s):** Dr. Kerk Kee

In growing an advanced cyberinfrastructure (CI) community, there are challenges that research universities will face. In every organization, corporation or university, there are key steps to follow in order to successfully develop new systems, programs, and innovations. In order to investigate that, we collected interviews with CI experts across the US about capacity building that supercomputing centers must note in order to advance CI adoption. More specifically, we explored in this poster the research question— What are the key steps that a supercomputing center must take in order to build capacity for CI adoption at a research university? Based on a grounded theory approach, we analyzed the transcript and concluded that the four key steps to take are espoused mission, strategic personalization, ongoing training, and feedback & evaluation.

## **Computational Science**

### **37. Seeing is Believing**

**Presenter(s):** Riccardo Angiolini, Monique Namsinh, Rita Sachechelashvilli, Rabah Habiss, and Ben Wasserman

**Advisor(s):** Dr. Michael Fahy

Twitter has become one of the leading platforms for information sharing. Such information comes in a variety of different forms and can range from news articles to personal feelings and opinions all the way to memes and pictures. It is important to note that within social media all this information has a direct



effect on those sharing as well as viewing it even if the user is not aware of such. Our project's goal is to not only deliver a fun and dynamic twitter analytics tool that provides useful insight to the user but also to connect it to relevant psychological studies that analyze how the information we interact with online affects our brains. In this project, we classify tweets by examining information derived by the Twitter API. Doing so, we aim to classify tweets based on their textual content and understand the impact that each tweet may have on the human brain over a medium to long period of time. Plenty of scientific studies have been done on this topic, some being the "Mere Exposure Effect", "Groupthink", "Blind Spot Bias", as well as the "Dunning-Kruger Effect" and we plan to incorporate the results of these studies in our project.

### **38. Continuous Quantum Measurement by Using Recurrent Neural Network**

**Presenter(s):** Shiva Barzili

**Advisor(s):** Dr. Justin Dressel

Quantum mechanics allows us to predict the probabilities of experimental measurements given knowledge about the quantum state. This correspondence to probabilities forces the state to change when a measurement result becomes known. These state-collapses from measurement compete with the natural time evolution of the quantum system to produce stochastic quantum state trajectories. Accurately tracking these trajectories is an important problem for quantum computing technology. Specifically, superconducting transmon qubits are kept at temperatures near absolute zero in dilution refrigerators, so are measured through their interaction with microwave fields sent into and out of the fridge. Quadratures of these microwave fields are monitored continuously in time, producing noisy voltages that contain information about the qubits. Tracking state trajectories using these voltages requires the calibration of many parameters, such as qubit energies, resonator linewidths, decoherence timescales, and the collection efficiency. Simplifying the calibration procedure in the laboratory is a problem of considerable interest. Modern machine learning methods like deep neural networks are powerful tools to extract non-trivial correlations in big sets of data, such as the collected voltages. Because of their ability to reproduce and model nonlinear processes, they have found applications in many areas like language translation, image processing, medicine, and finance. Here we explore the use of neural networks for tracking state trajectories when dynamical parameters are not initially known. We demonstrate that a Long Short-Term Memory Recurrent Neural Network can correctly infer the state trajectories of a single qubit without any prior knowledge of quantum mechanics. The experimental data used for training includes the initial state of the qubit, the raw voltage signal obtained from continuous measurement, and the result of a randomly chosen strong final projective measurement for verification. It remains to be seen how well the technique scales to larger systems.

### **39. Chord Distributed Hash Table Implementation**

**Presenter(s):** Austin Bohannon, Amanda Galemno, Samuel Kagan, and Sarah Lasman

**Advisor(s):** Dr. Michael Fahy

Data lookups on the Internet tend to be centralized. From DNS to search engines, reliance on a central authority is built into the backbone of the Web. Centralization has its costs, namely reliance on a single point of failure, which can be expensive to maintain and susceptible to flooding attacks. As such, for certain applications, like file searching or video-game matchmaking, a decentralized approach to data lookups makes sense. One of the main technologies used to decentralize data lookups is the distributed hash table (DHT). The Bittorrent protocol popularized its use with a robust, wide-scale implementation

that remained popular for years. We will implement the Chord DHT protocol in Java as an example and experimental program. The goal will be to learn how DHTs work, including the extent of what they can and cannot do, through a practical implementation. This will involve building a complex, threaded client, using hashes to identify the clients on a network, and developing an application-level protocol so clients can communicate with their peers over the network. This communication will be for joining the network, repairing the network when nodes leave, distributing data amongst the nodes, and finding which node owns a given piece of data. While we will be happy with a complete program, our stretch goals include NAT traversal, security features, and implementing a proof of concept matchmaking service for a multiplayer game using the DHT.

#### **40. Hacking and Exploiting a Website**

**Presenter(s):** Melinda Sherrill, Edgar Delgado, and David Jensen

**Advisor(s):** Dr. Michael Fahy

Let's face it, websites are vulnerable, and in a growing world of technical advancement, they are only becoming weaker. Too often, when developing a web application, security is often backlogged and not recognized as a primary concern. However, what is often not realized is that, whether owned by a small startup or large corporation, internet web-based applications are being attacked daily. In February, 2018, GitHub survived the largest DDoS attack of 1.35 terabits per second[1], and in 2014, a buffer over-read bug in OpenSSL caused 800,000 websites' encryption to be bypassed to access data[2]. Cyber security techniques in preventing attacks are becoming more futile than ever. This project details examples the average hacker would use when trying to exploit a website. Using a web server hosting PHP code, we will attempt to employ various DDoS attacks and record the result in logs. We will also be simulating a hack that utilizes SQL injections to bypass a login page and dump the tables in the database. In addition to breaking login authentication, we will also be demonstrating a password bot that will connect to our webserver and retrieve the admin password. Our goal is to enlighten the novice web-developer and technologically illiterate on possible threats that exist within the hacking realm when dealing with web interfaces. Though our project only represents a cusp of what an amateur hacker could accomplish, our aim is that these exploits will assist in cultivating an awareness on the mild capabilities a few scripts can do break a website.

References:

1 <https://www.wired.com/story/github-ddos-memcached/>

2 <http://heartbleed.com/>

## **Environmental Science and Policy**

#### **41. Effectiveness of Educational Signage on the Recycling Habits of Students**

**Presenter(s):** Jennifer Ascencio

**Advisor(s):** Mackenzie Crigger

Awareness and education helps broaden perspectives to think about and consider what hasn't really been thought about before. By generating awareness, my goal is to have a positive influence on the recycling habits of students by providing educational signage and making the recycling process easier and more accessible to them. Learning and practicing proper recycling habits now will have a long-term positive

impact in their lives and hopefully in the lives of others in their communities. By conducting waste audits for the Davis Apartments, we are able to analyze the recycling habits of students. The initial waste audit was an analysis of the recycling and trash waste before the signage was distributed and without an incentive. The first waste audit showed that 18% of recyclables are not disposed of correctly. The second waste audit was an analysis of the recycling and trash waste after the signage was distributed and paired with an incentive. The second waste audit showed that 17% of recyclables are not disposed of correctly. By conducting these waste audits and adding signage we can create consciousness each time we dispose of something.

#### **42. Recycling in the Residence Life Community**

**Presenter(s):** Brooke Bradford

**Advisor(s):** Mackenzie Crigger

In the past, implementing a successful recycling program in the residence life and first-year communities has proven to be a difficult task. A study conducted in Pralle-Sodaro Hall aimed to measure the impact of placing recycling bins in each individual dorm room. The goal of the bin placement was to encourage the separation of trash and recycling at its source. Prior to this experiment, recycling bins were not consistently available in residence life rooms and only reliably available in communal areas, causing the recycling of smaller items throughout the day to be inconvenient to residents. This project placed smaller recycling bins in the Pralle dorm rooms for residents on the 2nd and 4th floors. It is expected that rooms that have been supplied recycling bins will have a higher rate of recycled objects than rooms without bins. It is also predicted that the rate of improperly recycled objects in the trash will be lower in rooms with recycling bins than rooms without them.

#### **43. Procurement of Furniture in the Residence Halls**

**Presenter(s):** Hailley Coleman

**Advisor(s):** Mackenzie Crigger

This research looks into the procurement of furniture in the Chapman University residence halls. In total, Chapman currently owns over 2,500 bed frames and mattresses, 2,600 desks and chairs, and 2,300 dressers, among hundreds of other pieces. The purpose of this research is to evaluate whether or not there are more sustainable and environmentally friendly options for the procurement of furniture. The research has concluded that there are multiple areas of improvement in the current procurement process. The first is that all future furniture should be purchased from the same company within the same line. Each residence hall has a different finishing on the furniture with the pieces also coming in slight variations of size. As a result, furniture cannot be shared or reused across buildings. By purchasing from the same line each time, furniture will eventually be identical across buildings which will allow for a single storage space that all replacement pieces can come from. The furniture company recommended by the research is Sustainable Furniture Inc. They offer the "Sustainable Service Program" which will remove Chapman's old furniture, reclaim the material, and re-manufacture it to new furniture. Secondly, old carpeting should be replaced using carpet tiles. While there are challenges that come with carpet tiles such as fading, the company Interface has tiling options that would not show signs of fading in the older tiles. While Chapman is certainly improving in terms of sustainability, furniture procurement is one area that has many options for eco-friendly advancement.

#### **44. Sustainable Purchasing Policy**

**Presenter(s):** KC Hoppel

**Advisor(s):** Mackenzie Crigger

Chapman University maintains its commitment to a "campus culture that promotes a sustainable future" in its Sustainability Policy, which was implemented in 2014. However, the University currently has no mechanism to ensure this sustainable decision-making process occurs. One of the surest ways to guarantee this change is to enact a University-wide sustainable purchasing policy that ensures consistency between departments. Institutions benefit from sustainable procurement by receiving more efficient and long-lasting products, protecting and enhancing the local and global environment, supporting innovative technologies, creating a diverse supply chain, and gaining a competitive edge as a leading institution. A few cost-benefit analyses were conducted comparing products and materials currently purchased by the University to more environmentally-preferable alternatives to allow the University to make the most socially-optimal decisions that maximize the net social benefits for the campus and wider society regarding procurement practices. Additionally, campus members including faculty, staff, and students were surveyed to better understand the general attitude toward sustainable procurement on campus and how this support has changed since the last procurement audit took place in 2013. A few recommendations of this chapter of the 2018 Environmental Audit include implementing a sustainable purchasing policy to prioritize environmentally-preferable products when they can be acquired at similar total value (taking into account quality and Life Cycle information) and prioritizing products that are third-party certified.

#### **45. Graduation Regalia Rental System**

**Presenter(s):** Thaovan Nguyen

**Advisor(s):** Mackenzie Crigger

Each year, thousands of students around the United States put on caps and gowns to participate in an approximately 90-minute ceremony where they celebrate the accomplishment of graduating college. Thousands of gowns that are worn by students are then tossed aside and eventually, thrown away. The gowns then make their way to the landfills and remain there for hundreds of years. Landfills are not used to break down waste, only to store them. As the human population in Southern California grows exponentially, it is imperative that we reduce the amount of waste that is being created and reuse as many resources as possible to its fullest extent. Chapman University purchases gowns that are made from recycled plastic bottles. Each gown is equivalent to 23-26 plastic bottles which would end up in our landfills each time a Chapman student discards their gown. This chapter aims to highlight the importance of Chapman University implementing a regalia rental system for the undergraduate and master's programs which will further the school's commitment to sustainability. Through a cost benefit analysis, it is expected that the rental system will greatly benefit the students by reducing the cost of graduation regalia and will also benefit society by diverging waste from the landfills. There are three options Chapman could choose from, ranked from lowest cost to highest cost: 1. Enroll in a rental system with the current distributor of undergraduate and master's regalia, Balfour, 2. Create a rental system that is managed by Chapman which would recirculate gowns that previous classes have worn and rent them to the upcoming graduating classes, and 3. Chapman University purchasing gowns that would be available for students to rent for free. Regardless of which option Chapman chooses, the step will be towards a more environmentally responsible system compared to the status quo.

#### **46. Plastic Water Bottles at Chapman**

**Presenter(s):** Dina Sabatelli

**Advisor(s):** Mackenzie Crigger

As institutions that educate future leaders, it is essential for colleges and universities to be aware of how their impact adversely affects the environment. This study looks at single-use plastic water bottles on Chapman's campus, and compares Chapman's use with other campuses across the country. Over 100 schools around the US are involved in banning plastic water bottles on their campuses, and this effort is one that could be implemented at Chapman.

Chapman already has many water bottle refill stations strategically located on main campus and residence life, making it easy for students, faculty, staff, and visitors to use a reusable water bottle. Additionally, sustainability is becoming an increasingly more important factor for potential students, faculty, and donors. Because Chapman is a private university it is essential for Chapman to appeal to these stakeholders. Decreasing Chapman's impact is not only beneficial for the environment, but also the university as a whole.

#### **47. An Analysis of Surplus Furniture and Furniture Procurement.**

**Presenter(s):** Matthew Sahli

**Advisor(s):** MacKenzie Crigger

A study of the purchasing and use of furniture aiming to reduce the amount of new furniture purchased by the university as replacements for broken items. The university has a warehouse for storage of used item but does not have a way to successfully monitor the pieces. The university stores the surplus furniture in a 100-year-old citrus packing house. Furniture stored in the warehouse is grouped and stored with minimal labeling and protection. The warehouse will be remodeled and the storage space will be lost. Recommendations to assist the university to better care for surplus furniture include: implement a step in the purchasing process that would include a check of the warehouse for a sufficient replacement; create a plan that includes handling and storage procedures to protect and categorize item for use in the future; and create an online database that staff and faculty can access to better identify what is available in storage before making decisions in purchasing. The university could increase the amount of thought and care given to the storage and surplus furniture. The furniture purchased by the university is very good quality but needs to be replaced on a regular basis. Knowing the lifespan of the furniture and creating a plan for its replacement would allow the university to better prepare for the expense and keep the design of the building consistent. Future research into surplus furniture could start with a clean slate in the new storage facility.

#### **48. Local Food Procurement**

**Presenter(s):** Lauren Sandler

**Advisor(s):** Mackenzie Crigger

The 'Local Food Procurement' chapter of the 2018 Environmental Science Audit is focused on quantifying student preference for local and sustainable food in the hope to drive Chapman University to define and increase the percentage of locally sourced food. Food acquisition intended to meet the demand of developed countries encourages poor agricultural methods and creates resource-extraction trends that far exceed recharge rates. Shifting the consumer preference to local, sustainably raised meat and produce supports local economy, local farmers, and sustainable methods of production. By raising awareness of

food sourcing on Chapman's campus while incorporating affiliate opinions and desires, there is more opportunity for this shift to occur as a campus-wide initiative. Change is possible, as outlined by the many other universities who house Sodexo and uphold strong sustainability standards. This research incorporates interviews from Chapman Sodexo, OC Homegrown, and locally sourced restaurants within the Orange Circle. The 2018 Audit Survey strongly suggests that Chapman University students, staff, and faculty overwhelmingly support local food procurement and would prefer it if provided, even at an increased cost.

#### **49. Hazardous Material Procurement and Disposal at Chapman University**

**Presenter(s):** Kellen Twomey

**Advisor(s):** Mackenzie Crigger

Hazardous material procurement and disposal at Chapman University was studied to identify any practices or methods that could be altered or replaced with more environmentally sustainable alternatives. The practices of peer and aspirational schools, as well as private businesses were incorporated into proposed alternatives to be implemented by the university. Household hazardous waste generation in residence life facilities was also studied. Methods of minimizing waste and ensuring its proper disposal were formulated using a combination of educational campaigns and routine waste collection drives. These proposed methods are anticipated to reduce the amount of hazardous materials being purchased and disposed of by the university and the student body.

#### **50. Waste Management - Disposable Coffee Cups**

**Presenter(s):** Winnie Woo

**Advisor(s):** Mackenzie Crigger

This research focuses on evaluating consumer-end waste generated from coffee and tea consumption on campus. Over 50 billion disposable paper cups end up in landfills every year in the United States, yet such problem is not inevitable but an indicator of market failure in modern society. To embrace Chapman University's commitment to sustainability, such cradle-to-grave material should be evaluated and alternatives must be considered. Therefore, the purpose of this research is to understand the social norms for beverage consumption and bring about sustainable practices. Through introducing educational pieces and alternative business models, it is expected that practices which target both consumers and retailers could increase diversion rate and ultimately reduce waste. During a two month research period, educational signages were posted in the main dining areas, along with visualization of disposable cups - clear collection bins separating recyclable and non-recyclable coffee-related waste. Two waste audits on all waste from the main campus were also conducted. Results show that educational signages were not particularly useful in increasing diversion rate or awareness. However, visualization of waste show signs of bringing awareness regarding the issue.

#### **51. The Procurement of Furniture for Newly Renovated and Newly Constructed Buildings at Chapman University**

**Presenter(s):** Courtney Bonilla

**Advisor(s):** Mackenzie Crigger

Chapman University is constantly growing, adding new programs, attracting more people, and ultimately emphasizing the need for the expansion of Chapman's campus. Currently, Chapman University is planning the construction of two new buildings, the Keck Center and the Villa Park Orchards Residence Hall. Despite

Chapman's pride in its campus beauty, the University has not formally developed a way to ensure that this beauty is sustainable and environmentally-conscious. In terms of interior design, Chapman currently has a furniture storage facility that is not monitored and does not consider it as an option when furnishing new projects. In order to determine ways that Chapman University can work towards more sustainable interior design, my project looked at Chapman University's procurement of furniture in newly renovated and newly constructed buildings. In addition, this study also used information from the Environmental Science and Policy Capstone survey to better understand the attitude that the Chapman community has toward campus sustainability. From the data collected, this project produced recommendations that the University should keep in mind for future projects. These recommendations include the development of a formal sustainable procurement policy that incorporates the use of facility storage and that includes a statement of the University's commitment to sustainable design practices. A formal sustainable procurement policy that includes a commitment statement will allow for future projects to include sustainable practices as a necessity rather than just a recommendation.

