

# CUSRD

## Chapman University Student Research Day

**Wednesday, May 11, 2016**

### Spring Session Abstract Volume



**OURCA**  
AT CHAPMAN UNIVERSITY

Office of Undergraduate  
Research & Creative Activity

# Message from the Director

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Greetings and welcome to the 2016 Fall Chapman University Student Research Day. This celebration highlights the breadth and depth of scholarly research and creative activity conducted by Chapman undergraduate and graduate students. It is an exciting day to learn about, explore, and appreciate the efforts that students and faculty have put into a wide variety of research and creative projects across the campus. It is my hope that all members of the university community can engage in and benefit from the Chapman University Student Research Day.

To students—share your work, take a look at the impressive range of projects in which your classmates have been involved over the past year, or become inspired to continue or participate for the first time in research yourselves during your time here at Chapman University.

To faculty--recognize the hard work of the students you and others have mentored, taught, and supervised, and celebrate the culmination of their efforts in a professional presentation setting.

To all--enjoy learning about this unique aspect of a Chapman education that allows students to engage in scholarly activity at the highest level, expanding knowledge and pushing at the boundaries of one's academic discipline.

Thanks for coming, and enjoy the day!

*Dr. Anna Leahy is Director of the Office of Undergraduate Research and Creative Activity and Associate Director of the MFA program in creative writing at Chapman University.*

# Acknowledgements

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The Office of Undergraduate Research and Creative Activity gratefully acknowledges the following individuals and program for their support:

Dr. Glenn Pfeiffer, Vice Chancellor for Academic Administration

Crean College of Behavioral Sciences



Schmid College of Science and Technology



Wilkinson College of Arts, Humanities, and Social Sciences



# Keynote Speaker: Robert Akscyn

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Rob Akscyn is an American computer scientist, mathematician, and high-technology entrepreneur. His six-decade career spans leadership roles in military, academic, and industrial organizations, principally as founder and president of Knowledge Systems, a software company specializing in large-scale, distributed hypermedia technology.

During the 1960s and 1970s, Rob served in the U.S. Army. He graduated from West Point in 1973, then served first as an infantry sergeant and later as an infantry officer, following his graduation

He pursued his graduate studies under Allen Newell and Herb Simon at Carnegie Mellon University. During the 1980s, Rob was a Senior Project Scientist in the Computer Science Department there, where he co-led the ZOG-Vinson Project, a five-year project to transfer distributed hypertext technology to operational use aboard the USS Carl Vinson, one of the U.S. Navy's nuclear-powered aircraft carriers.

In 1981, at the request of the Westinghouse Nuclear Power Division, Rob co-founded Knowledge Systems, a commercial spinoff, to create KMS (Knowledge Management System). This company provided massive-scale, hypermedia technology to virtually all major organizations in the U.S. telecommunications, aerospace, and defense industries, as well as all the armed service branches and several major U.S. intelligence agencies.

During the mid-1990s, Rob was Project Leader for the Petaplex Project, a three-year research and development project that prototyped the design and implementation for a one-million-server 'superstorage system' for the National Security Agency.

In 2003, Rob was invited by the University of Waikato, New Zealand, to be a Visiting Senior Research Fellow, where he has been teaching and advising students in Computer Science. In recent years, Rob also has served as the Chairman of the Board for four high-technology companies.

Rob has been a member of the Association of Computing Machinery for over 40 years. He was an editor of a number of ACM publications; was founder and first Chair of the ACM Special Interest Group on Hypertext, Hypermedia and the Web (SIGWEB); and served as Conference Chair for three of ACM's international conferences (Hypertext '89, Hypertext '98, and Digital Libraries '98). In addition to his work in computer science, Rob presents results annually at mathematics conferences.