## **52. Macroinvertebrate Community Composition in the Inlet and Outlet of the San Joaquin**

### **Marsh**

**Presenter(s):** Courtney Bonilla

**Advisor(s):** Dr. Jason Keller

Wetlands are incredibly valuable ecosystems, providing a number of ecosystem services and functioning as a means to increase biodiversity and to work as nutrient traps. For this reason, they have been constructed or modified for the purpose of providing habitats, flood control, aquaculture, and water treatment. Due to the fact that treatment wetlands are a low-cost and an environmentally conscious alternative to conventional water treatment, there is growing interest in capitalizing on the natural water purification abilities of these systems. Macroinvertebrate identification has commonly been used to monitor water quality using indices of biological integrity. However, few studies have looked at small shifts in macroinvertebrate community composition from inlet to outlet of a treatment wetland. Our study looked at the composition and diversity of the macroinvertebrate communities near the inlet and outlet of the San Joaquin Marsh. While we hypothesized that the outlet would have a more diverse macroinvertebrate community than the inlet, our results showed the opposite. This suggests that environmental factors other than water treatment may affect the macroinvertebrate community in the inlet and outlet of the wetland.

## **53. Blue carbon - Greenhouse Gas Flux from Coastal California Restoration Projects**

**Presenter(s):** Haley Miller and Kyvan Elep

**Advisor(s):** Dr. Jason Keller and Dr. Cassandra Zalman

Coastal wetlands are valuable environments due, in part, to their ability to sequester and store carbon over long periods of time. There is a growing interest among coastal managers to capitalize on the carbon storage capacity of these ecosystems, known as "blue carbon", to drive restoration and conservation efforts in the context of emerging carbon markets. While wetlands are extremely efficient carbon sinks, they also have the ability to produce and emit greenhouse gasses like methane and nitrous oxide. Previous studies suggest that production and emission of methane from coastal wetland ecosystems are suppressed by the availability of sulfate in high salinity, tidally-influenced systems and that nitrous oxide fluxes are minimal in all but the most eutrophic coastal environments. However, these assumptions are

rarely tested on the ground in blue barbon ecosystems. Our studies used static chambers to measure greenhouse gas fluxes from two regionally-significant coastal restoration projects. We measured methane and nitrous oxide fluxes from a sediment augmentation project at the Seal Beach National Wildlife Preserve (southern California) and methane fluxes from the South Bay Salt Pond Restoration Project (San Francisco Bay). Our results demonstrate that while methane fluxes were low in both projects, there were “hot spots” of methane flux, including fluxes from high salinity locations. Nitrous oxide emissions from the Seal Beach project were generally minimal. A better understanding of spatial and temporal variability of methane fluxes is necessary to better understand the role that these coastal ecosystems play in emerging carbon markets in California and beyond.

**54. Burn Calories, Not Fossil Fuels: Mapping Bikeability as a Tool for Sustainable Transportation Planning**

**Presenter(s):** Jenny Gritton

**Advisor(s):** Dr. Georgiana Bostean

When designing and maintaining transportation infrastructure, active modes of transportation such as walking and biking are often overlooked. Although the planning process identifies areas where improvement is necessary to keep personal vehicle travel sustainable, more effort is needed to integrate and promote bikeability within transportation systems. A visual representation of bikeability across a region can help to guide local actions in improving rates of commute by bicycle; a sustainable, low-cost, and zero-emissions mode of transportation. This study adapts a previously derived index of regional bikeability to fit Orange County and provides a visual comparative score of the region’s most and least bikeable areas. Using geographic information systems (GIS), I analyzed the top five metrics of bikeability identified in the index: bike route density, route connectivity, separation of bike facilities from streets, topography, and density of common destinations. The resulting composite index map provided a clear contrast between areas of high and low bikeability. This provides an effective planning tool in identifying what types of changes are needed to support sustainable travel and seamlessly connected mobility throughout Orange County. By using this approach to analyze active transportation infrastructure in other regions, transportation planning everywhere could take a giant step toward a more sustainable future for members of all communities.

## **Health Sciences and Kinesiology**

**55. Progesterone Effects on Cervix Ripening and Preterm Birth in a Murine Model for Progesterone Withdrawal**

**Presenter(s):** Elaine Oldford

**Advisor(s):** Dr. Kenneth Sumida

Ovarian progesterone sustains pregnancy in mice, while the local loss of progesterone (P4) efficacy is hypothesized to promote cervix remodeling before labor. Although P4 treatments delay preterm birth (PTB) after ovariectomy (Ovx), timing of birth varies. This study focuses on whether P4 delays characteristics of cervix ripening and overrides the local P4 withdrawal to block ripening and birth. On day 16 post-breeding (pb), mice were Ovx and given silastic capsules filled with vehicle or P4. Postmortem, blood for serum P4 and cervix were taken from groups of mice to study collagen (picrosirius stain birefringence), as well as densities of cell nuclei and macrophages.



P4 treatment sustained serum concentrations >7-fold higher than in Ovx, compared to ovary-intact Sham controls during pregnancy. Preterm delivery occurred within 24h of Ovx (day 17 pb, n=5), but in the Ovx+P4 group, births were delayed to term (day 19 pb) or did not occur by D20 pb (n=6 each). In the cervix of Sham controls, reduced cell nuclei density and collagen degradation occurred with the approach of term. However, neither was altered by Ovx compared to the reduced collagen degradation in Ovx+P4 mice. Withdrawal of systemic P4 or P4 treatment did not affect these remodeling characteristics. As for F4/80 macrophages, their density was similarly elevated in the cervix of Sham and Ovx+P4 mice on days 16.5 pb and PP (term) compared to that in Ovx mice. Fetuses from Ovx+P4 mice were stillborn or did not survive the lengthened pregnancy.

Findings support the hypothesis that P4 blocks PTB induced by loss of systemic P4. Thereafter P4 does not affect the transition from a soft to ripe cervix. Birth in Ovx+P4 mice at term indicates a functional loss of P4 efficacy. However, in Ovx+P4 mice that remained pregnant, P4 treatment appeared able to sustain a quiescent uterus. While the importance of P4 regulation of macrophage activities in the prepartum cervix remains to be determined, P4 block of PTB may prove beneficial to some women at risk for advanced cervix ripening and premature birth.

### **56. Use of Dorsal Inlay Preputial Graft for a Tubularized Incised plate Urethroplasty**

**Presenter(s):** Aubrey Van Dyke

**Advisor(s):** Dr. Peter Wang

Hypospadias is a congenital disorder where the opening to a male's urethra is not on the usual location of the penis. It is typically characterized by penile curvature, proximal displacement of the urethral opening, and hooded foreskin. Surgical repair of this defect can lead to many complications. Still, the use of dorsal inlay preputial graft (P-DIG) for a tubularized incised plate (TIP) urethroplasty has been associated with fewer meatal stenosis and urethrocutaneous fistulas. Another advantage of P-DIG is that it allows for the creation of a more slit-like and orthotopic (apical) neomeatus. It was investigated the complication rates of children with distal hypospadias undergoing either TIP or TIP with P-DIG procedure. However, the results from studies plagued with low power and heterogeneous populations. There were two groups studied, children with just TIP procedures and children versus TIP with P-DIG. There was no significant difference between the two groups with respects to complications. Also, P-DIG was determined not to be a predictor for postoperative complications on univariate and multivariate binary logistic regression. These findings suggest that TIP with P-DIG is a safe alternate procedure for children with distal hypospadias with the added advantage of creating a more slit-like and orthotopic neomeatus. Since there were limitations of this study, further trials should be conducted to confirm these findings.

## **Integrated Educational Studies**

### **57. The Architecture of Belonging**

**Presenter(s):** Marina Ballesteros and Sarah Garcia-Gonzalez

**Advisor(s):** Dr. Michelle Samura

Although belonging is one of the most important factors for college student success, little is known about the role of campus space in the development of student belonging. This study focuses on residence halls to examine how physical spaces affect student sense of belonging. Drawing upon critical spatial perspectives, a qualitative analysis was conducted of student-created photo journals and maps and focus

group data. Preliminary findings include the importance of lighting for both students' sense of connectedness and their safety and the role that furniture plays in student interactions. Because residence hall spaces are used and experienced by students from diverse backgrounds, findings from this study may enable key decision makers to make more informed decisions about changes that can be made to the physical campus that will support the development of student belonging.

### **58. K-12 School Librarians and How They are Contributing to Globalized Education and Citizenship in Order to Produce 21st Century Students**

**Presenter(s):** Darliene Zepeda-Field

**Advisor(s):** Dr. Quaylan Allen

School districts and educators are beginning to acknowledge the benefits school librarians' pose within their school and for that reason, school libraries have been changing throughout the years. K-12 school librarians are key educators to teach global education in order to produce 21st century scholars in a time when school librarians seem to be an obsolete profession. Drawing from the qualitative analysis on 3 school librarians: elementary, middle school and high school, along with their school principal will provide the qualifications and structure that school librarians use to enhance education on a higher level while also encountering the challenges that arise from change in the curriculum. Also included are ethnographic observations from class visits to their library will provide a discussion on the curriculum provided by the school librarian that pertains to global education. The research will show that school librarians are highly qualified, and schools need to utilize their librarians' resources to educate the new generation of students by integrating library lessons every other week in the school library, as educated by Library and Informational Science (LIS) program standards from San Jose State University (SJSU). The value of this topic is to bring the interconnectedness of global education to our schools and for our libraries to bring scholastic experience to our communities while incorporating a global perspective on ways that the world accesses and shares information with others.

KEYWORDS: School librarians, Global Educators, Citizenship, Curriculum, Students, K-12, Collaboration

## **Political Science**

### **59. Young Voters and Party Preference: A Study of California Teens**

**Presenter(s):** Samantha Adams

**Advisor(s):** Dr. David Shafie

This paper aims to discover what is encouraging young voters to increasingly not affiliate with a party, and why they differ from independent voters of past generations. I expect to find that first time voters are far more likely to not identify with a party preference than past voters, and specifically that young voters are more likely to be unaffiliated. Young voters are becoming less and less partisan than previous generations due to differences in political socialization. There have been many studies and articles written on the political views of children, and how they are formed. I will be exploring the newly released data from the California Secretary of State's office comparing the party of registration of pre-registered 16 and 17-year-olds to the overall party registration of previous voters. It will be a county-by-county comparison of all of California, looking not only at which counties have the largest influx of non-preference voters, but how it measures up to that counties past registration, while also exploring the differences in Democrat, Republican, and minor party affiliations between pre-registered teen voters, and adult past voters, and

how that varies by county. Using this California Secretary of State data shows that even in a state that is thought of as having a foothold in one party, young people are increasingly registering as unaffiliated.

### **60. Economic Concerns and Attention Given to Campaigns**

**Presenter(s):** Saeed Al Hamed

**Advisor(s):** Dr. David Shafie

The purpose of this study is to examine the relationship between people's concern for economic issues of the country and the attention they give to political campaigns. Using the SETUPS 2016 Survey, conducted by the National Election Study, my hypothesis is that people who are more concerned with the economy tend to pay more attention to campaigns. The concern a person has with the economy has been measured by; financial situation, concern over personal finances, economy and unemployment. The research considers that paying more attention to campaigns is a complex concept which includes; the attention paid to government and politics, campaign involvement and contributions, interest in campaigns and the attention given to different types of media discussing politics. I expect to find that the attention given to campaigns depends on the perception of the economy a citizen has. The anticipated outcome is that there is a positive correlation between people's concern for the economy and the attention they give to political campaigns.

### **61. The Importance of Religion in 21st Century American Politics**

**Presenter(s):** Blake Crandall

**Advisor(s):** Dr. David Shafie

The role of religion in politics has changed immensely over time. In the two-party system that exists in the United States, religious affiliation has had significant influence on party identification. Historically, Protestant Christians have long supported the Republican party while Catholics and Jews have been in support of Democrats. The Obama presidency, specifically, changed party lines and the role of religion in voting behavior. If religious affiliation no longer directly correlates with party identification, what are the elements that are influencing political ideology and voting behavior? This study will use data from the 2016 ANES data set to provide an explanation as to what is causing the changes in party lines and how the relationship between religion and politics has changed in the 21st century. This study will measure variables such as income, age, race, education level, and access to media sources. I hypothesize that young minority Protestant Christians will have consistently voted Democratic, however there has been an increase in young white Protestant voters who now identify with the Democratic and Independent parties.

### **62. Legacy of the Vietnam War: Impacts of Video Journalism on Future U.S. Military Actions**

**Presenter(s):** Alexander Ballard

**Advisor(s):** John Emery

How did the proliferation of embedded media, specifically video journalism during the US war in Vietnam impact future U.S. military actions abroad? By assessing the impact of film on turning of the tides against the U.S. military actions in Vietnam via protest movements and declining popular support at home, I examine how this influenced changes in military policy for subsequent international military interventions. This project will look at several conflicts in the post-Vietnam era and demonstrate the ways in which U.S. actions were influenced and framed by the collective guilt stemming from the Vietnam War. In my assessment the "Vietnam Syndrome" gets to a key question involved in exploring how public support or protest has influenced more recent U.S. military actions. Ultimately, a summary of the results of this

project include greater legislative oversight on U.S. military action, a shift in military leadership and values, and a greater reliance on carefully planned military actions, shown through U.S. interventions in Iraq, Afghanistan, and other areas of the Middle East.

## **Psychology**

### **63. The Effects of Improvisational Dance on Cognition in People with Parkinson's Disease and Undergraduate Students**

**Presenter(s):** Lucie Jerome

**Advisor(s):** Dr. Connie Shears

Parkinson's disease (PD) is a chronic, progressive, neurological movement disorder that affects approximately one million Americans and ten million individuals worldwide (Parkinson's Disease Foundation). Levodopa, a drug that enhances dopamine production in the brain and combats the effects of the disease, is the most commonly prescribed medication for individuals with PD as it is highly effective for reducing motor symptoms, such as tremors. Dance classes, however, have also been shown to increase balance, gait, emotional well-being, and quality of life, issues which are often resistant to pharmacological or surgical treatment. The present research proposes a novel connection between free-form improvisational dance and improved cognition in people with PD as well as healthy, undergraduate students in a pre-post test, between-subjects design study. All participants (n=97) completed two cognitive assessments, the Boston Naming Task (BN) measuring memory and the Instances Task (IT) measuring divergent thinking abilities, both before and after a ten-minute dance session of either improvisation (I) or non-improvised, directed movement (DM). The researchers predicted that the cognitive scores of individuals with PD in the I condition will improve the most, and that scores of the undergraduate students in the DM condition will improve the least. Should the study produce these findings, it would support the use of improvisational dance classes to improve cognitive abilities for both people with PD and healthy students. Results indicated that being in the I condition or having past experience with improvisational dance experience boosted participants' divergent thinking scores on IT. Furthermore, a case study on one participant with PD has shown an increase on both BN and IT scores after improvisational dance, thus supporting the hypothesis.

### **64. The Relationship Between Physical Exercise, DHEA and Memory**

**Presenter(s):** Kelsey Leavy

**Advisor(s):** Dr. Connie Shears and Dr. Marco Bisoffi

While exercise has been shown to improve memory, the reason behind this is still under question. This study will seek to determine if the neurosteroid dehydroepiandrosterone (DHEA) could play a role in this phenomenon. DHEA is proposed to act as a counterbalance to cortisol, increasing after periods of acute stress (Dong and Zheng P, 2011; Russo et. al,2012). One effect of DHEA increase is improved memory (Alhaj, H. A et. al, 2005; Barrett-Connor and Edelstein, 1994; Carlson et. al, 1999; Maninger et al., 2009; Wolkowitz et. al, 1997). Physical exercise has been shown to act as an acute stressor, increasing DHEA levels (Di Luigi et. al, 2006; Heaney et. al, 2013). I hypothesized that if DHEA contributes to improved memory following exercise, the group with the highest increase in DHEA following exercise, will also have the highest increase in memory. To test this, 60 Chapman students over the age of 18 who were able to partake in physical exercise were randomly assigned to one of three exercise conditions: a control (no

exercise) group, a low intensity exercise group and a high intensity exercise group. Both before and after all three conditions, participants provided two saliva samples, to test for cortisol and DHEA levels, and completed a set of memory tasks. Initial result showed that exercise, regardless of intensity level, improved accuracy on both memory task. However while both exercise conditions resulted in an improvement on the memory tasks, the control condition displayed a decrease in pre/post score. Likewise, DHEA levels were as predicted; the highest level seen with the highest intensity and a smaller increase associated with the low intensity level. Interestingly, the control condition actually had a decrease in DHEA, but it was very marginal.

### **65. Emotions and Memory: Does Questioning Matter Across Development?**

**Presenter(s):** Samira Amirazizi

**Advisor(s):** Dr. Connie Shears

Why do we remember a funeral from several years ago more than what we ate for lunch yesterday? Emotions may contribute to false memory, especially across development. Van Damme et. al, (2016) showed that positive pictures allowed attention to a broad range of stimuli, with less attention to details; and negative pictures created fewer false memories of central details but more false memories about peripheral details. The fuzzy trace theory explains the creation of false memories through a reliance on a memory trace that captures the underlying meaning of an event (gist) when retrieval of item specific details (verbatim) are not possible (Reyna & Brainerd, 1995). However, reasoning based on gist processing requires advanced cognition that increases with expertise, suggesting adults who rely on gist may be susceptible to false memory (Brainerd & Reyna, 2012). If false memories are created by a reliance on gist traces, we hypothesize that children should actually be less likely to form false memories than adults. Emotional pictures are viewed by adults and children who answer either gist or verbatim questions regarding each picture's content and then answered a recall statement. Overall, adults were more accurate than children. As predicted there was a significant interaction between age, valence and question type. Positive pictures, were significantly more accurately responded to by adults than children for both question types, especially verbatim questions. For negative pictures, there were no significant differences between adults and children suggesting that the presence of threatening information has similar memory effects across development. In regard to neutral pictures, adults were significantly more accurate than children in the gist condition, but had almost the same accuracy in the verbatim condition. These differences between adults and children in regards to recall towards emotional stimuli and varying question types can be insightful when it comes to practical matters such as eyewitness testimony and education.

### **66. Personal Values and Health Behaviors: What's the Connection?**

**Presenter(s):** Marie Bedel, Danielle Zahn, and Moriah Geller

**Advisor(s):** Dr. Julia Boehm

Chronic diseases are widespread, however many are preventable with healthy behaviors. Unfortunately, health behaviors are notoriously difficult to change. The current research seeks to explore a novel approach to motivating healthy behaviors by using self-affirmation theory, which proposes that people strive to maintain a global sense of self-integrity (Steele, 1988). According to this theory, when individuals experience threats to their self-integrity throughout daily life—such as being exposed to threatening health information during a doctor's visit—threats can be ameliorated by focusing on positive attributes or personal values (Sherman, Nelson, & Steele, 2000). This study examines whether participants who are

randomly assigned to a self-affirmation condition—in which they write about a personal value (N=26)—are more receptive to threatening health information and will subsequently make healthier food-related choices compared to a control group (N=32). Adult participants over the age of 25 (M=45.35 years) participated in a one-time, hour-long lab visit during which they completed questionnaires, engaged in a writing task, read threatening health information, and made a food choice. We hypothesized that individuals who had self-affirmed would eat more healthy foods than individuals who had not self-affirmed. We also examined whether typical dietary behaviors affected the relationship between self-affirmation and food consumption. Analyses suggest there was not a significant effect of the intervention on healthy food choice,  $t(56)=-.20$ ,  $p=.85$ , or unhealthy food choice,  $t(56)=.50$ ,  $p=.62$ . Additionally, there was not a significant interaction between condition and participants' typical dietary behaviors for healthy food choice,  $F(1, 53)=.59$ ,  $p=.45$ , or unhealthy food choice,  $F(1, 53)=.04$ ,  $p=.84$ . It is possible that these results were not statistically significant due to limited statistical power. However, continued investigation of the relationship between self-affirmation and improved health with more participants could inform future health interventions.

### **67. It's For Their Health: Encouraging vs. Discouraging Autonomy During Adolescence**

**Presenter(s):** Moriah Geller

**Advisor(s):** Dr. Julia Boehm

Chronic diseases are widespread, but most are preventable with healthy behaviors. Creating effective interventions to improve health behaviors—especially those of adolescents—is no easy task. The objective of this research is to create an effective health intervention that harnesses the common adolescent desire for autonomy. 91 young adult participants between the ages of 18 and 25 years (M=19.36 years) were randomly assigned to either the experimental condition (N=48) that asked them to engage in a writing task that emphasized an internal health locus of control (i.e., they described ways in which they—rather than others—are in control of their health) or a neutral control condition (N=43). We hypothesized that, compared to those in the neutral control condition, those in the experimental condition would have higher internal health locus of control scores post-intervention and would also make healthier food choices when presented with a variety of options. There was not a significant difference in post-intervention internal health locus of control scores between those in the experimental condition (M=4.39, SD=.62) and those in the control condition (M=4.45, SD=.61),  $t(90)=-.44$ ,  $p=.66$ . However, there was a statistically significant effect of the intervention on snack choice such that those in the experimental condition (M=.35, SD=.57) selected significantly fewer unhealthy snacks than those in the control condition (M=.63, SD=.73),  $t(90)=-2.02$ ,  $p=.046$ . These results suggest that encouraging adolescents to think about ways in which they are in control of their health may translate into healthier behaviors, particularly related to food choice. The current research suggests that the developmentally appropriate and universal adolescent desire for autonomy may be harnessed to encourage healthier choices among adolescents and young adults. Establishing healthy behaviors during adolescence is crucial because it may lead to the formation of healthy habits that last for life.

### **68. Text Analysis of A Self-Affirmation Writing Task**

**Presenter(s):** Michelle Nguyen and Samira Amirazizi

**Advisor(s):** Dr. Julia Boehm

The words we use in daily life are a reflection of who we are and the social relationships we are in (Tausczik & Pennebaker, 2010). The degree to which people express emotion, how they express it, and the valence

of that emotion can provide insight on their experience of the world. We used the Linguistic Inquiry and Word Count (LIWC) to analyze text that participants wrote about as part of a larger study in which they reflected upon a personal value that was most important to them. This included values such as creativity, spirituality or religion, being kind and respectful to others, honesty, and relationships with family and friends. We sought to analyze the text for emotionality, social interactions, and relationship quality to see how participants expressed themselves. Individuals were recruited who were at least 25 years old without strong food preferences nor limitations in physical activity. Participants came to a research lab at Chapman University during which they completed a writing task for at least 10 minutes. Participants were randomly assigned to one of two conditions: a control condition or a self-affirmation condition (i.e., writing about their most important personal value). Among participants in the self-affirmation condition (N = 26), the most frequent value chosen was relationships with family and friends. For the purpose of our analyses, we compared people who wrote about valuing relationships with family and friends to all other values. Analysis of the data showed significant differences between these two groups in the LIWC categories of social, family, feel, affiliation, leisure and home. Those who chose relationships with family and friends over any other value used greater frequency of these words in their essays. Information gathered from the text analysis using the LIWC can be used to implement more personalized and specific self-affirmation writing tasks in future studies.

## **69. Faces of Time: Developing Protocol for the Crowdsourced Annotation of Time Magazine**

### **Images**

**Presenter(s):** Aisha Cornejo

**Advisor(s):** Dr. Vincent Berardi

This project served to aid with the development of a research project that aims to analyze the progression of the appearance and context of women's faces in Time Magazine images from 1960 through 1990. This will be accomplished by using Mechanical Turk to employ crowdsourced labor to extract every image of a face from select issues of Time magazine over the time period of interest. Mechanical Turk will also be used to label the following characteristics of each face: photo/drawing, gaze direction, context (ad/feature/cover), color/monochrome, ethnicity, age, gender, presence of a smile, and image quality. My work focused on the developing the labeling system and exploring the consistency of labelers. Through processing multiple issues from the corpus, I found potentially problematic issues that had not yet been considered such as the presence of masked individuals, images with an overwhelming number of miniature faces, and photos of young children with ambiguous gender and ethnicity. The results of my exploration led to the creation of new categories (e.g. adult versus child) and the establishment of specific criteria to be provided to potential raters to reduce ambiguity in the task. These criteria were included in an instruction set for MTurkers that I created. In addition, I developed an R-script that used Cohen's kappa to analyze interrater reliability across all categories to view the consistency of labelers. The data used was of 3 university students; who individually processed images from the same issue and labeled the faces according to the established protocol. The overall average Cohen's kappa was .740. The Cohen's kappa was above .723 for all variables except image quality. Kappa for image quality was .362. Lastly, I aided in the development of internal checks within the Mechanical Turk system to identify instances of labelers potentially manipulating the system for financial gain.

## **70. Detectability of Cultural Markers of Sexual Orientation and Their Effects on Anti-Gay Stigma**

**Presenter(s):** Joanna Dare

**Advisor(s):** Dr. David Frederick

People actively advertise core aspects of their identities and their beliefs to the world through their choices of clothing, the way they walk, and the jewelry and symbols they wear. Gay women use such markers in order to be recognized as a part of the ingroup, and to develop nonverbal signs so as to not risk societal disapproval (Krakauer & Rose, 2002). This project focuses on cultural markers lesbian women employ to convey identity, if these markers reliably increase recognition, and if displaying them increases stigmatization. Study 1 was conducted as a focus group study in which a list of reliable markers was generated by seventeen lesbian women, and were used to create a series of stimuli. Study 2 (n = 150) was conducted in order to test whether these markers accurately influence perception of sexual orientation. Study 3 looked at if displaying markers affects anti-gay stigma. Participants rated the extent to which they believed the person to be lesbian or heterosexual, and how certain they were of their ratings. There was an effect of marker presence on perception, as well as an effect of sexual orientation. Participants were more likely to classify lesbian women as lesbian even when no markers were present. In addition, participants answered questions to measure social distance and prejudice against the stimuli. The findings of this study provide an indication to what extent lesbian markers are noticeable to mainstream culture, along with how gay women use fashion and body language to embed themselves in the subculture, the extent to which these act as effective signals of identity, and if they impact stigmatization.

## **71. Patriotism and Protests: Understanding the Diversity of Responses to the NFL Player Protests During the National Anthem**

**Presenter(s):** Alexandra Galvin, Andrea Fernandez, and Joanna Dare

**Advisor(s):** Dr. David Frederick

**Objective:** The goal of this project is to examine the social psychological factors shaping attitudes towards NFL football players engaged in protests during the national anthem. This research examines alternative strategies for increasing public support for addressing systemic racism against minority men and women. There are several theoretical perspectives, such as Social Dominance Theory and Right-Wing Authoritarianism, that help explain these reactions. This study evaluates whether prejudicial attitudes, political ideology, or other factors most strongly predict negative attitudes towards the protesters and messages of the protest.

**Method:** Through Mechanical Turk, 1168 individuals participated in this study. This sample consisted of 38% men, 61% women, and 1% who identified as other. Participants identified as Republican or leans Republican (n = 253, 22%), Independent (n = 235, 20%), or Democrat or leans Democrat (n = 680, 58%). After answering basic demographic questions, participants were shown a screenshot of an image of players kneeling during the national anthem and asked a series of questions about their opinions regarding these players and this issue.

**Results & Conclusions:** Those identifying as Democrat were much more likely to support (88%), defend (92%) and believe these players' acts of protest are patriotic (73%). Republicans disapprove (79%) of players sitting or kneeling during the national anthem. Republicans who believe that police brutality against Blacks in American is a major problem were much more likely to support the players than Republicans who do not believe police brutality is a major problem. Further, Republicans were more likely to support punishing the players as 44% would boo the players, 56% believed players should be penalized,



and 60% believed that the NFL should require athletes to stand. This research provides further insight into how individual's beliefs and personal biases shape their perspective of the world and actions of other people.

## **72. Repetitive Transcranial Magnetic Stimulation in Treating Obsessive-Compulsive Disorder**

**Presenter(s):** Alexandra Galvin

**Advisor(s):** Dr. Steven Schandler

**Objective:** Obsessive-Compulsive Disorder (OCD) is a chronic and life-altering psychiatric illness reported to affect 2.3% of the global population. Cognitive Behavioral Therapy and therapeutic medications are the common treatments for OCD. While effective, the nature and length of Cognitive Behavioral Therapy and medication side effects restrict the application of these treatments. Therefore, there is a need to research other therapies that will be acceptable to a wider range of people. One recently reported, highly successful treatment is brain stimulation therapy. Specifically, Repetitive Transcranial Magnetic Stimulation (rTMS) has been successful in treating symptoms of depression and anxiety. The purpose of this thesis was to evaluate Repetitive Transcranial Magnetic Stimulation (rTMS) as a potential form of treatment for OCD.

**Method:** It was hypothesized that an adult diagnosed with OCD who receives rTMS for 2-12 weeks, he or she will experience a greater reduction of OCD symptoms than an OCD adult who receives a non-electrically stimulating treatment. This study applied a meta-analytical evaluation of current treatment literature to test the hypothesis.

**Results and Conclusions:** Overall, the findings supported the hypothesis that, compared to other treatments rTMS is a successful form of treating OCD symptoms. This experimental form of treatment provided participants with a quick speed of effect and few side effects. However, the clarity of the findings was reduced due to the lack of adequate comparison or control groups in some studies. Future research with larger sample sizes, control conditions, and consistency in treatments being received by participants is needed to achieve more definitive conclusions.

## **73. The Association of Health Care Access and the Development of Depression in Malignant Cancer Patients**

**Presenter(s):** Ryann Garcia

**Advisor(s):** Dr. Tara Gruenewald

The occurrence of cancer is a major life event known to contribute to distress among affected individuals. Roughly 21% of cancer patients report depressive symptoms in the first year after their diagnosis (Cuijpers et al., 2014). Depression may affect the progression of cancer through decreasing adherence to treatment regimens (DiMatteo et al., 2000) or psychobiological states (e.g., altered neuroendocrine function, inflammation) and behavioral processes (e.g., drug or alcohol use, lack of physical activity) that may affect immunity. The goal of this study is to examine the association of health care access and the development of depression in cancer patients that have taken part in one of three longitudinal studies on aging. Specifically, the relationship between cancer and depression examined over a four-year period is evaluated in participants from the United States via the Health and Retirement Study (HRS), England via the English Longitudinal Study of Ageing (ELSA), and Ireland via The Irish Longitudinal Study on Ageing (TILDA). We will compare participants with or without incident cancer in 2010 (since the last assessment in 2008) on levels of depression in 2010 and 2014. It is hypothesized that participants with access to public and private care will be less likely to develop depression after being diagnosed with malignant cancer.

Participants in the United States must obtain their own private insurance until the age of 65 when Medicare becomes available to them; participants in England and Ireland have access to public insurance as well as supplemental, private insurance throughout their life. Analyses of data obtained from HRS, ELSA, and TILDA are ongoing and will control for levels of depression in 2008, age, race/ethnicity, sex, and education level. Future research efforts might focus on the effects of various cancer treatments on the development of depression and how health care access moderates this relationship.

#### **74. Special Education Programs and Their Effect on Children with Autism Spectrum Disorder**

**Presenter(s):** Ariann Ghorbanian

**Advisor(s):** Dr. Steven Schandler

According to the Centers for Disease Control and Prevention, 1 in 68 children are diagnosed with Autism Spectrum Disorder (ASD). In order to ensure that these children obtain the best education possible, it is important to understand how their environment can impact their academic and social development. This thesis investigated whether special education programs are beneficial for educational and social success in children with ASD. It was hypothesized a child with ASD who has been placed in a restrictive special education program in a public school, will experience more social exclusion and bullying and be less likely to achieve optimal outcomes than a child with ASD who is placed in a general education classroom. This hypothesis was tested using a meta-analysis of empirical research. Overall, the findings supported the hypothesis. Program and peer-mediated interventions implemented into a general education setting allowed children with ASD to be more effectively integrated into an inclusive program. There were negative academic and social outcomes reported for children with ASD placed in the general academic program. The most pervasive negative outcome was bullying victimization of children with ASD. These findings underscore the need to empirically research the impact of education environment on academic and social performance of children with ASD to achieve a greater understanding regarding the ways in which these children experience the educational system. The resultant data will allow researchers, school teachers, and families to make better informed decisions regarding the learning environment of children with ASD in order to help them reach their full potential.

#### **75. Social Concern Anxiety Sensitivity is Associated with Higher Pain Response in Pediatric Patients with Cancer**

**Presenter(s):** Paige Greif, Natasha Hikita, and Christina Korth

**Advisor(s):** Dr. Brooke Jenkins

Anxiety sensitivity often leads to excess distress in anxiety-provoking situations. For some, the social implications of the anxiety cause an intensification of the symptoms they are already experiencing. Those with high levels of social concern anxiety sensitivity fear the anxiety-inducing situation itself, and the social ramifications of their anxiety. In medical settings, this effect may be compounded. Pediatric patients with cancer are frequently exposed to painful procedures throughout the course of their treatment. These experiences can be exceptionally unpleasant for children with high levels of social concern. This study aimed to examine the relationship between social concern and physiological response to pain in pediatric cancer patients. Participants (N = 73) completed the Cold Pressor Task (CPT), in which their hand was placed in 7 degree Celsius water, to induce pain and assess pain response. Participants' physiological pain response was measured via salivary alpha amylase (sAA) levels assayed from saliva samples taken at three timepoints: baseline, immediately after the CPT, and 15 minutes post-CPT. The social concern subscale of the Childhood Anxiety Sensitivity Index (CASI) was completed by participants to assess their level of social

concern (e.g., “I don’t want other people to know when I feel afraid”). Children who scored higher on this subscale of the CASI exhibited higher sAA levels throughout the CPT compared to children who scored lower ( $F(1, 48) = 5.570, p = .022$ ). These results demonstrate a significant relationship between social concern anxiety sensitivity and physiological response to pain, as measured by sAA. This suggests that children with high social concern may have a more intense physiological pain response. The findings imply the need for more research into the pathways by which anxiety sensitivity affects responses to pain. Because pediatric cancer patients are frequently exposed to painful stimuli, it is important to consider factors which can assist in reducing the amount of pain experienced by these children.

## **76. The Effects of School-Based Mindfulness on Emotional Regulation**

**Presenter(s):** Grecia Gutierrez

**Advisor(s):** Dr. Steven Schandler

Background and Purpose: Mindfulness is the process of increasing self-awareness through paying attention to actions of the present moment, and without any judgment to the experiences that are currently unfolding. Because it is focused on the individual's use of their own resources, mindfulness is gaining increased prominence as a complementary and alternative intervention method by Western Psychology. While research on the therapeutic effectiveness of mindfulness initially focused exclusively on adults, recent mindfulness research has begun to be directed at the effects of structured mindfulness programs on children and adolescents. This research suggests a relationship between the use of mindfulness and a child's increased ability to regulate emotions critical to responding appropriately to a wide range of emotions. However further research needs to be conducted in order to support concrete conclusions. The purpose of this thesis research was to examine the effectiveness on emotional regulation in children and adolescents. To do this systematically, research was directed at primary and secondary school-based mindful programs designed to enhance student's emotional regulation. It was hypothesized that students enrolled in a school-based mindful program would show greater emotional regulation than students who were just following the regular school curriculum or enrolled in another program. Methods: Using meta-analytical methods, recent empirical studies on school-based mindfulness were gathered and evaluated. All articles looked at various forms of school-based mindfulness and its effects in multiple factors related to emotional regulation across preschool students all the way to high school students. Conclusion: Overall, the findings supported the hypothesis. However, the strength of the support was reduced by variations in the types of mindful programs and the multiple assessments applied to measure emotional regulation. Further studies are needed to more clearly identify the elements of mindfulness that are the most beneficial to children and adolescents.

## **77. Emotion Regulation and Positive Affect in the Context of Salivary Alpha-Amylase Response to Pain in Children with Cancer: Physiology, Self-Report, and Behavior**

**Presenter(s):** Natasha Hikita, Christina Korth, and Paige Greif

**Advisor(s):** Dr. Brooke Jenkins

Children with cancer are repeatedly exposed to aversive stimuli including painful procedures. Therefore, emotional regulation techniques may prove useful during such experiences and contribute to pain resilience. This study aimed to determine whether three different emotional regulation strategies (distraction, reappraisal and reassurance) impacted physiological, self-reported and behavioral pain responses in pediatric patients with cancer ages 6 to 18 years ( $N = 73$ ). The cold pressor task (CPT), an experimental task in which pain is induced by having participants place their hand in cold water, was used

to examine pain responses. Patients placed their hand in 7 degree Celsius water for up to 4 minutes. Saliva samples were collected 15 minutes before, immediately after, and then 15 minutes after the CPT. Saliva samples were assayed for alpha amylase, a proxy for sympathetic nervous system activation. Self-reported pain severity was measured upon hand removal. Pain tolerance was assessed by length of time participants kept their hand in the water. Children in the reassurance condition exhibited salivary alpha amylase levels that continued to rise post completion of the CPT as compared to children in the distraction (Beta = -1.68, SE = 0.73,  $z = -2.30$ ,  $p = .021$ , 95% CI [-3.10, -0.25]) and reappraisal (Beta = -1.24, SE = 0.72,  $z = -1.73$ ,  $p = .084$ , 95% CI [-2.65, 0.17]) conditions. However, when self-reported pain and behavior were examined, no differences in pain severity (Wald Chi-squared (2) = 2.47,  $p = .292$ ), or pain tolerance (Wald Chi-squared (2) = 1.38,  $p = 0.502$ ) among the emotional regulation strategies were observed. Thus, significant findings were present for physiological markers of distress, but not for self-reported and behavioral measures. These findings suggest that in terms of physiological measures, specific emotional regulation strategies, such as distraction and reappraisal, may be more beneficial in reducing stress responses to painful medical procedures in pediatric patients with cancer as compared to reassurance.