# Schedule of Events

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**9:30 – 11:30 am**

**Poster Session 1**

*Arts, Education, Humanities, and Social Sciences*

**Sandhu Conference Center**

**12:00 – 1:30 pm**

**Lunch Keynote Speaker**

*Rob Akscyn*

*RSVP required*

**Bush Conference Center**

*Beckman Hall, 404*

**2:00 – 4:00 pm**

**Poster Session 2**

*Behavioral, Health, and Natural Sciences*

**Sandhu Conference Center**

# Table of Contents

---

<b>Message from the Director</b>	1
<b>Acknowledgements</b>	2
<b>Keynote Speaker Biography</b>	3
<b>Schedule of Events</b>	5
<b>Poster Session 1: Abstracts</b>	
<b>Graduate Students</b>	
<b>College of Educational Studies</b>	
Educational Studies	11
<b>Wilkinson College of Arts, Humanities, and Social Sciences</b>	
Communication Studies	11
<b>Undergraduate Students</b>	
<b>College of Educational Studies</b>	
Educational Studies	12
<b>Dodge College of Film and Media Arts</b>	
Film	13
<b>Wilkinson College of Arts, Humanities, and Social Sciences</b>	
Anthropology	14
Art	15
Asian Studies	16
Communication Studies	17
Peace Studies	22
Political Science	23
Religious Studies	31
Sociology	31
World Languages	34
<b>Poster Session 1: Quick Reference – Students/Poster #'s</b>	35
<b>Poster Session 2: Abstracts</b>	
<b>Graduate Students</b>	
<b>Schmid College of science and Technology</b>	
Food Science	39
<b>Undergraduate Students</b>	
<b>Crean College of Health and Behavioral Sciences</b>	
Athletic Training	42
Psychology	42
<b>School of Pharmacy</b>	
Pharmacy	49

# Table of Contents

---

<b>Schmid College of Science and Technology</b>	
Biological Sciences	50
Chemistry and Biochemistry	56
Environmental Sciences	66
Food Science	73
Physics	74
<b>Poster Session 1: Quick Reference – Students/Poster #'s</b>	<b>76</b>





**Poster Session 1**  
**Abstracts**

**Arts, Education, Humanities,**  
**and Social Sciences**



# Graduate Students

## College of Educational Studies

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### Educational Studies

#### 1. Supporting LGBT Students in Schools through a MTSS Framework

**Presenter(s):** Dennis Hisamoto

**Advisor(s):** Dr. Amy-Jane Griffiths

Lesbian, Gay, Bisexual, Transgender, and Questioning (LGBTQ) students face a plethora of negative social, emotional, and educational outcomes in K12 schools because of their sexuality and/or gender expression. The hegemonic discourse of sexuality (e.g., the language of 'straight' to refer to heterosexuals) and gender expression (e.g., gender roles dictating what is considered masculine or feminine) imply that deviations from these norms are socially undesirable. These dominant and heteronormative cultural values permeate our social world, reaching all domains of our social lives. Schools, as social institutions, are not immune from these heteronormative microaggressions toward sexual minority youth (SMY), as student peers are charged with relentlessly enforcing this norm. This goal of this paper is to identify evidence-based multi-tiered system of supports for LGBTQ youth, and provide insight to make schools safe and inclusive environments for all.

## Wilkinson College of Arts, Humanities and Social Sciences

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### Communication Studies

#### 2. Exploring Predictors of Sexualized Images on Celebrity Instagram Accounts: A Content Analysis

**Presenter(s):** Dominique Stewart and Holeka Inaba

**Advisor(s):** Dr. Riva Tukachinsky

An estimated 77.6 million individuals in the U.S. are Instagram users (Instagram, 2015). With such a large community of users, the increasing influence of celebrities (Choi and Berger, 2010) can affect those who view the photos, especially at a time when sexualized images have become such a prevalent aspect of the media (Mancuso, 2015). This qualitative study investigates A-list celebrity Instagram photographs to determine sexualized characteristics based on Goffman's (1976) concepts of gender advertisement. Among other variables, these include body chopping, feminine touch, objectification, ritualization of subordination and nudity. The goal of this study is to test the following hypotheses: (1) the higher the net worth of a celebrity, the more sexualized images on their Instagram account; (2) compared to male celebrities, female celebrities will post more sexualized photos. Finally, we will examine whether ethnic celebrities post more sexualized images than their white counterparts.

### **3. From Dorris Day to Kim K: How Sexualization in Celebrity Instagram Accounts Affects Social Validation in Today's Society**

**Presenter(s):** Michelle Williams and Kristina Kraus

**Advisor(s):** Dr. Riva Tukachinsky

Due to an increasing prevalence of social media in today's culture, it is imperative to understand the messages communicated by these images. In this study, we aim to understand the relationship between the sexualization of celebrity individual's Instagram photos and the subsequent social validation. Our final sample included N=1500 Instagram photographs of celebrities selected from People magazine's top 200 Celebrity List. Each image was coded for objectification, ritualization of subordination, degree of nudity and whether or not the photo is a selfie. Social validation, in this study, is operationalized as number of likes and comments. We predicted that (H1) a photo that portrays an objectified individual will have a greater amount of likes per photo than a photo without objectification of an individual; (H2) predicted that a selfie will have a greater amount of likes per photo than a headshot, half body, or full body photo; (H3) predicted that a photo which features ritualization of subordination will result in more likes per photo, than a photo without ritualization of subordination; and (H4) predicted that a photo which features an individual displaying some form of nudity will result in more likes per photo, than a photo without any nudity. This study will help researchers better understand sexualization in celebrity Instagram posts and how socially validated these images are.