### **78. Testing an Intervention Targeting Child Postoperative Distress**

**Presenter(s):** Christina Korth

**Advisor(s):** Dr. Brooke Jenkins

After undergoing surgery, children frequently experience postoperative distress, consisting of pain and anxiety. Adult (e.g., health care providers and parents) behaviors can influence child distress in various medical environments. Several adult behaviors have been shown to alleviate (i.e., desired behaviors) or elicit (i.e., undesired behaviors) child distress. The Nurse and Parent Tailored Intervention for Postoperative Distress (NP-TIPS) has been developed to alter nurse and parent behaviors to mitigate child distress in the postoperative environment. Prior analyses of NP-TIPS demonstrates that this intervention successfully modified both nurse and parent behaviors to increase rates of desired behaviors and decrease rates of undesired behaviors in the postanesthesia care unit (PACU). The current study investigated whether these behavior changes reduced time spent in the PACU, child postoperative pain, and maladaptive behavior changes. In the PACU, all interactions between nurses and parent-child dyads were videotaped. Analgesic requirements and physiological data were determined through medical record abstraction. Parents completed the Faces Pain Scale-Revised, Parent's Postoperative Pain Measure, and Post Hospitalization Behavior Questionnaire at home on postoperative days 1, 3, and 7. In general children exhibited low levels of pain. There were no significant differences between children in the baseline versus post-intervention group for time spent in the PACU, objective and subjective measures of pain, and maladaptive behavior changes. This suggests NP-TIPS may be useful for children experiencing high levels of pain, but may not make a significant difference in minimizing distress when children experience relatively low levels of pain. Therefore, more research is needed to understand how adult behavior changes might influence the time spent in PACU, pain, and maladaptive behavior changes.

# **Sociology**

## **79. An Alternative Model of Identity Development**

**Presenter(s):** Kyler Asato

**Advisor(s):** Dr. Kevin Stockbridge

Activism and identity development take on a certain image due to mainstream media's presentation of key figures and a purposeful detachment of their personal life from their activism. Similarly, queer literature on identity development posit images of navigation of identity, but not the discovery of queer identities, especially more marginalized ones like asexual, genderqueer, transgender, and polyamorous. This highly restricts the way we can understand identity and the way that we can navigate life as this identity. So, this study asks, how can we come to understand the reality of queer identity in ways that are authentic to the multiplicities of human experience? To answer this question, focus is on existing literature on "Identity Development" to see how identity is currently represented and "Diaspora, Borderlands, Intersectionality, and Autoethnography" to see how it can be represented. To this effect, this is co-written with Dr. Kevin Stockbridge to map the effect of Duo-Auto-Ethnopoetics in order to display the importance of topics like Intersectionality and Diaspora in understanding certain identities. Writing about four set topics, we convey the diversity in experiences through our style of writing and the experiences we have with these topics. We write about our own intentionality in the poems and our understandings of each other's poems. Using this data, we highlight the diversity of experience in the LGBTQIA+ community, the impact of society in creating meaning, and construct and argue for an alternative method for identity formation: testimony. Through the literature on "Diaspora, Borderlands, Intersectionality, and Autoethnography," we contextualize this alternative method amidst poststructural and massively diverse experiences within the community. Current literature and narratives on identity development are limited in scope and complexity, and in contexts of homophobia, community infighting, and varying violence against different identities, it is imperative that we change our methods. While this may not be the solution, it is an alternative one.

# **Software Engineering**

## **80. Project Mayhem**

**Presenter(s):** Varsenik Aslanyan, Grayson Berman, and Bailey Anderson

**Advisor(s):** Dr. Michael Fahy

The purpose of this project is to make a networking game that is turn-based between two clients. This project takes the client-server communication to a more fun level by creating a game for clients to link to and play against each other. The theme of this game is Chapman colleges fighting against each other. Each player picks a college; such as Dodge, Crean, COPA, etc., that has four different movesets. Each college has two base attack moves that will always be offered to the players. The first attack will always do at least five damage points no matter what, plus whatever number that is randomly generated from 0-10, the second move is not constant and will randomly generate a hit attack that either can be critical or not at all critical meaning it will randomly generate a number between 0-25. Each college will also be given two special moves that are unique to each college and will randomly generate to each college giving every college a different advantage. The players each take turns picking attacks, and once one player's health is depleted, the game is over and the other player wins. This project will demonstrate multicasting as well

as client-server communication. In this game, the players will function as clients that connect to a central server. There will also be a Client Listener and a Client Handler file that will handle sending messages between the players as well as contain the logic for the game, such as keeping score and using each move.

### **81. IRCBot: An Internet Relay Chat Automation**

**Presenter(s):** Brandon Briseno and Alfonso Castanos

**Advisor(s):** Dr. Michael Fahy

Internet Relay Chat (IRC) is an online medium for text based process-to-process communication. The application layer protocol is compatible with any client program which can establish a socket connection with any server on the IRC network. IRC has existed as a form of real-time communication over the internet since the early 1980s. Although countless other mediums for online text based communication have developed since then (eg: AIM, Whatsapp, Skype), the IRC protocol has remained virtually unchanged and robust throughout the years. IRC is commonly used in the computer science field today as a system for reliable teleconferencing which may assist in a range of tasks, from organizing social events to coordinating automated online attacks. The purpose of this project is to learn the IRC protocol and fully implement an automated client program (or a "bot") which can: identify itself, establish its own socket connection, join/create a channel, promote itself, listen for commands from other clients and perform automated tasks accordingly. Research will be based upon the official IRC protocol, published by The Internet Society in 2000. Furthermore, the client will inherit abstract objects from an open source Java IRC API (application programming interface) called PircBot. The code will be written in a high-level programming language (Java) and will be maintained on a Github repository where group members will push and pull changes daily. Meanwhile, all code will remain compliant with Google's official Java checkstyle and Chapman's coding requirements.

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# Graduate Students

## Communication Studies

### **1. Cyberinfrastructure Development & Implementation: Challenges and Solutions**

**Presenter(s):** Juliette Atchekzai and Sam Mountjoy

**Advisor(s):** Dr. Kerk Kee

The rapid growth of information and communication technologies have continued to improve, thereby improving the quality and ease of communication despite distance. Still yet, there are many barriers to the diffusion of innovations process in the context of cyberinfrastructure (CI), defined as “infrastructure based upon distributed computer, information, and communication technology.” Thirty-eight transcripts were coded for barriers in Rogers’ diffusion of innovations process, and for possible solutions to those barriers. Findings suggest that barriers include understanding user needs, cutting through the noise, finding the right people to work on a team, team workability, communication due to location, policies, licensing, funding, and the political culture. The barriers were categorized into five classes: innovation specific, team specific, university specific, community specific, and adoption challenges. These challenges can impede on the development and implementation process, therefore there is a critical need to understand possible solutions. Understanding these types of challenges can ease the process of development and implementation. This research addresses each challenge mentioned above and two possible solutions for each challenge.

### **2. Validation and Measurement of the SMILE Model of Health Care Communication**

**Presenter(s):** Juliette Atchekzai

**Advisor(s):** Dr. Lisa Sparks and Dr. Keith Weber

An estimated 80% of serious medical errors are the fault of miscommunication. Current theoretical constructs applied to health communication research do not aptly recognize nor account for the applicability in interpersonal health encounters in the specific health communication foundation, which may have serious implications for individuals, their families and/or caregivers, and generally healthcare systems and structures. With innovative advances in medicine, the growing older adult and aging population in the United States warrants further attention on methods of cultivating effective communication patterns, especially in the context of health. Currently, there exists no one model to explain and predict effective communication interactions in health settings. The SMILE Health Care Communication Model is proposed to fill this gap in framework by providing a research and theoretically based model for patients to better their communication in health encounters. Thus, this study aims to validate and measure the SMILE-HCC so that it may aptly be used in interventions and research in the future of the field. Participants, recruited through convenience and snowball sampling, were asked to complete brief online surveys that assessed their communication experiences in the health care setting. Study 1 tests the model in older adults evaluating interactions with their primary care physician, and study 2 tests the model in informal caregivers that reported on their experiences with their care-recipient’s physician. With the validation of the SMILE Model of Health Care Communication, the heuristically-facile implementation may lead to more effective communication strategies in the future.

### **3. Cyberinfrastructure Software Development: Towards a Theoretical Understanding**

**Presenter(s):** Jacob Lopez and Devin Velasco

**Advisor(s):** Dr. Kerk Kee

Cyberinfrastructures are “large-scale distributed scientific enterprises” (Lee, Dourish, & Mark, 2006, p. 1) developed and maintained by human employment and technological performance (Lee, Dourish, & Mark, 2006). In recent decades, cyberinfrastructure has emerged as a driving force for scientific research and practice. Collaborative efforts of recent years have spawned a number of innovations in data mining, visualization, storage, and management, leading to major increases in research productivity (Kee, Craddock, Blodgett, & Olwan, 2011). Despite the promise of cyberinfrastructure, there has been little investigation into the development and implementation of such enterprises. Using qualitative data acquired from 48 in-depth interviews with cyberinfrastructure practitioners, this study examines the interactions surrounding the development and implementation of cyberinfrastructure software. Specifically, this study seeks to define the development phase of new software and understand how new software is shaped by person-person, person-object, and object-object interactions. Analysis of the interviews was guided by grounded theory, the diffusion of innovations theory (Rogers, 2003), and actor-network theory (Latour, 2005). Results do not support a standard diffusion of innovations definition of a development cycle. Subsequently, a new theoretical “development-implementation” process is proposed. Additionally, eight themes emerged contributing to the understanding of cyberinfrastructure interactions. Theoretical and practical implications for the development of new cyberinfrastructure projects are discussed.

## **Food Science**

### **4. Irradiation as an Alternative to Methyl Bromide Fumigation and DPA treatment of ‘Granny Smith’ Apples**

**Presenter(s):** Paul Olabode, Beatrice Michael

**Advisor(s):** Dr. Anuradha Prakash and Dr. Anderson Melo

Irradiation at 250 Gy is approved as a phytosanitary treatment for apples destined for Mexico to serve as an alternative to methyl bromide (MeBr) fumigation which is an ozone depleter. MeBr also increases the incidence of surface scald in ‘Granny Smith’ apples. To prevent surface scald, ‘Granny Smith’ apples are dipped in diphenylamine (DPA), a compound considered to be a carcinogen and prohibited in Europe. The objective of this study is to evaluate the effect of irradiation on ‘Granny Smith’ apples and determine if it can preclude the use of both, DPA and MeBr. Freshly harvested ‘Granny Smith’ apples were irradiated at 310 Gy or 1000 Gy or fumigated with MeBr at 48 mg/m<sup>3</sup>. Treated and control fruits were stored at 0.5 ± 0.5 °C, 92 ± 3 % relative humidity for up to 6 months. Following cold storage, fruits were kept at one week at ambient temperature prior to analysis. Ethylene levels in the irradiated apples decreased significantly ( $p < 0.05$ ) upon treatment and remained lower throughout storage compared to control and fumigated. Similarly, the incidence of surface scald was significantly lower in irradiated fruit as compared to fumigated and control apples at all storage times. Conjugated dienes and  $\alpha$ -farnesene concentrations decreased significantly ( $p < 0.05$ ) during storage in irradiated apples, consistent with the lowered ethylene

and surface scald. However, 43% of apples irradiated at 1000 Gy showed internal browning after 90 days, and 56% after 6 months + 7 days during ambient temperature storage. The low internal browning and superficial scald compared to control in the apples treated at 310 Gy, suggests that 250 Gy would serve as a good alternative to MeBr for phytosanitary purposes and as an alternative to DPA treatment.

Keywords: Alpha-farnesene, DPA, phytosanitary irradiation, surface scald, x-ray.

## **Pharmacy**

### **5. Exploring the Permissiveness and Altering the Regiospecificity of C6 Prenyltransferases Towards Drug Development**

**Presenter(s):** Ahmed Aoun

**Advisor(s):** Dr. Sherif Elshahawi

Prenyltransferase (PT) biocatalysts are tailoring enzymes used to catalyze the attachment of prenyl moieties to natural products. PTs possess certain degree of permissiveness allowing them to utilize various substrates. This prenyl modification in small molecules leads to changes in structural and biological activities and opens the door for a unique approach towards drug development. PriB PT is an example of aromatic PTs and has been characterized previously as a L-tryptophan (L-Trp) C6 C-prenyltransferase (C-PT). PriB accommodates various non-native donor and acceptor substrates and was found to prenylate the drug pindolol and the antibiotic daptomycin producing a derivative with higher activity. Alignment of PriB with other C6-C-PTs in addition to the analysis of the binding pocket of the tertiary crystal structure of PriB suggested a key amino acid residue, histidine 312 (His312), to play an important role in determining the regiospecificity of the enzyme. Hence, we hypothesized that mutation of His312 to other amino acid residues will alter the enzyme regiospecificity and possibly its permissiveness. Prenylation at different sites could alter the pharmacokinetics and biological activities of small molecules. Site-directed mutagenesis approach was used to mutate His312 and the constructs were confirmed via sequencing. Overproduction and purification of the mutant proteins and testing their in vitro activity is undergoing. This work will also shed some light on the mechanistic insights of aromatic PTs. Overall, the outcome of this study is to utilize the permissiveness of PriB enzyme for drug diversification and determine the activity of the mutant PriB enzymes.

### **6. CD44-Targeted Peptide-Colchicine Conjugates for Acute Gout Attacks.**

**Presenter(s):** Khalid Zoghebi

**Advisor(s):** Dr. Keykavous Parang and Dr. Khaled Elsaid

Gout is inflammatory arthritis that is the result of the precipitation of serum urate into crystallized deposits of monosodium urate (MSU) in and around the joint. Gout has gained a huge significance in many countries because of its prevalence has increased among populations. Resident macrophages play a vital role in initiating the inflammation cascade that leads to acute gout attacks. CD44 is a macrophage transmembrane glycoprotein that has various functions in cell division, migration, adhesion, and signaling. The CD44 receptor is overexpressed in many diseases including inflammation, therefore, could be used as targeted delivery for colchicine, which is considered a drug of choice for treatment of gout to reduce its side effects. Recently, peptide P6 ligand (FDAIAEIGNQLYLFKDGKYW) has been found that targets CD44

receptor. The objective of this project was to design CD44-targeting peptide conjugated with colchicine via a hydrolyzable linker to provide specificity and selectivity toward resident macrophages. Peptide P6 and peptide-colchicine conjugate were synthesized using Fmoc/tBu solid phase and solution phase chemistry, respectively, purified by reversed phase HPLC (RP-HPLC), and characterized using Matrix Assisted Laser Desorption/Ionization (MALDI) mass spectrometry. Glutaric anhydride was used as the linker and attached to N-deacetyl colchicine in solution phase to generate colchicine glutaryl ester. Alternatively, the conjugation of P6 and colchicine-glutaryl ester conjugate was carried out on a solid support. Binding studies between the designed conjugate and CD44 were conducted to confirm that the conjugation is binding as the natural ligand does. Furthermore, a comparative study of the stability of the ligand in synovial fluids from normal, mild to moderate, versus severely inflamed joints was carried out to assess P6 peptide stability. Preliminary data of the binding to the CD44 receptor of the conjugate and peptide alone compared to positive control (hyaluronic acid) showed similar binding affinity.

## Undergraduate Students

### Biochemistry and Molecular Biology

#### **7. Effects of Nanocurcumin ([WR]5-conjugate) on Doxorubicin-Induced Cardiotoxicity**

**Presenter(s):** Elizabeth Iantosca, Thimanthi Withana, Shirley Fong, Shaban Darwish, and Yuri Lee

**Advisor(s):** Dr. Sun Yang and Dr. Keykavous Parang

Oncology patients require multiple red blood cell transfusions as replacement therapy and despite the benefits this also causes patients to be susceptible to iron overload. Many studies have shown that iron can play a role in both tumor initiation and growth as well as in tumor metastasis. Doxorubicin (Dox) can readily bind with Iron (III) at physiological pH and through iron-mediated interactions, it causes the formation of reactive oxygen species (ROS), such as hydrogen peroxide and superoxide radical anions. Eventually, this results in mitochondrial respiration and cardiotoxicity. Curcumin (diferuloylmethane), a natural product abundant in turmeric, has been well documented for its anti-inflammatory, antioxidant, antiviral, anti-angiogenic, and anti-tumorigenic properties with no notable toxicity. Recent studies have also pointed to curcumin as a potent iron-chelating agent, but its full pharmacological potential is limited due to its extremely low water solubility (<0.1 mg/mL). The creation of an innovative nanoparticle drug delivery system will increase the solubility and drug delivery of curcumin, which may enhance its iron chelation capacity and subsequently protect myocytes from doxorubicin-induced cardiotoxicity. An iron-overloaded model of mouse myoblast cell line (C2C12) was used to determine the effects of curcumin on Dox-associated cardiotoxicity. Our study showed that the basal level of ROS in iron-overloaded C2C12 cells is much higher compared to that of parental cells. (WR)5-curcumin conjugate exhibited reduced cytotoxicity in comparison to normal curcumin at the same concentrations in Fe<sup>3+</sup> overloaded C2C12 cells. Our results also demonstrated that co-incubation of (WR)5-curcumin conjugate significantly reversed the induction of intracellular ROS levels by Dox treatment in Fe<sup>3+</sup> overloaded C2C12 cells. In summary, (WR)5-curcumin could be a safe and effective iron chelation treatment to protect myocytes from Dox-induced cardiotoxicity.

## **8. Reduced Cardiotoxicity Effects of Doxorubicin Conjugate (Dox-SS-[C(WR)4K])**

**Presenter(s):** Thimanthi Withana, Elizabeth Iantosca, Shirley Fong, and Shaban Darwish

**Advisor(s):** Dr. Sun Yang and Dr. Keykavous Parang

Doxorubicin (Dox) is a common anticancer drug used for treatment of human malignancies such as breast cancer. A major limitation of Dox treatment is dose-dependent cardiotoxicity caused by iron accumulation in mitochondria, which then results in increased production of reactive oxygen species (ROS). Our goal is to utilize targeted delivery system to minimize the uptake of Dox in cardiomyocytes, which may reduce its cardiotoxicity without compromising its anti-tumor activities. We successfully developed a Dox-conjugate, Dox-SS-[C(WR)4K], to reduce its cytotoxicity in cardiomyocytes. To assess the effects of Dox conjugate, a mouse myoblast cell line C2C12 was used. Cell viability was determined by MTT colorimetric analysis and Flow Cytometry was used to measure the intracellular ROS levels of C2C12 cells after treatments. Western Blot analysis was used to determine the protein expression levels. MTT results showed that at 20uM, Dox significantly reduced cell viability to 26% of control; cells exposed to Dox-conjugate for 72-hours remained as high as 78% of control. In Fe<sup>3+</sup>-overloaded C2C12 cells, Dox (0.5uM) notably increased intracellular ROS levels to 1.97-fold of control; while Dox-conjugate only stimulates ROS production of 1.13-fold of control. Consistently, Dox-conjugate exhibited significantly less cytotoxicity in Fe<sup>3+</sup>-overloaded C2C12 cells compared to Dox. Our data suggested that Dox-conjugate may have a reduced cytotoxicity in comparison to Dox alone in myoblast cells. We also determined the effects of Dox and Dox-conjugate on the expression levels of APE/Ref-1, a multifunctional protein that plays a major role in oxidative DNA repair and protecting cells from ROS. Western Blot analysis showed significantly higher expression of APE/REF1 protein after treatment of Dox-conjugate (5uM) compared to Dox (73% and 10% of control respectively). In summary, our study showed that Dox-SS-[C(WR)4K] exhibits promising protective activity in myoblast cells in comparison to Dox alone. Further study is needed to determine the anti-tumor activity of Dox-SS-[C(WR)4K].

## **9. Association Between Cancer Exosomes and Prostate Field Cancerization**

**Presenter(s):** Philip Pytak

**Advisor(s):** Dr. Marco Bisoffi

Field cancerization is a pre-malignant state where cells adjacent to adenocarcinomas experience molecular, genetic, and biochemical changes, including an over-expression of certain proteins. Field cancerization has been associated with tumor multifocality in the prostate, though the mechanism of this association is unknown. Identifying any of its causes would allow for clinical detection of tumor-adjacent tissue susceptible to tumorigenesis, potential targets in cancer therapy, and better staging and grading assessments of prostate cancer. One possible inducer of prostate field cancerization is exosomes: cell-secreted vesicles used for cellular communication; exosomes secreted from tumor foci may induce field cancerization by priming nearby tissue for tumorigenesis. In this study, markers for exosomes (CD9) and markers for field cancerization (EGR-1 and FASN) were detected with specific antibodies on three separate human tissue microarrays (TMAs), each containing consecutive cuts of tumorous, tumor-adjacent, and disease-free prostate tissue. Using confocal microscopy, the same regions of interest were selected and analyzed in all TMAs in order to determine a correlation amongst these biomarkers and better understand prostate field cancerization. The results show a positive correlation between exosomal marker CD9 and field cancerization marker EGR-1, indicating exosomes are involved in the etiology of field cancerization.

## **10. Purification and Initial Characterization of the Redox Sensing Protein NifA**

**Presenter(s):** Eddie Wadors and Heidi Standke

**Advisor(s):** Dr. Cedric Owens and Michael Medina

Nitrogen fixation in the endophytic symbiont *Gluconacetobacter diazotrophicus* is regulated by the sigma54 transcriptional activator, NifA. NifA activates nitrogenase when redox levels are favorable and fixed nitrogen levels are low. To date, the redox sensing mechanism of NifA is unknown. We hypothesize that NifA binds a redox sensitive iron-sulfur cluster. Previous efforts to characterize NifA have been difficult due to the expressed protein aggregating in inclusion bodies and being poorly soluble when purified. Here, we present our recent efforts to solubilize and characterize NifA. To improve protein expression and solubility, NifA was fused to the highly soluble Maltose Binding Protein, creating a NifA-MBP fusion protein. Expression studies demonstrated that NifA-MBP expresses well in *E. coli* BL21 when grown for four hours at 18°C using 40 μM of the inducer IPTG. Cells were then lysed via sonication, and the supernatant removed from the pellet. The MBP tagged NifA was then purified via Nickel and ion exchange chromatography to ca. 90% homogeneity. To test this hypothesis that NifA is an iron-sulfur protein, we reconstituted NifA anaerobically with iron and sulfide. Subsequently, by UV-Vis spectroscopy, we determined the presence of the [4Fe:4S] cluster and showed that the cluster falls apart under oxidizing conditions, suggesting a possible mechanism for redox sensing.

## **Biological Sciences**

### **11. IL-15 Effects of Glucose Metabolism in Cardiomyocytes**

**Presenter(s):** Kelly Hennigan, Michael Tomac and Veronica Yim

**Advisor(s):** Dr. Marcia Abbott

Obesity is increasingly prevalent amongst Americans, with billions of dollars spent and many deaths due to it. The myokine IL-15 (IL-15) has the ability to reduce obesity and its related disorders, such as glucose intolerance, in various cell types. However, it is not known whether or not IL-15 mediates glucose metabolism in cardiomyocytes (CM). The objective of the current study was to determine if IL-15 regulates proteins associated with glucose metabolism in CM. H9c2 CM cells were used to study IL-15 signaling. Following culture and differentiation CM were treated for 24 hrs with 100 ng/ml of IL-15. Proteins were harvested from the CM and a Bradford assay was used to quantify the protein concentration. Thirty-five micrograms of protein were loaded onto 4-20% polyacrylamide gels for electrophoresis. Proteins were then transferred from the gel onto a PVDF membrane. Primary antibodies (PhosphoAMPK, total AMPK, GLUT1, GLUT4 and GAPDH) were applied to the membranes, followed by secondary antibodies. The membranes were then imaged using chemiluminescence. Image J was used to quantify the density of the visualized protein bands. A t-test ( $P < 0.05$ ) was used to determine if IL-15 had significant effects on protein levels. IL-15 did not alter either phosphoAMPK or total AMPK levels ( $P > 0.05$ ). Glucose transporters GLUT1 and GLUT4 concentrations were significantly increased with IL-15 treatment compared to untreated CM ( $P < 0.05$ ,  $P < 0.01$ ). The data indicate that IL-15 increases the protein concentration of glucose transporters in CMs. Overall, IL-15 has the potential to be a regulator of glucose metabolism in CM.

## **12. Exploration of Mechanistic Controls of Methane Production in Northern Peatlands**

**Presenter(s):** Crosby Tinucci

**Advisor(s):** Dr. Cassandra Zalman and Dr. Jason Keller

Peatlands are important ecosystems in the global carbon cycle, storing one-third of the total terrestrial soil carbon and producing the potent greenhouse gas methane as a byproduct of microbial decomposition. Although significant at the global scale, the amount of methane produced by individual peatland soils varies dramatically. The reasons for this variability are not well understood. In peatlands, methane production can be controlled by many factors such as substrate availability, a top-down mechanism, and microbial community composition and population size, bottom-up mechanisms. This project explored the top-down and bottom-up controls on methane production in northern Minnesota peatlands. Surface (0-25 cm) and deep (100-150 cm) peat were collected from two Sphagnum-dominated peatlands in northern Minnesota and anaerobically incubated in the laboratory for six weeks. Various treatments were applied to the soils: addition of labile carbon in the form of <sup>13</sup>C-labeled glucose to mitigate potential carbon limitation; inoculation of deep peat with the surface microbial community; and incubation at either 4 or 14 degrees C to determine the effect of temperature on microbial dynamics. Carbon dioxide, methane, and hydrogen concentrations were determined using gas chromatography and the flow of carbon was isotopically traced using cavity ring down spectroscopy. Isotopic analyses suggest that temperature has no effect on dominant methanogenic pathway. The addition of glucose did not significantly increase methane production; in contrast, the addition of surface microbes into deep peat samples stimulated methanogenesis. These preliminary data suggest that these systems may be controlled by microbial community composition, a bottom-up mechanism, rather than substrate availability; however, further analyses of the microbial community and substrate availability are needed to confirm this finding.

## **Communication Studies**

### **13. Individual Well-Being and Hurtful Behaviors in Romantic Relationships**

**Presenter(s):** Jasmine Capacete, Francisco Orozco, Javell Valley, Kathryn Webb, and Jennifer Rulon

**Advisor(s):** Dr. Jennifer Bevan

In this study, we explored social media jealousy and its effects on intimate partner relationships. People on average use social media 1-2 hours per day and its prevalence is becoming an integral part in modern relationships. Previous studies have shown that social networking mate-retention tactics are now considered the norm in maintaining healthy relationships. Our study, which was conducting on 494 individuals averaging around the age of 23 years old, delves into the negative effects of surveillance and jealousy, specifically with the use of social media. The purpose of this study was to test our hypothesis that the greater the amount of jealousy and surveillance as a social networking mate retention tactic, the lower the quality of relationship satisfaction between romantic partners. Participants in this study were at least 18 years old and were asked to take an anonymous online survey on their jealousy, hurtful behaviors, and the relationship satisfaction in their romantic relationships. The study's results show a negative relationship between online surveillance as a mate retention tactic and relationship satisfaction in couples was found, thus supporting our hypothesis.

#### **14. Testing the PRCA-24 Ability to Predict Social Interaction: A Behavioral Test of the Predictive Power of the Communication Apprehension Measure**

**Presenter(s):** Madison Murphy

**Advisor(s):** Dr. Keith Weber

Communication trait research looks to investigate how traits influence the manner in which human beings interact with one another in communication situations. One of the major criticisms of personality and trait research is its over-reliance on self-report measures and the lack of evidence illustrating these measures ability to accurately predict behavior (Northouse, 2007). The current investigation sought to answer this critique by using one of the most widely recognized trait measures in the field of Communication Studies to predict behavior. Specifically, the current investigation uses participant's scores on the PRCA-24 scale to predict social behavior. Previously, this scale was used purely through self-reporting methods however in this study the scale was paired with an experimental component added to increase validity. I originally gave students a survey (part of the communication apprehension measure) and then created a false scenario where the students were left in the room with an observer and themselves. I then scored their real-time communication apprehension through a variety of variables including engagement, order of speaking, etc. in an effort to create an observable score to compare with the survey score that lacked validation and was open to bias. Results indicate that the PRCA-24 measure was able to predict social interaction behaviors more than 70% of the time which is an incredibly significant number. These results not only add to the validity of this measure but speak to the utility of all trait research and allow for the declining field to be reinigorated for a new generation of communication trait researchers.

#### **15. What Influences Collaborators Working in Cyberinfrastructure?**

**Presenter(s):** Chloe Pace

**Advisor(s):** Dr. Kerk Kee and Andrew Schrock

Cyberinfrastructure (CI), also referred to as e-science, is an immense database that stores and organizes data while allowing users (researchers, scientists, doctors, etc.) to communicate and share large capacities of information. Collaboration is a key strategy when it comes to working in CI because of the many tools and functions within its use. This poster examines 3 key concepts that influence collaborators working in CI. These concepts shown are work field, intent, and environment. Within those concepts, it's further demonstrated whether these collaborators are from the same field or different fields; work together for personal gain or for the greater good of a group; or work in an institutional or interpersonal setting. We found that these different forms of collaboration affect their collaboration styles.

#### **16. The Power of Awe-Eliciting Music on Inspiration and Well-Being**

**Presenter(s):** Samantha Quevedo and Rachael Kaufhold

**Advisor(s):** Dr. Sophie Janicke

From folk songs to pop songs, from classic to jazz, music has been part of people's lives ever since human beings acquire vocal voices. People love music for good reasons: from a psychological perspective, studies have shown that music can be used to induce positive mood (Thompson, Schellenberg, & Husain, 2001) and to improve performances on cognitive tasks (e.g., Schellenberg, Nakata, Hunter, & Tamoto, 2007).



But people also turn to music for “inspiration.” A recent nationally representative study of American audiences has shown that music is the number one inspiring media for American people (Raney et al., 2018). Research has shown that inspiration is related to a variety of aspects of well-being (Thrash et al., 2010) However, there is no experimental research to date that studies the effects of inspirational music on well-being. The current study tried to fill this gap in the literature. To that end, 91 participants were randomly assigned to either two pieces of inspiring music, or one piece of non-awe eliciting music that served as control condition. It was hypothesized that upon hearing awe-eliciting music, compared to non-awe eliciting music, participants would experience more inspiration, which in turn would predict satisfaction with life, positive affect, and life meaning; along with spirituality and prosocial intention. Additionally, we predicted that inspiration will mediate the relationship between awe-inspiring music and well-being outcomes. Ultimately, this study hopes to demonstrate that awe-eliciting music is more beneficial in creating subjective well-being and psychological well-being than non-awe eliciting music.

### **17. Examining the Effectiveness of Using Identity Theory in Product Marketing: An Application of Glossier's "You" Marketing Strategy**

**Presenter(s):** Kaylee Richards

**Advisor(s):** Hannah Ball

The marketing strategy of appeal to identity has potential room to create greater connectivity to consumers. Using the Communication Theory of Identity (CTI; Hecht, 1993) as a theoretical framework, this study examines the marketing strategies used by United States-based beauty company, Glossier. Notably, the language used in the product description of the Glossier “You” perfume appeals to the reader’s personal identity. Therefore, our study examines whether the extent to which participants identify with the product affects their purchasing intentions, credibility, and engagement in word-of-mouth communication about the product; and whether the experience of reactance mediates these relationships. Data will be obtained using a quasi-experiment in which participants will be randomly assigned to read the product description and view the marketing images of either (a) Glossier’s “You” or (b) a competing perfume. Notably, the comparable product has a similar price point and ethical ingredients to Glossier “You” but does not use the same language appealing to the consumer’s identity. After viewing either message strategy, participants will complete an online questionnaire regarding their identification with the message strategy they viewed as well as their reactions to the marketing approach. Following the CTI, it is hypothesized that participants will experience greater identification with the Glossier “You” marketing strategy and that this identification will result in greater purchasing intentions, greater perceived credibility, and greater intentions to communicate about the product via online- and offline word-of-mouth. Results will have implications for marketing tactics in appealing to millennial consumers in a saturated market, as well as for future applications of identity theory in strategic message design.

# Computational Science

## **18. Soft Tissue Sarcoma Clinical Presentation, Treatment, and Survival in Adolescents and Young Adults compared to Older Adults: A Report from the Scandinavian Sarcoma Group**

**Presenter(s):** Vidal Arroyo

**Advisor(s):** Dr. Philip J. Lupo, Dr. Beatrice Melin, Dr. Emelie Styring, Dr. Olga Zaikova, and Dr. Karin Papworth

Five-year survival rates for those diagnosed with soft tissue sarcoma (STS) have improved significantly among children and older adults (OAs), but these same trends have not been observed for adolescents and young adults (AYAs). While these disparities could be due to differences in biology or treatment, few studies have evaluated STS occurrence and outcome in AYAs. Therefore, the purpose of this study was to evaluate differences between adolescents and young adults (AYAs) and older adults (OAs) diagnosed with STS by stratifying analysis by: (1) clinical presentation; (2) treatment; and (3) survival.

Data were obtained from the Scandinavian Sarcoma Group (SSG) Central Register, which includes information on 5,747 patients from Sweden and Norway, diagnosed with a STS during 1986-2011. Variables included: age at diagnosis, metastasis at diagnosis, tumor size, histology, adjuvant treatment, date of death or last follow-up. AYAs were defined as those diagnosed ages 15-39 years. Categorical variables were analyzed using chi-square tests, and continuous variables were analyzed using t-tests. Overall survival (OS) and recurrence-free survival (RFS) were compared between AYAs and OAs using Kaplan-Meier estimates and log-rank tests.

Overall and by STS subtype, there were significant differences between AYAs and OAs on presentation, treatment, and survival. The distribution of STS subtypes was different between OAs and AYAs. OAs were also more likely to have larger tumors ( $>5$  cm, 67% vs. 52%,  $p < 0.001$ ) and higher malignancy grade (grade IV, 45% vs. 31%,  $p < 0.001$ ). Interestingly, AYAs were more likely to be treated with radiotherapy and chemotherapy compared to OAs (12% vs. 5%,  $p < 0.001$ ). In most scenarios AYAs had significantly better OS and RFS compared to OAs, other than for MPNST (OS:  $p = 0.19$ , RFS:  $p = 0.28$ ).

There were several differences between AYAs and OAs on STS presentation, treatment, and outcome. Additional work is needed to characterize the biology underlying these differences, which will inform future treatment strategies for both AYAs and OAs with STS.

## **19. SpaceX Mission Control**

**Presenter(s):** Dawson Jung and Everett Yee

**Advisor(s):** Dr. Michael Fahy

The purpose of this research project is to simulate a SpaceX Falcon family rocket flight status and monitoring tool to supervise launch activities. This is achieved using a variety of data sources and open-source Application Program Interfaces (APIs). This tool is being built using the JavaFX platform, which is used for creating and delivering desktop applications. Scene Builder is also being used to create the user interface. The application aggregates four panes of data. Each pane will include the latest or next upcoming webcast embedded as a YouTube video, separate tabs to access the latest tweets and Reddit threads, specific information on the latest launch (such as launch time, core number, and flight number), and the flight trajectory graphs, among other things. The challenges of this project will be creating a user friendly and aesthetically pleasing user interface, finding and accessing data and information streams from open source and social media APIs, and taking the data and parsing it into a form that can be read and be

used by the user in a friendly and useful manner. This project also has the potential to be expanded to include more functionality and include support for more launch providers given more time and resources to work on this project.

## **Environmental Science and Policy**

### **20. Comprehensive Recycling and Research Facility**

**Presenter(s):** Colton Green

**Advisor(s):** Mackenzie Crigger

Chapman University does not continually collect household hazardous waste (HHW) from its on-campus residents unlike other larger scale top universities in the west, such as UCLA, UC Davis and Loyola Marymount University. With the \$150 million expansion of Chapman's Katella Grand residence hall and new construction on campus, now is an opportune time to redesign waste streams that could help divert 100 percent of HHW with little to no additional effort by on-campus residents. It was proposed that campus-wide HHW collection bins, as well as a comprehensive recycling facility to process priority waste/recycling should be implemented. Increasing waste diversion rate has the potential to save the university money in the long run because Chapman's waste provider recycles for free as opposed to paying for trash removal. Furthermore, the proposed facility could be used for waste tracking and enable future research for the Environmental Science and Policy program. With a recycling hub facility, it would be easier to study and improve waste diversion on campus for years to come.