## **Undergraduate Students**

### **College of Educational Studies**

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#### **Educational Studies**

### **4. Space, Safety, and Support: Experiences of Transgender Students in Higher Education**

**Presenter(s):** Emmett Griffith

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

While there are many studies that focus on lesbian, gay, and bisexual identities, there is a significant lack of research regarding the experiences of transgender and gender non-conforming people, specifically trans students in higher education. In attempt to fill the gaps in literature, the following research study employs qualitative methods to explore the underrepresented and diverse experiences of transgender and gender non-conforming undergraduate students—amplifying the voices that have been silenced and sharing the stories that are too often ignored. Semi-structured one hour interviews were conducted with seven trans-identified individuals, ages 18 to 25, who were currently enrolled or had recently graduated from the same small, four-year, liberal arts college. The purpose of the research is to examine the experiences of transgender and gender non-conforming students in a college setting at small university—focusing primarily on perceptions of campus climate, exclusion/inclusion, support, spaces, and discrimination. It looks at how transgender students navigate their experiences in the classroom and relationships with

members of the campus community (faculty, staff, peers, etc.). The findings cover the participants' perceptions of space, the student body, classroom climate, and queer and trans community building. The study concludes with recommended improvements universities should make, as suggested by the participants, in terms of being trans-inclusive and updating on-campus resources. This project will continue through Chapman's Summer Undergraduate Research Fellowship Program.

#### **5. The Application of Educational Neuroscience in Mathematics Pedagogy**

**Presenter(s):** Anna Kuhn

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

The purpose of this paper is to explore the relationship between educational neuroscience and mathematics teaching and learning strategies. This research project is qualitative research to integrate educational neuroscience with mathematics pedagogy in order to better inform teaching strategies and improve the quality of mathematics education. Through theoretical approaches to researching educational neuroscience, empirical studies, and personal interviews with experts in the field, the broad implications of educational neuroscience and mathematics are explored. The main themes discussed in the theoretically based articles are addressing skepticism, stating the potential that educational neuroscience has for improving education, and the need for further research. Within the empirical studies reviewed the themes analyzed include but are not limited to, the importance of cognition in learning, the implications for educational neuroscience in learning mathematics, and exploring individuals' mathematical difficulties such as dyscalculia. The personal interviews are used to support and expand on findings of research studies. Topics discussed with experts include the limitations of laboratory research, the application of neurological findings to education, and strategies for teachers and students.

## **Dodge College of Film and Media Arts**

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### **Film**

#### **6. Lost in Adaptation**

**Presenter(s):** Caitlin Manocchio

**Advisor(s):** Dr. Kelli Fuery

Jacques Derrida's, in *Sending: on representation* (1994), writes "philosophical societies that send us here as their representatives- can no longer, in this case, allow itself [the philosophical idea] to be enclosed in a single idiom, at the risk of floating, neutral and disembodied, remote from every body of language" (Derrida 1994: 14). What Derrida offers is a challenge to the experience and structure of representation as a practice in visual culture and for contemporary spectatorship. When the function of representation is being questioned, rather than its subject, the practice of representation is seen to expose a "system of thought" that is often 'enclosed in a single idiom'. The dominant means through which the Autism spectrum, particularly individuals with Asperger's Syndrome, tends to be portrayed, occurs via a narrow mediated lens, intended to work as a representative of the Autistic Spectrum as a whole. Television programs and films, such as: *The*

Big Bang Theory (2007-present), Sherlock (2010-present), Parenthood (2007-2014), Adam (2009), Rain Man (1988), show only the most extremist and stereotypical portrayal of the characteristics found within an Asperger's individual. All of these films and television programs feature men or boys on the spectrum. The lack of representation of women with Asperger's in film and television media is directly correlated to the amount of women being misdiagnosed with another learning or mental disorder.