## **Health Sciences and Kinesiology**

### **21. GRAIL Based Sensory Perturbations - A New Tool to Assess Sensory Organization and Fall Risk During Walking in the Elderly**

**Presenter(s):** Harbir Bhatti

**Advisor(s):** Dr. Rahul Soangra

Every 11 seconds, an older adult is treated in the emergency room for a fall; and every 19 minutes, an older adult die from a fall. According to the CDC's Web-based Injury Statistics Query and Reporting (WISQARS), one in four Americans aged 65+ falls each year. In 2014, the total medical cost of fall injuries was \$31 billion. These fall accident and injury statistics may remain unchanged unless an automated highly accurate mechanism for fall risk assessment is available. Having said that, the purpose of this research study is to identify fall prone elderly and prevent fall from occurring. Using sensory perturbations as an assessment tool, this study involved randomly perturbing participants while walking on the GRAIL (Gait Real-time Assessment and Interactive Laboratory consisting of virtual environment and treadmill). Five walking trials were performed which tested for somatosensory, vestibular and visual sensory organization while walking. We designed treadmill-based programs to provide perturbations to all three sensory systems- visual, vestibular and somatosensory during walking. We expect somatosensory and visual perturbed inputs together will influence stance time, double support time and swing times in the participants with high fall risk. We expect the stance time of the participants will increase significantly and the swing time will reduce, in order to maintain dynamic balance as an adaptive behavior.

## **22. Evaluating the Predictive Quality of the Chapman Bone Algorithm Using Aggregated Data Sets**

**Presenter(s):** Noah Barrett and Cameron James

**Advisor(s):** Dr. Frank Frisch and Dr. Cyril Rakovski

Due to an aging population, osteoporosis has become an increasingly prevalent metabolic bone disorder that is largely undiagnosed worldwide because of inaccessible and expensive DXA machines. The Chapman Bone Algorithm (CBA), a mathematical treatment that enables osteoporosis determination by using easily assayed bone metabolites from blood serum, has been previously presented as a less-expensive, more feasible option for analyzing bone health. The CBA has a sensitivity of 1.0 and a specificity of 0.83, with an area under the Receiver Operating Characteristic curve of 0.93. Our goal was to utilize existing data from primary literature sources to determine if the CBA could be applied with similar or equal fidelity. We obtained mean values from analyses of serum osteocalcin (s-OC) and serum pyridinoline (s-PYD) markers in conjunction with patient age from various large-sample data sets available in primary literature. Following analyses of aggregated mean values from the literature, we found that 60% of studies predicted the presence or absence of osteoporosis with the same degree of accuracy between FRAX and CBA methods. Osteoporosis was defined as having a t-score of  $\leq -2.5$  (FRAX) or surpassing the threshold p-value of  $\geq 0.035$  (CBA). We expected higher agreement between the FRAX scores and our CBA, but this may be due to the aggregated nature of the data. Our findings indicated the need to advance the CBA in analyzing larger-scale primary data sets, underscoring the importance of raw data analysis, to determine the full efficacy of this diagnostic tool.

## **History**

### **23. Remembering the Children : The Warsaw Ghetto Boy as a Symbol in the Artwork of**

**Samuel Bak**

**Presenter(s):** Brooke Fessler

**Advisor(s):** Dr. Marilyn Harran

In the postwar years, survivors of the Holocaust pursued many different avenues in order to ensure the history of what happened would not be forgotten. Memorials were built, monuments raised, and museum institutions established, all in the hope that the great atrocities against humanity that occurred during the Holocaust would remain a part of the history taught to future generations. In attempting to do this, they faced the challenge of seeking to express events that defy expression. One survivor of the Holocaust, Samuel Bak, utilizes symbols and imagery in his artwork to explore how the world has changed as a result of these events. This project specifically explores the influence of the The Boy in the Warsaw Ghetto photograph in the imagery of several of Bak's key works, closely analyzing the imagery in the context of Bak's personal experiences and the history of the Holocaust. In his 2009 series Icon of Loss, Samuel Bak seeks to provide viewers with the iconic symbol of the Warsaw Ghetto Boy as a representation of both his personal memories of what occurred during the Holocaust, while additionally utilizing this symbol as a link to the history of all the children who were affected by the events of the Holocaust. In doing so, he enacts remembrance, creating reminders of a history that should never be forgotten.

#### **24. Tolerance as a Way to Remember**

**Presenter(s):** Natalie Figueroa

**Advisor(s):** Dr. Marilyn Harran

This project examines the topic of Holocaust memorialization with a specific focus on the Simon Wiesenthal Center and their Los Angeles Museum of Tolerance. It posits that the mission and design of the museum were shaped by two major factors, first, the values of Nazi hunter Simon Wiesenthal for whom the Center was named, and second, racial and ethnic tensions within the City of Los Angeles during the late 1980s and early 1990s, which culminated in the Los Angeles riots in 1992 following the acquittal of four white police officers in the 1991 beating of Rodney King. The museum opened its doors the following year. In the context of social tensions and upheaval, the museum's founders reframed Holocaust remembrance from being a primary concern to the Jewish community to one embracing the entire civic community. The museum's founders conceptualized and designed the museum to demonstrate Holocaust remembrance as inseparable from social and religious tolerance. Evidence to support this thesis will be drawn from a close analysis of several museum exhibits, as well as from primary sources which speak to the development of the museum in the context of the history of Los Angeles. From the vantage point of the museum's design and exhibits, this project addresses the broader issue of how Holocaust memory and museums reflect both historical content and civic context.

#### **25. Polityka Historyczna: Debates on Holocaust Remembrance in Poland**

**Presenter(s):** Connor Kridle

**Advisor(s):** Dr. Marilyn Harran

On February 6th, 2018 Polish President Andrzej Duda signed "the amendment to The Act on the Institute of National Remembrance," or as some in the western media called it, Poland's "Holocaust law." This law struck many outside Poland as a surprise act of revisionist history by the far-right, nationalist party in power. This project utilizes Polish government materials, as well as scholarly literature on Polish history and nationalism to argue for a more complex and nuanced interpretation. This interpretation places the law within the historical context of the post-communist Polish struggle to form a national narrative. The law's passing is not a sudden occurrence, but the result of more than a decade of heated debate and discussions as Poland seeks to come to terms with its complicated history during the Holocaust. One flash point in this debate occurred in 2001 with the publication of the book *Neighbors* by Jan Gross describing the 1941 murder of some 1,600 Jews in Jedwabne by their Christian neighbors. While the passage of this law signals a new step by the party in power to conclude debate on Poland's role during the Holocaust, many in Poland oppose it. This project seeks to magnify these dissenting voices who see power in dialogue, in questioning, and in examination of the past in all its complexity.

## **26. Musical Survival: Women's Orchestra Auschwitz-Birkenau**

**Presenter(s):** Emma Rosenzweig-Bock

**Advisor(s):** Dr. Marilyn Harran

This project explores the women's orchestra of Auschwitz-Birkenau as a means to survival in the camp. It argues that participation in the orchestra prolonged life and created a sense of community among orchestra members, while at the same time subjecting them to the ethical dilemmas that Primo Levi characterized as "the gray zone." The ability to create music protected the orchestra members from the dangers of exhausting physical labor and gave them potentially life-saving benefits, including more food and better housing. At the same time, membership in the orchestra separated the women from their fellow prisoners who often treated them with hostility. Orchestra members also lived with the constant fear that a poor performance could be a death sentence. Examination of the oral and written accounts of orchestra members thus provides a window on what Holocaust scholar Lawrence Langer has termed "choiceless choices," particularly as it affected women prisoners. It also demonstrates the Nazi strategy of pitting prisoner against prisoner with the goal of dehumanization. This project utilizes historical methodology to examine diverse primary sources, including oral testimonies in the USC Shoah Visual History Archive and memoirs written by orchestra members, as well as scholarly studies, particularly those focusing on the still debated actions of Alma Rose as orchestra leader.

## **27. Olympia, Part I: Festival of Nations Documentary, Propaganda, and National Legitimacy**

**Presenter(s):** Katherine Russell

**Advisor(s):** Dr. Marilyn Harran and Dr. Jeffrey Koerber

This project examines the groundbreaking 1938 documentary Olympia Part I: Festival of Nations, a film record of the Berlin Olympic games of 1936. While the question of whether the film's creator, Leni Riefenstahl, intended this sports film to also be a propaganda film, remains a matter of debate, it is clear that the Nazi leadership utilized it to further their propaganda and ideological goals. This project posits that Riefenstahl utilized innovative film techniques to entertain, indeed to astound her audience, producing mesmerizing images that became powerful symbols of Nazi legitimacy. As Riefenstahl presents in her film, 51 nations came to Germany for the 1936 Olympics bringing with them the best of the best. The plan to bring the games to Berlin had actually been formulated before Hitler came to power. The film demonstrates how the Nazis exploited the games to promote their renewed national prestige. With shots of Adolf Hitler watching the competition from above, Riefenstahl shows him as the orchestrator of all we see and hear, particularly during the opening ceremonies. The project builds evidence for its thesis through close analysis of specific images and scenes in the film combined with historical analysis of Nazi ideology as articulated in laws and edicts promulgated by 1938.

## **28. Janusz Korczak: Sculptor of a Child's Soul**

**Presenter(s):** Sarah Walling

**Advisor(s):** Dr. Marilyn Harran

A pioneering pedagogue, an acclaimed author, a dedicated physician, a courageous soldier, even a popular radio personality, Janusz Korczak was a familiar figure to many people in pre-Holocaust Poland, even if they knew him only under his pseudonym of Henryk Goldszmit. The research question I focused on was how Janusz Korczak was able to empower children in his orphanages. Drawing on USC Shoah Foundation eyewitness testimonies, diaries and memoirs, as well as scholarly secondary sources, my project analyzes the life work of Korczak. My thesis is that from an early age, Korczak viewed children as autonomous individuals, each with unique potential. Rather than regarding the purpose of education to be the “filling” of children as “empty vessels” with knowledge as was the pedagogy of the time, he saw the purpose of education as eliciting the abilities intrinsic to each child, i.e. “sculpting” the soul. Korczak understood caring for children as far more than giving them a bed to sleep in and food to eat. He saw the uniqueness within each child and sought through practical activities to teach them justice, fairness, and respect for all people. Korczak remained steadfast to his cause even as the Jewish children for whom he cared were sent into the ghetto. Even there, he encouraged the children to self-empowerment and refused to leave them, although he was given multiple opportunities to do so. Ultimately, in an act of unforgettable courage, he marched with them through the streets of Warsaw to the train that would take them to their death at Treblinka in August 1942.

## **Integrated Educational Studies**

### **29. Moving Beyond Numbers: Examining Language in Mathematics Classrooms**

**Presenter(s):** Ansley Wong

**Advisor(s):** Dr. Cathery Yeh

There is growing attention on the mathematics learning experiences of emergent bilingual students, a term used rather than English language learners to emphasize the rich linguistic knowledge of students who know and speak two or more languages instead of how they are often positioned of not knowing English, in the field of mathematics education. The majority of past and current studies have examined the impact of students' language proficiency on academic performance. While this work has deepened understanding of mathematics learning for emergent bilinguals, language is only one of many semiotic resources (e.g. physical control of space, gestures, and gaze) at play in bilingual/multilingual classrooms. Research is needed that unpack the development of principled instruction that supports students' engagement in meaningful disciplinary discourse practices. Using Cultural Historical Activity Theory (CHAT) as a framework, I examine classrooms as complex activity systems. Learning is considered a social endeavor that occurs as students engage individually and collectively with each other and with mediational tools that impact student participation. Study findings demonstrate the importance of using a systems approach to examining individual and intersectional impact of teacher's decision-making (e.g. tasks, mediating artifacts, division of labor, community, and norms) on student learning. Findings offer guidance to mathematics educators on the design classroom learning spaces that better leverage emergent bilingual students' individual and collective abilities.

# **Peace Studies**

## **30. Racial and Social Integration of Chapman College in the 1960s**

**Presenter(s):** Andrew Calloway

**Advisor(s):** Dr. Lisa Leitz and Dr. Quaylan Allen

Looking through the theories and practices of microaggressions, contact theory, friendship segregation and critical race theory, the challenge to deconstruct the frameworks of racism, and segregation that were implemented in public education and higher education systems remains to be the struggle in classroom and campus settings. What are the effects of having a diverse student population? Analyzing the history of court cases such as Mendez v Westminster School District, Brown v. Board of Education of Topeka, and Florida ex rel Hawkins v. Board of Control of Florida shows the hardships of schools and other university systems blanketing the practice of segregation and difficulties into becoming more integrated. It would take almost a decade later of court cases for the United States Executive Branch to pass the Civil Rights Act of 1964 and Title VI, furthering the definition of equal protection and the Fourteenth Amendment. It has been a struggle in classrooms to teach the moments of history in which racism and social divisions was a social practice in America. The struggles can create the dilemma for the professor is hoping to create a safe comfortable environment in where perspectives, questions, and analysis can be shared in challenging strong political and social institutions that have practiced racism. Louise Booth's Fulfilling A Dream and the mission of Disciples of Christ shares insight of challenging strong held social conditions in our communities and across the United States. The rich history of Chapman College and the important figures and role models that have come and gone through the school's history can teach some lessons of how the student's developed feelings of belonging and a sense of empowerment in which social change can be made in their communities by earning an education.

## **31. Peace & Positionality through Music**

**Presenter(s):** Taylor Kunkel

**Advisor(s):** Dr. Lisa Leitz

In the spring of 2016, I received a grant from the Babbie Center (in conjunction with OURCA) to conduct musical research while abroad in South Africa. Later that year, I recorded some of the protest music at the University of Cape Town during the #FeesMustFall movement. One aspect that stood out to me were various attempts amongst some of the protesters to explore music through a decolonized lens. Due to the nature of the recordings I gathered, I considered discussing the meanings behind, as well as my own personal experiences with, each recording – especially seeing as though protest music serves as a direct link between my two disciplines, music and peace studies. My exploration of ethical research practices has made it clear, however, that I did not properly get permission to use this data. Using self-reflection and an examination of the positionality of researchers and musicians, I am using this Independent Study course to develop a path for creative projects to ethically obtain sensitive data. I plan to create a brochure with which I can provide some tips and tricks for students going into the realm of arts field work, and hopefully with this project, I can offer some advice for grant recipients in the arts.



### **32. Public Opinion on Homelessness in Orange County: Trends and Political Repercussions**

**Presenter(s):** Bennett Tuleja

**Advisor(s):** Dr. Lisa Leitz

This research seeks to bridge a 30-year gap in Public Opinion research regarding the issue of homelessness. Lee (2010) utilized data from the 1980s to gain a comprehensive perspective on homelessness and with a snapshot of the public's opinion on the issue. Lee found that a particular demographic set in particular was apathetic towards the homeless, demonstrating what was coined the "not-in-my-backyard" ideology and trend for those exemplifying the aforementioned apathetic viewpoint. That demographic that expressed this as their opinion was male, white, conservatives. This research will delve into seeing if this demographic set that held their opinions on the homeless in the 1980s holds those same opinions today. Utilizing data from the 2018 Orange County Annual Survey (OCAS), the notion that white, male, conservatives, hold apathetic viewpoints will be analyzed to see if their demographic viewpoints have changed, remained consistent, or perhaps another demographic within society has come to adopt a more apathetic view towards the homeless. Preliminary results have demonstrated that Caucasian/white, non-Hispanic individuals emphasize the importance of the issue compared to those identifying as African American, Multi-Racial, and Hispanic/Latino. However, those identifying as Asian have come to exemplify the same level of prioritization of the issue of homelessness. This study will analyze the prioritization of the issue, along with public demand to devote more resources to aid the homeless to determine the interest of demographics in the issue as well as their willingness to help provide aid. Further, this will be broken down to view what party affiliations, ethnicities, and genders lean towards these tendencies of prioritization and demand to compare the notions set forth in Lee (2010).

### **33. State-Sponsored Terrorism in the Vietnam War: The Phoenix Program**

**Presenter(s):** Bennett Tuleja

**Advisor(s):** John Emery

The Phoenix Program arose in 1968 following the Tet Offensive that changed the political tides of the Vietnam War. The controversial CIA program was targeted towards civilians, not militants and sought to gather information about the Viet Cong Infrastructure (VCI); from there utilizing the information to eventually neutralize its members. As it was difficult to identify who a militant was and who a civilian was in Vietnam, the program allowed the capture of any suspected Viet Cong member or sympathizer. The Phoenix Program was infamous for its brutal tactics and information gathering methods; including torture and morally contentious assassination campaigns. Tactics utilized by the United States, given the military's use of advanced weaponry and unconventional tactics such as those of the Phoenix Program, have led to the notion that war crimes may have been committed by the US during the Vietnam War. The concept of terrorism, while relevant throughout the history of humanity has become far more relevant and unfortunately more commonly known in the new wave of terrorism that has been seen over the course of the past few decades. While terrorism is widely known by many, the concept of state-sponsored terrorism is not; particularly pertaining to the United States. This project will assess the tactics the Phoenix Program used throughout its operations during the Vietnam War, including what its goals were exactly, why it came to exist, and whether the tactics utilized by the Phoenix Program qualify as state-sponsored terrorism.

# Physics

## **34. Generation of Orbital Angular Momentum Light Modes**

**Presenter(s):** William Parker

**Advisor(s):** Dr. Jerry LaRue

Twisted light beams are a relatively recent development in the field of quantum optics. In 1992, Allen et. alumn showed that laser light with a Laguerre-Gaussian amplitude distribution has well-defined orbital angular momentum. There are numerous applications for twisted light, including optical tweezing, optical communications, and investigations into the interactions between photons and matter. High-dimensional data transmission using a twisted light beam has been shown to drastically increase our ability to transmit data, through free space, at a fast rate. In 2012, researchers at the University of Southern California transmitted data at a rate of 2.5 terabits per second, across a distance of roughly 1km. Mirhosseini (2014) showed a similar result and also demonstrated the effectiveness of this type of data transmission for quantum key distribution, as it is highly resistant to eavesdropping attacks. In addition to having direct applications in communications, twisted light is fundamentally interesting. For one, twisted light itself is a quantum system that is relatively easy to study. Also, the interaction between light and matter has long been an interesting field of study, in some ways contributing to the very development of quantum mechanics. The extra degrees of freedom introduced by twisting light provides a new richness to the study of light-matter interactions. In order to study twisted light, a few methods to generate it have been proposed and proven to work. However, the field is still missing a method that is small, robust, cost-effective, efficient, and also versatile enough to generate any combination of light beams on demand. The closest is Mirhosseini's method, in which he used a single Digital Micromirror Device as a binary diffraction grating, which transforms an incident plane wave into twisted light. I have replicated a version of this set-up and am working towards subtle improvements, including achieving a higher efficiency, finding the limits of the capabilities of such a set-up, and considering adaption for use with a femtosecond laser.

# Political Science

## **35. Latino Voting Trends in Orange County**

**Presenter(s):** Mark Dominguez

**Advisor(s):** Dr. David Shafie

The Latino population in the United States currently can sway a political election towards a certain party. As the community continues to grow and spread throughout the rest of the country, the political ideologies of the population will follow them. While historically, the Latino community does not have a high voter turnout, they have proved that they participate in the political arena in different ways. There has been research done which highlights the best ways of mobilizing the "Sleeping Giant" in order to try and sway a vote in a certain way for the Republican or Democratic party. I will use the 2018 Orange County Annual Survey to determine why a significant proportion of the Latino community identifies with the Democratic Party. I anticipate Latinos being drawn to the Democratic Party because of their focus on issues like Deferred Action for Childhood Arrivals (DACA), immigration, education and social services that

affect their community directly. Politicians looking to win elections can capitalize on the large Latino population in Orange County that has the power to sway an election if they emphasize the issues in the forefront of Latino voters.

### **36. Paranormal Beliefs and Their Effect on American Fears and Political Identification**

**Presenter(s):** Tyler Ferrari

**Advisor(s):** Dr. David Shafie

Urban legends and conspiracy theories have been a cornerstone of American culture for many years, and these stories and theories have permeated many aspects of society from tourism to pop culture. But how have these stories and theories affected politics? Conspiracy theories and urban legends all revolve around the distrust of institutions, ranging from governments to the media, but there is very little research to indicate how beliefs in these types of phenomena affect political self-identification, and fear in real-world disasters. This paper seeks to answer the following: How do paranormal and abnormal beliefs influence political identification? And how do these beliefs influence one's fear of "real-world" events like natural disasters and terrorism? While prominent scholars like Cass Sunstein note the causes and solutions of conspiracy theories while noting the damage they can cause to a society, there is little work done to see what types of voters these people are. This paper hypothesizes that beliefs in paranormal phenomena are negatively correlated with political sophistication and strength of political ideology. Using the Chapman Survey of American fears, this paper will analyze data involving beliefs in paranormal phenomena like bigfoot and aliens, beliefs that government is covering up the truth about certain events, and fears about possible real world disasters. These will be compared to political party identification in order to test the hypotheses asserted in this paper.

### **37. The Effects of Education and Media Consumption on Political Participation**

**Presenter(s):** Elise Grindstaff-Silverstein

**Advisor(s):** Dr. David Shafie

This analysis will examine the effect that education and media consumption have on political participation in the United States. Using data from the "SETUPS: Voting Behavior: The 2016 Election" survey which was conducted by the N. E. S.; the researcher will attempt to affirm the hypothesis that individuals with a higher level of education and a higher level of media consumption will display more political participation than individuals with lower education and media consumption levels. While these variables have been examined before, there is less research that studies how the two independent variables interact with each other to influence the dependent variable; a great deal of research examines one broad influence with the assumption that others play a role as well. Certain questions from the SETUPS data have been selected, re-coded, and analyzed to determine the interaction and significance of the variables. This analysis will be reported and the results will be compared to existing research regarding influences on various political behaviors such as voting patterns, involvement in traditional and non-traditional demonstrations, and discussion of politics. I expect to find that people with higher rates of education and media consumption will report higher levels of political participation.

### **38. Rules of Engagement from The Vietnam War to the War in Afghanistan**

**Presenter(s):** Alec Harrington

**Advisor(s):** John Emery

This study attempts to understand how US military Rules of Engagement (ROE) have transformed from The Vietnam War to the War in Afghanistan. It assesses the impact of the evolution in ROE and its effect on the safety of US personnel engaged in combat. ROE have been constructed to protect the innocent; however, an unintended consequence of these policies is that it might give too much protection to the enemy while restraining US personnel to their tactical disadvantage. For this project, I have interviewed Master Chief Hershel Davis, a retired Navy SEAL who served in Vietnam, and will compare this to the contemporary autobiography by Navy SEAL Marcus Luttrell, Lone Survivor. This interview and autobiography provide the firsthand account of vastly differing ROE, in a combat setting, to provide insight into evolving war norms from the 1970s to conflicts today. This project will look at how ROE have evolved and the strategic and moral rationale for this shift, and assess how this aids or hinders service members from completing their mission. Ultimately, ROE have taken the US in the right direction in producing a safer and more ethical war; nevertheless, the unintended consequences of such a policy, as demonstrated in the interview and autobiography, call us to question the utility and efficacy of such a restrictive policy today.

### **39. Bumper Sticker Politics.**

**Presenter(s):** Adam O'Shea

**Advisor(s):** Dr. David Shafie

In my research, I seek to identify factors that may cause people to be more inclined to express their political opinions via bumper stickers. I will be building on research that was published in a study titled, "The Expression of Emotion and Social Status in the Language Barrier of Bumper Stickers" by James W. Endersby, and Michael J. Towle which proved a positive correlation between socioeconomic status and the use of bumper stickers to express opinions. They did so by observing the cars in the greater area surrounding Washington D.C. and counting the bumper stickers on cars and labeling their intensity. Stickers that depicted the name of a university were deemed less intense in nature, while political stickers were deemed more intense. They then surveyed the owners of the cars to identify their socioeconomic status, and they deemed that middle class individuals were more inclined to use bumper stickers to express their opinions. So using the National Election Study, I will attempt to identify other factors such as race, religion, and political affiliation that may make individuals more inclined to express themselves with bumper stickers, as opposed to just socioeconomic status. I will also be expanding the scope of the experiment to include political buttons and other artifacts that express people's point of view. Through my research, I anticipate that factors like race and religion that will be able to give a deeper understanding as to why people use bumper stickers and other artifacts as a form of expression that differ from socioeconomic status.

#### **40. The Effects of Different State Laws and Requirements on Voter Turnout**

**Presenter(s):** Austin Pyka

**Advisor(s):** Dr. David Shafie

High or low voter voter turnout in presidential elections can be due to the different types of voting methods and systems in each state, such as voting requirements and ways of voting. The purpose of this research is to see which states voting methods and systems results in higher or lower voter turnout. The variables in each state such as, same-day registration, voter I.D laws, early voting, mail in voting, absentee voting without excuse, in person absentee voting and provisional voting. Additionally, each state uses a different type of voting systems, these include, optical scan paper ballot systems, direct recording electronic systems (DRE), ballot marking devices and systems, punch card voting systems. These variables in each state will be applied to the 2016 presidential election to compare and contrast the voter turnout in each state. According to the national conference of state legislators, voter I.D. Laws are classified as strict, non-strict or none at all. I will analyze state-level voter turnout data from the 2016 presidential election, as well as a database of state voting systems compiled by the University of Florida. The expected results for this research is that voter turnout is affected in a positive or negative way depending on the convenience of the specific states voting system and requirements.

#### **41. Opinion on Climate Change and Its Influence on Policy**

**Presenter(s):** Eteri Sachechelashvili

**Advisor(s):** Dr. David Shafie

This paper explores how people's opinions about climate change influence their opinions on policy, such as the relationship between opinions of whether there is solid evidence average temperature on Earth has been warming in the past four decades and of whether a person supports leaving coal in the ground to avoid climate change or agrees that rich countries have a moral obligation to reduce greenhouse gas. The paper also examines the consequences of climate change denial. The data source I am using is the US National 2015 survey on energy and the environment. According to Idso, Carter, and Singer, it is frequently disregarded that scientists have different views about the effects of fossil fuels on the worldwide climate. This one source states that the surveys and articles that are most often used to support a claim of scientific consensus can be purposefully deceptive and obtained by the use of flawed tools. Conversely, according to Darling and Sisterson, reporters, especially in the United States try to present a balanced publication about climate change and this leads to a very tiny minority view getting the same time as the majority or consensus view. As the result, people who receive this information often end up having an unbalanced understanding of details and therefore slow down action toward alleviating global warming.

#### **42. Attitudes Toward Immigration in Orange County**

**Presenter(s):** Elizabeth Tostado

**Advisor(s):** Dr. David Shafie

My research focuses primarily on Orange County and the attitudes that those within OC hold toward immigration. Typically, most people believe California to be a very progressive state as well as accepting when compared to other states in the United States. I decided to take a look at Orange County, which is within California, to see how those views play out in this County. I take a look at a few independent

variables which may or may not significantly affect an individual's attitude toward immigration. I use a few common independent variables which consist of age, race gender, and ideology. Another independent variable which may affect attitudes toward immigration is approval of President Donald Trump. This independent variable is essentially seeking to see if there is a Trump effect when it comes to attitudes toward immigration within OC. One of my hypothesis is that race is related to attitudes toward immigration. The dataset I am using to test my hypotheses is the 2018 Orange County annual survey. I expect these variables will predict whether people view immigration as a positive force in Orange County, as well as support for legalization of undocumented immigrants and DACA.

#### **43. The Price of Protection: The Relationship Between Fear of Terrorism and the Value of Civil Liberties**

**Presenter(s):** Kristen Weiser

**Advisor(s):** Dr. David Shafie

This paper studies public reactions to terror attacks in the United States, specifically analyzing the reaction of fear and its relationship with a willingness to surrender civil rights in exchange for greater protection. In order to examine this, I use data from "The Attack on America and Civil Liberties Trade-Offs: A Three-Wave National Panel Survey," conducted from 2001 to 2004. The literature focuses on gender as a control variable and concludes that women are more likely to react to an attack with fear and support for protective policies, whereas men are more likely to react with anger and support for retributive policies. Previous research also finds that trust in government was high following the attack on September 11, 2001. I focus on other variables including marital status and several demographic features. I also address the difference in levels of trust in the Federal Government throughout the waves of the survey. Results are expected to support previous findings on gender. Non-white respondents are expected to place greater importance on protecting civil liberties. Married individuals are expected to have higher support for preventative policies. Lastly, trust in government is expected to vary from previous findings, with trust being lower immediately following an attack. My general hypothesis is that fear of terrorist attacks and trust in government are associated with acceptance of authoritarian policies and willingness to sacrifice civil liberties.

## **Psychology**

#### **44. Can Random Number Generation be Taught Implicitly?**

**Presenter(s):** Daniel Briseno and Alice (Sook Mun) Wong

**Advisor(s):** Dr. Uri Maoz

Human endogenous random-number generation (RNG) has been shown to be systematically biased—underrepresenting long repetitions of short patterns (e.g., 0-0-0-0 is underrepresented in binary random-series)—but improvable in a competitive environment with feedback. (Rapoport and Budescu, 1992). In our experiment, we test whether this learning transfers back to non-competitive environments. In the first phase, we measured whether subjects' RNG ability transferred from a competitive environment with feedback (CF) to an endogenous, self-directed one (SD), devoid of feedback or competition. Subjects carried out an experiment composed of 3 parts: (1) Pre-SD: RNG of Rock (R), Paper (P), Scissors (S); (2) CF:

game of R-P-S against a computer; (3) Post-SD: same as pre-SD. The CF part varied among 3 between-subject conditions. In conditions 1 and 2, the computer searched for patterns in each subject's choice history and used those to beat the subject. So, subjects' choices needed to be as random as possible to win. In condition 3, the computer generally followed a simple, repetitive pattern. In conditions 1 and 3, subjects were only instructed to play against the computer, while in condition 2 they were specifically informed that they had to be as random as possible to win. Subjects were considerably more random in CF trials than pre- and post-SD ones, reaching levels comparable to a pseudorandom-number generation. But subjects under conditions 1 and 2 were unable to transfer their superior RNG abilities from CF to SD trials. Our results suggest that the differences between the conditions were driven mainly by the systematic underrepresentation of long repetitions of short patterns. One major limitation of the first phase of our experiment was our sample size (n=60). In the second phase of our experiment, we are uploading the experiment to an online platform to obtain a larger sample size. In addition, we will be investigating whether the manner in which feedback is given in the CF block has an effect on the subject's transfer learning of RNG.

#### **45. The Influence of Visuospatial Intervention on Mathematical Ability**

**Presenter(s):** Tiffany Bui, Matthew Eclevia and Cody Shishido

**Advisor(s):** Dr. Jessica Walker

The research proposal of this study intends to identify whether visuospatial interventions improve mathematical ability in college students. Visuospatial skills are important for identifying the distance between two objects, memory of images, and visualizing objects by mentally rotating them. The two important concepts relating to visuospatial ability are spatial relations and spatial visualizations. These are the abilities to mentally rotate two dimensional and three dimensional objects. Prior research has shown that visuospatial interventions are an effective tool for the improvement mathematical performance. This study is designed to see whether mathematical aptitude improves from pre-test to post-test after participation in visuospatial interventions. A visuospatial assessment, a mathematical assessment, and a demographic survey were utilized to provide data on factors such as age, prior visuospatial experience, gender, and intelligence; factors which we believe could be extraneous variables. After pilot testing, participants scored 60% and 50% on the visuospatial and mathematical diagnoses test, respectively. These preliminary results suggest that further pilot testing and assessment revision is needed in order to accurately measure baseline visuospatial and mathematical ability

#### **46. The Relationship Between Learning a Second Language and Color in Visual Communication**

**Presenter(s):** Adina Corke

**Advisor(s):** Dr. Connie Shears

Previous research indicates that there is a relationship between color and working memory as well as a relationship between working memory and learning a second language. However, these two relationships have not yet been considered together. The purpose of this research study is to understand if there is a relationship between color and learning, specifically when learning a second language. It was hypothesized that the presence of a warm color such as orange would correlate with an increase of efficiency in learning a second language compared to the presence of a cool color such as blue.

Participants were asked to translate 14 German words to English in both a pretest and a posttest. The pretest determined previous knowledge of the language. Between the tests, a timed lesson was presented that included the correct translations with orange slides, blue slides, or white slides dependent on the condition randomly assigned to the participants. Participants who viewed the lesson with white slides were part of the control group. To determine the number of words learned, the dependent variable was the difference between participants' pre and posttest scores. Results suggest there is no relationship between color and learning a second language. Therefore, the research hypothesis was not supported by the data, but another relationship was found. There were two positive correlations both between the number of times participants guessed translations on the pretest and the number of correct translations given on the posttest and between the number of translations participants guessed on the pretest and the number of incorrect translations they gave on their posttests. Limitations of this study included relying on participants' self-reports of fully functioning color sight and not compensating for the individual associations participants made with the order and choice of the foreign words presented.

#### **47. The Effectiveness of Animal Assisted Therapy as a Therapeutic Tool for Traumatized Children**

**Presenter(s):** Adina Corke

**Advisor(s):** Dr. Steven Schandler

Previous research shows that child maltreatment is not only rampant worldwide, but that it has long-lasting effects on children's mental and physical health. While child maltreatment cases have decreased over the last 10 years, nearly 700,000 children were still victims of abuse or neglect in 2015. To treat the mental illnesses that result from neglect and abuse, some psychologists have focused their research on many treatments. Most treatments currently require substantial activity and/or substantial thinking on the part of the patient. This is counterproductive to the fragile psychological status of the neglected or abused patient. One recently-developed and applied therapy with relatively low patient demands is animal-assisted therapy (AAT). Recent studies have proposed that AAT utilized in conjunction with standard treatments provides an effective and well-tolerated intervention for traumatized and psychologically fragile patients, such as victims of abuse. The purpose of this thesis research project was to systematically evaluate this proposal by testing the hypothesis that AAT, when used in conjunction with standard treatment, is more effective in decreasing symptomatology in traumatized children than other therapeutic tools used in conjunction with standard treatment. Using a meta-analytical research method, empirical studies were located and evaluated regarding the treatment of traumatized children that either included AAT, other therapeutic tools, or standard treatment alone. Overall, the findings showed that AAT is an effective adjunct therapy, particularly in its acceleration of the decrease of symptomatology in traumatized children. However, AAT is no more effective than other adjunct therapies. Limitations of this study included small sample sizes from the studies analyzed and the misrepresentation of AAT as a standalone therapeutic practice. Further research is needed to accurately and directly compare AAT to other adjunct therapies.



#### **48. The Prevalence of Different Forms of Infidelity in a National Sample of Unmarried Heterosexual Adults**

**Presenter(s):** Andrea Fernandez

**Advisor(s):** Dr. David Frederick

For many people, romantic relationships have symbolize unity, faithfulness, and trust between two people. With every relationship, however, there are conflicts, which can lead to separation and poorer psychological well-being. One common conflict is regarding infidelity. Infidelity is not simply a risk factor for mental health, it can also impact physical health as well. Most people having affairs fail to use condoms, which places their unsuspecting primary romantic partner at a greater risk for contracting an STD. A great deal of research has examined the prevalence and predictors of infidelity as defined by sexual intercourse, and have focused on married couples. What makes my current analyses important and unique is that I explore the prevalence and predictors of a wide variety of behaviors that could be considered infidelity, such as oral sex and kissing, in a national sample of dating couples. Participants were 13,259 heterosexual men and women between the ages of 18 to 65. Participants were not married but in a dating relationship and had made a commitment to be exclusive with their partner. They indicated whether or not they had engaged in a list of a dozen behaviors after agreeing to be monogamous with their partner (e.g., kissing someone else, fantasizing about someone else, watching pornography, oral sex with someone else). Men were more likely to engage in every behavior than were women. Relationship length, relationship satisfaction, and sexual satisfaction were all important predictors of infidelity. People who were sexually dissatisfied were most likely to sexually fantasize about someone they knew, but kissing someone else was most strongly predicted by relationship satisfaction. Among people who had a sexual affair, over half reported that their partner was never aware of their affair, which suggest the potential risk of contracting a sexually transmitted infection.