## Wilkinson College of Arts, Humanities, and Social Sciences

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### Anthropology

#### **7. The Culture of Disney Pin Trading**

**Presenter(s):** Alicia Cuber

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

This research project is based on ethnographic fieldwork in Disneyland to study the culture of pin trading. Focusing on the stores in Frontierland, Main Street, and New Orleans Square, this looks at the social interaction created and sustained through the reciprocal act of pin trading. Following Marcel Mauss and Goffman, I analyze the type of people who participate pin trading and see if there are common trends, as well as understand why they choose to participate in pin trading. I use participant observation and interviewing, as well as visual analysis. This paper analyzes how this subculture "presents itself" (Goffman) while understand reciprocity in the construction of identity and relationships (Mauss).

#### **8. Art, Artifact, and Otherization: How Didactics and Exhibition Design Construct Perceptions of African Objects**

**Presenter(s):** Jessica Bocinski

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

This project will examine how the presence or absence of museum didactics when exhibiting African objects influences the viewer's perception of those objects. Specifically, this project looks at the relationship between didactics and the viewer's mental characterization of African objects as either art or artifact. The exploration of perceptions about African objects is directly connected to, and inherently reveals, greater conceptualizations about the definition of art and how the line between art and artifact is drawn by institutions and individuals within society. Investigation of this topic is conducted primarily through fieldwork study.

## Art

### **9. Gustav Klimt's Faculty Paintings: An Analysis of Philosophy, Medicine and Jurisprudence**

**Presenter(s):** Kelsey Anderson

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

The Faculty Paintings by Gustav Klimt were commissioned by the University of Vienna in 1894 to personify and glorify the disciplines of Philosophy, Medicine and Jurisprudence. When Philosophy was displayed at the 6th Secession exhibition in 1900, Klimt was met with harsh criticism. Klimt's patrons, and the public, were fully aware of his innovative body of work and progressive technique. Despite this, the paintings prompted criticism due to their unprecedented content and style. Klimt accomplished the task of personifying the three faculties yet he lacked the ability to simultaneously glorify the faculties in his paintings. This thesis will analyze the negative criticisms directed at Philosophy, Medicine and Jurisprudence through the exploration of contemporary texts and photographs of the now destroyed series. Klimt's Faculty Paintings equalized the disciplines with all of humanity, opposing the intended glory the commission demanded. This lack of glory sparked the foundation of distaste present in public sentiment, illuminating the need for a hierarchical elevation of the faculties within society.

### **10. Looking at the Whole: Edward Hopper's Exploration of the Female Form**

**Presenter(s):** Tayler Bonfert

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

Edward Hopper's paintings are visual documents of the emotional, social, and psychological transformations occurring in America during the 1920's through the 1940's. Hopper was clearly influenced by, if not the epitome of, the pervasive theories of the "healthy-body culture", Freudian psychoanalysis, and new body-centric advertising in the motion-picture industry. Although he often used his wife Jo as a model, Hopper created new characters in his paintings by depicting nameless faces and vulnerable nude forms in isolated spaces. This depiction was a direct reflection of the societal tensions of the time as women's lives changed and they experienced an increasing sense of isolation in the urban setting. Critics downplay the sociological content of Hopper's paintings, arguing that the lack of context surrounding his ambiguous figures and the predominance of negative space are not worth a deeper analysis. My thesis will explore these isolated female forms as a vibrant expression of the alienation that was not only the essence of the average American experience, but also a widespread phenomenon of the inter-war period.

### **11. The Effect Richard Serra's Public Art Has Had on Southern California**

**Presenter(s):** Dani Planto

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

In 2006, three outdoor public sculptures by Richard Serra were erected in Southern California: Connector in Costa Mesa, T.E.U.C.L.A. in Los Angeles, and Santa Fe Depot in San Diego. In each venue Serra was commissioned to create a sculpture that would create a new environment out of the site and bring together the communities around it. In my research, I explore why these



sculptures were chosen for their particular locations as well as what they bring to the surrounding area. Since these pieces have been in place for a decade now, they have had their time to show their communities why they are there and how they have affected them. In my research I have explored why those sculptures were chosen for those particular locations, as well as what they bring to the surrounding area.