#### **49. The Effects of Brief Mindfulness Meditation on Vulnerability to Stress**

**Presenter(s):** Christopher Garau

**Advisor(s):** Dr. Connie Shears

In recent years, mindfulness meditation (MM) has become a promising method for stress reduction. While much of the literature in the field is focused on subjective data, this research aimed to further understand the physiological effects of MM. This research hypothesizes that if a participant practices MM for 10-minutes, then there will be a stronger observable increase in heart rate variability (HRV) and decrease in galvanic skin response (GSR), than the active-control group (relaxation music), and the control group (audiobook). Participants (N=90) were randomly assigned into 3 groups consisting of listening to a 10-minute audio clip of either guided MM, relaxation music or an audiobook. Electrocardiogram and GSR data were taken simultaneously during a baseline period and a post-intervention period. The results found that both MM and relaxation music groups showed a significant increase in HRV more so than the control group, however against the hypothesis, relaxation music had more of an effect on HRV than did MM. Similarity, against the hypothesis, MM had the smallest decrease in GSR of the three conditions, while relaxation music had the greatest decrease followed by the control. While more research is needed to draw conclusions, the findings of this study suggest that both MM and relaxation music can increase HRV and reduce physiological stress.

## **50. Who Has The Best Sex Life? Associations of Sexual Orientation to Sexual Attitudes, Behavior, and Satisfaction.**

**Presenter(s):** Jaden Harding

**Advisor(s):** Dr. David Frederick

Keeping sex fun and interesting as relationships progress is important to many men and women of all sexual orientations. The importance of sexual satisfaction in relationships makes it critical to understand the attitudes and behaviors that enhance people's sex lives. Couples employ a variety of strategies to keep their sex lives from dwindling, but the efficacy of these strategies is not well known. Using a large national survey of over 50,000 adults, we draw attention to common romantic and sexual behaviors that are rarely assessed in the literature but are likely important contributors to maintaining sexual passion. These include intimate behaviors (e.g., cuddling, kissing, laughing together during sexual activity), incorporating sexual variety (e.g., trying new sexual positions; wearing lingerie), setting a romantic/sexual mood (e.g., lighting candles; playing music), and using different types of sexual communication. We also examined commonly assessed behaviors that have been the focal point of previous research (e.g., frequency of sex, oral sex, and orgasm). One of the key limitations of most research on sexuality is that the experiences of lesbian women are underexplored. We used coarsened exact matching to identify a set of heterosexual women in our dataset who most closely resembled the lesbian women in age, relationship length, cohabitation length, parental status, and BMI. This allowed us to conduct meaningful comparisons between these groups and enhance our understanding of variation in sexual satisfaction and behaviors across genders and sexual orientations.

## **51. Empathy In Artificial Intelligence and Navitar**

**Presenter(s):** Jayson Marshall

**Advisor(s):** Dr. David Pincus

The goal of this literature review on empathy in artificial intelligence (AI) is to inform the development of a psychotherapeutic problem-solving application tentatively called "Navitar." Mobile health (mHealth) applications have several potential advantages, with lower cost, higher utilization, and potentially higher engagement and disclosure by users. Empathy is a process engaged by therapists to assist in their understanding of their clients' worlds in order to broaden and shape the flow of experience toward positive therapeutic outcomes. As such, empathy, has been seen as a key factor in mHealth apps, and virtual humans that simulate empathy have been designed to identify emotions of the client and to generate matching emotional responses during interactions with users. Despite the promise of empathic virtual humans in the future there are ethical and practical barriers that must be worked through. Large amounts of detailed, and highly personal information may be gathered and stored within such applications, and if the machine makes a potentially harmful mistake, who will take the blame? Even small errors in emotion-matching by AI have been found to be highly disruptive to the user's experience. The Navitar architecture aims to simulate empathy in the simplest, most elegant manner possible in order to reduce the costs of production, to reduce the likelihood of simulation errors, and to avoid most of the ethical challenges involving personal disclosure. Navitar takes the user through a series of close-ended questions arranged within a branching root architecture until the user arrives at one of three possible interventions: (a) a behavioral solution; (b) an emotional awareness intervention; or (c) an acceptance-based intervention. Over time, Navitar will record individual users' patterns of movement through the question sets, creating an experiential map of the user over time.

## **52. Can Participating in High School and Intercollegiate Sports Contribute as a Protective Factor to Adolescent Alcohol Abuse?**

**Presenter(s):** Carli Mc Culloch

**Advisor(s):** Dr. Steven Schandler

Alcohol is the most commonly used substance among adolescents. Adolescent alcohol abuse has been associated with negative consequences, such as car accidents, poor academic performance, and possible dependency later in life. As society searches for prevention techniques to ensure adolescent's healthy growth and development, recent efforts have turned to participation in sports. Although several studies lend evidence of adolescent participation in sports as a protective factor to alcohol abuse, the research is not conclusive. The purpose of this thesis was to systematically examine the relationship between participation in sports and adolescent alcohol abuse. It was hypothesized that If an adolescent participates in organized high school or intercollegiate sports, then their probability of abusing alcohol will be lower than that of an adolescent who does not participate in organized high school or intercollegiate sports. Through the method of a meta-analysis, recent empirical studies among various databases provided mixed results. Participation in sports was a protective factor under some circumstances but not under others. The findings further demonstrated that gender and type of sport affect alcohol use. The controversy of the results recommends that further research is needed to endorse participation in sports as a healthy method to reduce alcohol use among adolescents. Further directions for research include analysis of differences between gender and contact level of the sport.

## **53. Group Cohesion and Perceptions of Group Success in the College Classroom**

**Presenter(s):** Carly Nasch, Griffyn Pilcher, and Jake Uyeda

**Advisor(s):** Dr. Benjamin Rosenberg

The present study investigated the relationship between group cohesion and perceived academic success in undergraduate students in a semester long group project. There has been much research on the idea that a cohesive, tight knit group of individuals is more effective in reaching a unified goal. In addition, Schwarz and Schwarz (2007) determined that while group cohesion predicted enjoyment and group effectiveness, cohesion did not motivate group efficiency. Even though these and many other studies have examined group cohesiveness in the context of athletic (for review see Filho, Dobersek, Gershgoren, Becker, & Tenenbaum, 2014) and workplace teams (e.g., Kozlowski & Chao, 2012), less research has tested the effect of group cohesion in an academic setting (e.g., Gaylon, Heaton, Best, & Williams, 2015; Slavin, 1996). Given this lack of research, the purpose of this study was to determine if having a cohesive group environment is related to a more subjectively successful working environment among college students. Using several college Research Methods classes as our participant pool, we asked whether a group would work in better unison with less drama or conflict if there was more camaraderie outside of the classroom compared to a group of strangers with little to no out of class interaction. Based on the findings from athletics and the workplace, we created three hypotheses. First, (1) groups with a higher ratio of friends to nonfriends will rate their team and individual cohesion as more positively as well as (2) higher friend ratio leading to higher expected grades. Lastly, (3) Higher team cohesion is positively related to perceived group success. Participants completed an online questionnaire regarding their relationships with their specific group mates and their individual beliefs on the group dynamic. Groups that knew more of their partners than didn't know prior to the assignment felt a greater comradeship and compatibility. They viewed their team as more cohesive overall and expected a higher grade on the assignment at the conclusion of the semester.

#### **54. The Effects of Health-Promoting Signs Encouraging Stair Use in Parking Structures**

**Presenter(s):** Fiona Tang

**Advisor(s):** Dr. Vincent Berardi and Dr. Benjamin Rosenberg

This research study aims to promote physical activity by encouraging stair use rather than elevators using persuasive point-of-choice prompts. The current investigation is comprised of two sub-studies: pilot testing, which we have completed; and the main study, which will be conducted in the fall. While most studies in this area use observation to count pedestrian traffic, a novel component of the current research is that we will use a pressure mat to measure stair and elevator use. As such, before completing the main study, we completed two pilot studies to test the feasibility of the mat technology and the messaging of the persuasive prompts. We researched the type of mat that would be ideal for recording pedestrian traffic and considered features such as wired/wireless, battery-powered, open-switch, minimal threshold activation, and high-frequency recording. We completed various trials to determine the validity and accuracy of the mats in different settings and situations and the results of this analysis will be discussed. Additionally, the results from the survey conducted to evaluate potential messages on the point-of-choice prompts will also be detailed. Within this survey, message categories were narrowed to motivational/encouraging and nudging/humor messages. The survey was administered in Chapman University classes and students' responses to several sample messages in each of these categories were compared via a series of six, semantic differential adjectives, rated on seven-point scales. Qualitative feedback on an open-ended question after each message was also solicited. The highest rated messages will be used in the main study. There are three key components to the main study which we will complete in the fall: 1) objectively measure stair and elevator use for two weeks; 2) introduce point-of-choice prompts and measure stair and elevator use for two weeks; 3) remove signs and continue recording for an additional two weeks to observe potential effects.

#### **55. The Relationship Between Childhood Obesity and Depression**

**Presenter(s):** Anna White

**Advisor(s):** Dr. Steven Schandler

One in five children between the ages of 6 and 19 are obese, displaying a Body Mass Index above the 85th percentile of children within their age range. Epidemiological research shows that obesity leads to degenerative disorders such as heart disease and diabetes, especially when excess body fat stores begin at a young age. Etiological research has indicated that psychological factors play a prominent role in the cause of childhood obesity. A psychological factor particularly prevalent is childhood depression, of which, one consistent behavior is reduced eating control. Recent research proposes a relationship between depressive symptoms and a loss of controlled eating, which can lead to obesity. The purpose of this thesis research was to systematically evaluate this proposal by testing the hypothesis that a child diagnosed with depression is more likely to develop obesity than a child whom is not diagnosed with depression. Using meta-analytical research methods, the thesis systematically located and evaluated empirical investigations of childhood obesity and depression. Overall, the findings supported the thesis hypothesis, demonstrating a direct relationship between the development of childhood depression and obesity. However, methodology weaknesses of some studies produced a lack of clarity as to whether depression was the cause or the result of obesity. Further research is necessary to definitively determine the role of depression as a cause of childhood obesity. If depression is found to be a causative factor, then psychological practices that are used for children can be refined and more aggressively applied to identify and treat childhood depression before the development of the eating behaviors which lead to obesity.

# **Sociology**

## **56. The Lottery**

**Presenter(s):** Benjamin Weber

**Advisor(s):** Dr. Stephanie Takaragawa

In 2018, recreational marijuana became legal for adult consumers in the state of California, but it took decades to get to this point. The most influential and catalytic piece of California marijuana legislation, Senate Bill 420, passed in 2004, partially decriminalizing and medicalizing marijuana use all while facilitating the onset of marijuana dispensaries throughout the state. A Tale of Three Cities (Heddleston, 2013) posits that San Francisco's rich grassroots activist culture along with collaboration efforts on behalf of city officials made the drafting and eventual passing of pro-regulation legislation possible. Varying cultures surrounding marijuana regulation and citizen activism in San Francisco, Los Angeles, and San Diego areas resulted in the formation of 3 unique regulation models: pro-regulation, laissez-faire, and prohibitionist, respectively. These political opportunity models led to highly contrasting formations and practices of marijuana dispensaries throughout California. My research was concerned with understanding the conditions and implications of the laissez-faire, lottery-determined model implemented in Orange County. Beginning in February 2017, I conducted over 50 hours of fieldwork spanning 4 months at Sky High Medical Marijuana Dispensary in Santa Ana, California, infamously known for its videotaped police raids which exhibit officers mocking disabled patients while eating marijuana edibles. I gathered extensive bi-weekly observations, designed and conducted structured interviews with 2 female budtenders, one of the male owners and a security guard. I also charted employee/er relations as well as power structures, analyzed political cartoons and other activist media associated with the raids, and distributed a survey to the surrounding neighborhood. Results highlighted an overall instability of the storefront as an institution, with 6 police and 17 anonymous raids up until May 2017. In addition, the informal economy and high-risk environment that medical dispensaries constituted allowed more opportunities for sexism.

# **Software Engineering**

## **57. Synergy - An Exploration into Media Management**

**Presenter(s):** Brendan Copp, Ben Seeley, and Ali Nejad

**Advisor(s):** Dr. Michael Fahy

Synergy provides a clean interface with which an individual may manage several social media accounts at once. To accomplish its task Synergy deals with multiple Application Protocol Interfaces. These APIs are accessed through their associated website URL endpoints. The program notifies a website that it is acting on behalf of a user by attaching an authenticated user key to a specialized URL. Synergy can then convey to the website that it would like to upload or retrieve information by actions to the same endpoint in the object notation language JSON. Research was done on each API through documentation hosted on the associated websites. The idea was originally founded when a classmate of ours complained about how strenuous maintaining several social media profiles was. The goal of Synergy is to reduce the time a user

spends when uploading to multiple sites. Upon startup Synergy will prompt a user for a caption and the location of a photo they would like to upload. The program then processes both components and uploads them to several sites of the user's choosing. With the benchmark that a user will upload the same post to three social media sites we expect our program to be three times quicker than conventional means. Synergy is written in Python and interacts through RESTful APIs, a website interface loosely based on the HTTP protocol.

### **58. Pokémon Go Client**

**Presenter(s):** Lisa Dong

**Advisor(s):** Dr. Michael Fahy

Pokemon Go, the location based, augmented reality game developed by Niantic, became a global phenomenon overnight. The game has attracted long time Pokemon fans and brought in a plethora of new players due to the game's revolutionary gameplay revolving around new and innovative concepts. Pokemon Go utilizes the player's GPS to move and explore real locations in order to catch and interact with virtual pocket monsters, otherwise known as Pokemon. In addition, by using augmented reality technology, Pokemon could be seen in these real life locations with the use of a smartphone's camera. The focus of this project will be to access and edit unofficial Pokemon Go API reverse engineered by independent developers. In addition, this project's stretch goals include automating player login as well as perform gameplay such as visiting locations to receive in-game items and catch nearby Pokemon. Some of the challenges presented will be in finding a current and working API, downloading and setting up the API correctly, and learning about advanced programs and applications that are needed in order to create a Pokemon Go client.

### **59. News Haikus**

**Presenter(s):** Murphy Studebaker

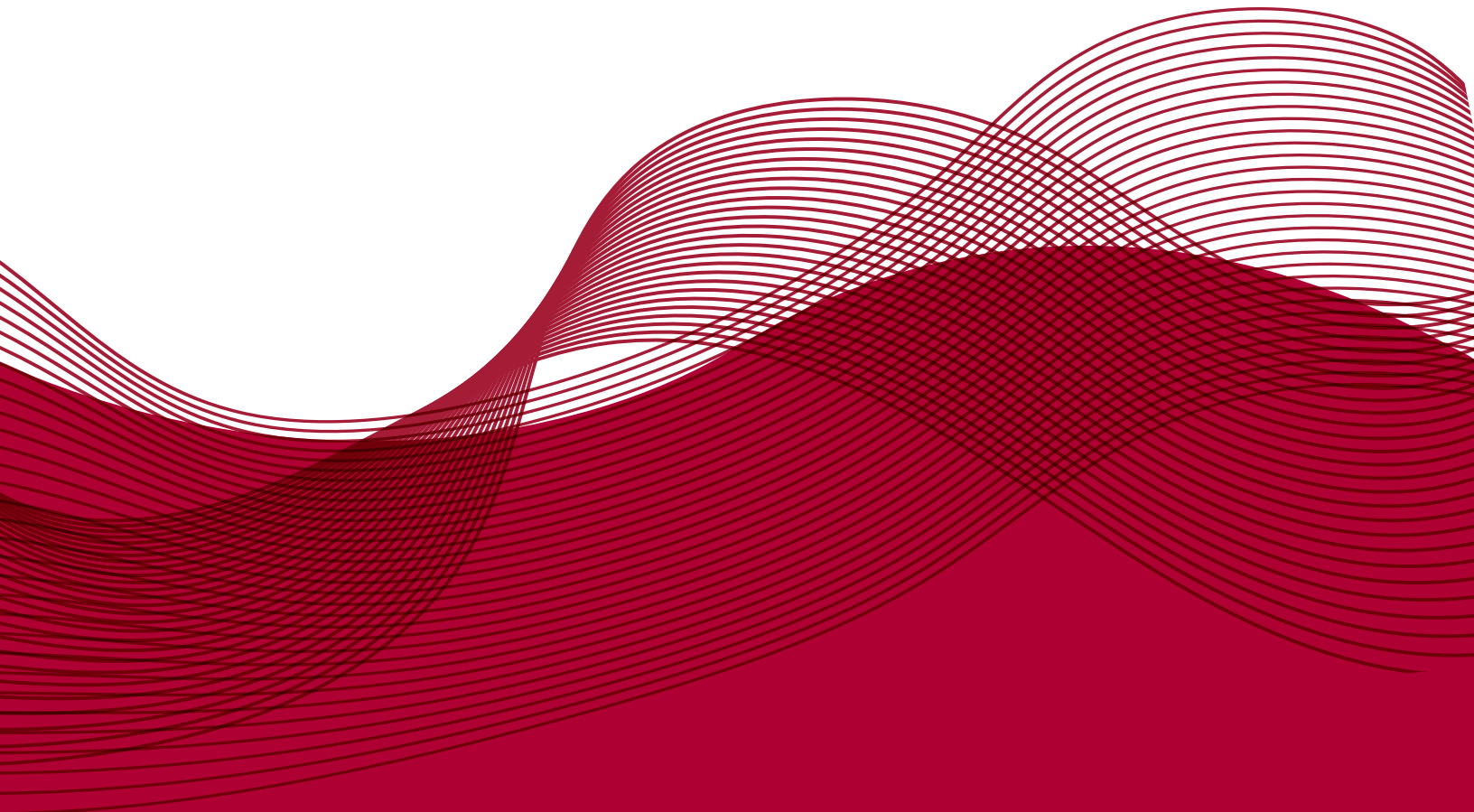
**Advisor(s):** Dr. Michael Fahy

"News Haikus" is an interdisciplinary research project that serves to question the role news media plays in our society by restating headlines and articles into a classic artistic form: the haiku. Using the Google News API and linguistic processing Python packages, News Haikus will computationally create poetry anthologies from both a single day's news coverage, and coverage across multiple publishers about the same event. This will allow users to analyze the linguistic choices made in headlines and articles and have a new connection with what may otherwise seem outlandish or overwhelming. The application will pull the top articles from a user-inputted search query from the Google News API, then process the headlines and descriptions with the python Natural Language Toolkit to classify words by their parts of speech. The program will then cross-reference existing haiku poetry and use the PyHyphen library to select words that fit the five, seven, five syllable distributions while also forming a coherent theme. This approach of computationally recognizing syllables and syntax to form haikus means the poems can be generated automatically, within seconds, on any article published to the internet. In addition to the application, "News Haikus" will include an analysis of language choice across multiple publishers and categorical events. Further development of this project could expand a computer's ability to simulate creativity beyond the haiku to more elaborate literary forms.

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