## **12. Communication of Consciousness and Societal Dichotomies in the Work of Jean-Michel Basquiat**

**Presenter(s):** McKenna Robbie

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

Since his rise to fame during the Neo-Expressionist movement of the 1980s, the artist Jean-Michel Basquiat has experienced widespread criticism of his work due to his artistic beginnings in graffiti and the belief that the insatiable art market of the 1980s artificially inflated its worth. His oeuvre is also described as “primitive” due to his abstracted forms and use of highly pigmented color, qualities in diametric opposition to the Minimalist art produced in the preceding decades. However, dismissing his work as meretricious and merely symptomatic of an avaricious market indicates a failure to comprehend the means by which Basquiat communicates his experiences with the racial divide in the United States and his consciousness of the dichotomies of wealth versus poverty and inclusion versus segregation. Furthermore, Basquiat’s paintings often reference figures of his youth, similarly beguiled by the tantalizing promise of the cult of celebrity, thus intimating his awareness of his own exploitation.

## **Asian Studies**

### **13. The Limits of Occidentalism: Capitalism, Nationalism and Imperialism**

**Presenter(s):** Hotaru Morita

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

From the 18th century, following the advent of imperialism and the wonders of the Orient inscribed in the works of Marco Polo. The cultural perceptions of the other has demonstrated the construction of fear, wonder and stereotypes between the East and West binary. As Edward Said explains in the theory of Orientalism, this binary has constructed an non-existent fantasy of how westerners perceive the eastern people and the eastern culture. One of the outcomes of capitalist and imperial discourse, such generalizations have become the popular lens for understanding people who are "other." A similar argument is made in the eastern perceptions of westerners in the theory of Occidentalism. Ian Buruma and Avishai Margalit explore "the west in the eyes of its enemies" on multiple layers: historically, ideally, mentally and religiously. The historic undertones of post-colonialism upheavals, the capitalist driven ideals embodied in America, the lowered morality due to materialistic endeavors, and the divide in religious thinking are all sources of tension. For the purposes of this paper, however, I argue that Occidentalism in practice is limited for it never provides a clear definition of the west, further establishes the binary and it reinforces stereotypes. The theory of Occidentalism provides a framework for understanding the construction of media images regarding the west, henceforth it reflects the need for

understanding and civilized discussion between different people of different backgrounds and cultures, however, it does not provide a clear framework for resolving these differences.

## **Communication Studies**

### **14. Accelerating Cyberinfrastructure: Understanding Innovation Attributes and Adopter Categories of the Diffusion of Innovations Theory in the Context of e-Science**

**Presenter(s):** Lydia Benjamin

**Advisor(s):** Dr. Kerk Kee and Mona Sleiman

There is potential to advance scientific research through cyberinfrastructure and e-science, however these modern approaches have not been widely adopted and used across disciplines. Through the lens of the diffusion of innovations theory (Rogers, 2003), this study investigates the relationship between organizational capacity and the innovation attributes and adoption of cyberinfrastructure. Using the Grounded Theory Approach (Corbin & Strauss, 1990), the researchers conducted 15 interviews and extracted emergent themes. This analysis revealed how innovation attributes and adopter categories relate to organizational capacity within the e-science community. This poster discusses the five classic innovation attributes (Rogers, 2003) in the context of cyberinfrastructure. Additionally, this poster investigates how adopter categories are related to organizational capacity. Ultimately, this investigation sheds light on how innovation attributes and adopter categories relate to organizational capacity.

### **15. Strategic Opinion Leadership for the Adoption and Diffusion of Cyberinfrastructure**

**Presenter(s):** Jamie McCain

**Advisor(s):** Dr. Kerk Kee and Mona Sleiman

For over a decade, the National Science Foundation has been funding the development of Cyberinfrastructure (CI) to accelerate and promote breakthrough research. CI, made up of interdependent technologies, remote instruments, big datasets, dispersed experts, and diverse intuitions (Kee, 2015), provides a platform for researchers to keep up with computing demands of modern sciences and big data. However, limited research has explained the driving factors that will successfully promote the diffusion of CI. Through the lens of the Diffusion of Innovations Theory (Rogers, 2003), the researchers examined opinion leadership in the context of CI, developing an understanding of how opinion leadership influences CI diffusion. Analysis of diffusion and opinion leadership literature revealed a wide range of strategies that opinion leaders can utilize to advance CI adoption and diffusion. Practically, opinion leaders may employ these strategies to successfully spread the adoption of CI within their organization.

### **16. The Multidimensionality of Cyberinfrastructure: Objects, Practices, and Ideologies in the e-Science Community**

**Presenter(s):** Samantha Stein

**Advisor(s):** Dr. Kerk Kee and Mona Sleiman

In order to understand the multidimensionality of advanced cyberinfrastructure (CI), this study explores three components that are necessary for the full manifestation of CI. This investigation highlights three essential components of CI: material objects, behavioral practices, and

philosophical ideologies. Using the Grounded Theory Approach (Corbin & Strauss, 1990), this study analyzes interviews from 15 participants who are disciplinarily diverse and geographically dispersed across e-science projects. Analysis reveals a plethora of factors within the essential components of objects, practices, and ideologies. This investigation advocates for looking beyond the material dimension of CI, conceptualizing it as a sociotechnical and multidimensional system.

**17. Towards a Message-, Individual-, and Social-based Model of Environmental Communication: Advancing Theories of Reactance and Planned Behavior in a Water Conservation Context**

**Presenter(s):** Lauren Henderson

**Advisor(s):** Dr. Jake Liang

Environmental communication researchers have long been interested in understanding factors influencing receivers' support of environmental issues, including conservation advocacy. The ongoing drought in California calls for an urgent need to design effective environmental messages to promote water conservation. However, a recent study (Authors, in press) shows the shocking findings that well-intended water conservation messages can produce a negative attitude change. In order to more comprehensively understand how receivers respond to water conservation messages, the current research advances an integrated communication model that combines concepts from reactance theory (Dillard & Shen, 2005) and the theory of planned behavior (Ajzen, 1991). Specifically, this model integrates message-based (i.e., threat to freedom) with social-based (i.e., subjective norms) and individual-based (i.e., perceived behavioral control) processes. The data fit the hypothesized model and all paths followed predicted directions. Results further show that water conservation messages elicit reactance (i.e., threat to freedom), depending on the message strategy or the combination of strategies applied. Interestingly, subjective norms and perceived behavioral control negatively correlated with threat to freedom. These results practically point to (1) water conservation messages can produce reactance that negatively affects behavioral intention, (2) a new theoretical model illuminating message-, social-, and individual-based on behavioral intention regarding environmental issues, and (3) a message focused on subjective norms and perceived behavioral control may aid in reducing reactance.

**18. Strategic Pre-Interaction Messages for Human-Robot Interaction: The Effect of User- and Robot-Generated Content on Trust and Interaction Outcomes**

**Presenter(s):** Lauren Henderson, Claire Abeyratne, Eunice Kwak, and Keever Mulligan

**Advisor(s):** Dr. Jake Liang

Human-Robot Interaction (HRI) will soon transform and shift the communication landscape such that people exchange messages with robots. However, successful HRI requires people to trust robots, and in turn, the trust affects the interaction. Although prior research has examined the determinants of human-robot trust during HRI (e.g., Robinette, Wagner, & Howard, 2014; Wagner, 2015), no research has examined the messages people received prior to interacting with the robot. We posit that strategic pre-interaction messages affect human-robot trust and interaction outcomes (i.e., robot evaluations, robot credibility, participant mood) by affording the persuasive influences from user-generated content (UGC) on participatory websites (Walther & Jang, 2012). In Study 1, participants were assigned to one of two conditions (UGC/control) in an original

experiment of human-robot trust. Compared to control (descriptive information only), results showed that UGC moderated the correlation between human-robot trust and interaction outcomes in a positive direction (average  $r = +.39$ ) for robot as media and robot as tools. In Study 2, we explored the effect of robot-generated content but did not find similar moderation effects. These findings point to an important empirical potential for pre-interaction messages to be strategically deployed to affect human-robot trust and interaction outcomes.

**19. Increasing Chapman students intention to take on water conservation behaviors through the "Cali Cacti" social media campaign.**

**Presenter(s):** Lauren Henderson, Claire Abeyratne, Eunice Kwak, and Keever Mulligan

**Advisor(s):** Dr. Jake Liang

Water conservation is especially important due to the ongoing drought. However, conservation messages have been shown to yield mixed effects attitudes (Liang, Henderson, & Kee, in press). The team designed novel conservation messages applying late-breaking research findings. These findings involved an empirical model related to individuals' subjective norms, self-efficacy, and reactance on behavioral intention to conserve water (Liang, Henderson, & Kee, under review). The campaign utilized a social media platform with advertising support. The evaluation study is ongoing and prospective results can support the development and evaluation of future water conservation campaigns.

**20. Tinder, Bumble, and Hinge: Mobile Phone Dating Application Effects on Relationship Satisfaction, Romantic Beliefs, and Unrealistic Expectations**

**Presenter(s):** Joely Friedman, Larisa Bellan, Jessica Dominguez, Amanda Nievesky, and Rebecca Warbrick

**Advisor(s):** Dr. Sybilla Dorros

The current study investigates the impact of dating applications on relational and physiological well-being. Specifically, this study examines how mobile phone dating application use affected users relationship satisfaction, romantic beliefs, and unrealistic expectations. We hypothesized that the use of mobile phone dating applications will be positively associated with romantic beliefs, will be positively associated with perfectionism, will be negatively associated with relationship satisfaction, and will be positively associated with unrealistic expectations of love. A survey was distributed to N= 379 participants (n= 129 males and n= 208 females), with the remaining unreported. The survey asked about their relationship satisfaction, unrealistic expectations and romantic perfectionism. Participants were required to have currently or ever used mobile phone dating applications such as Tinder, Bumble, or Hinge. The results and methods will be discussed.

## **21. The Dark Side of Dating Applications: Jealousy, Loneliness, Self-Esteem, Depression and Anxiety**

**Presenter(s):** Tiffany Hutcheson, Emily Griganavicius, Charles Pickford, Madison Strahl, and Mark Wimberley

**Advisor(s):** Dr. Sybilla Dorros

Due to the increasing popularity of mobile phone dating applications (apps) in today's society, it is critical to understand the effects mobile phone dating apps (i.e., Tinder, Bumble, and Hinge) have on mental health. In this study we aim to understand how certain variables of mental health such as jealousy, self-esteem, depression and anxiety, and loneliness in order to understand potential harmful effects on mental health. An online survey was administered to N=379, 18 and over who currently use or have used a mobile phone dating app (i.e., Tinder, Bumble, Hinge). We predicted that (H1a) cognitive jealousy will be positively associated with individuals' usage of mobile phone dating apps; (H1b) emotional jealousy will be positively associated with individuals' usage of mobile phone dating apps; (H1c) behavioral jealousy will be positively associated with individuals' usage of mobile phone dating apps. How will the usage of mobile phone dating apps affect an individual's self-esteem, loneliness, depression and anxiety. Past research has focused on jealousy in relation to traditional online dating sites and social networking sites; however, this study seeks to understand the effects from only the mobile phone application platform. There is no previous research on the effects of mental health for those who use dating applications such as Tinder, Bumble, and Hinge. This study strives to understand the relationship between mobile phone dating application use and negative mental side effects. Results and conclusions will be discussed.

## **22. Tinder & Bumble: Evolutionary Theory and Flirting Styles in the Age of Mobile Phone Dating Applications**

**Presenter(s):** Emily Potashnick, Brad Heuer, Sage Hirsch, Sydney Jacobs, and Kayla Velloso

**Advisor(s):** Dr. Sybilla Dorros

Online dating websites seek to increase opportunities to meet potential romantic partners. In this mobile phone driven age, coupled with the recent development and rising popularity in mobile phone dating applications (MPDA), individuals now have the opportunity to effortlessly meet potential partners at the swipe of a finger. While existing research has focused predominantly on online dating websites, this study attempts to fill the gap in research on MPDA. In this study, we focus on two of the most popular applications (apps), Tinder and Bumble. Utilizing Darwin's evolutionary theory (1859), sexual selection theory (1998), and the flirting styles inventory, we aim to discover effectiveness of each respective app, preference of app amongst males and females, and what flirting styles are correlated with Tinder and Bumble users. We distributed an online, self-administered questionnaire to 379 MPDA users, ages ranging from 18-35 years old, in which participants completed the flirting styles inventory and questions regarding MPDA use. Results and conclusions will be discussed.

### **23. Tinder, Bumble, & Hinge: The Impact of Mobile Phone Dating Applications on Well Being and Real-Life Relationships**

**Presenter(s):** Amanda Rogers, Georgina Bridger, Josh Nudelman, Hadeel Qasem, and Molly Simpson

**Advisor(s):** Dr. Sybilla Dorros

With the advancement of different dating media platforms, it has now become eminently easy to find a partner by the swipe of a finger, touch of a button, and through chat tools. Tinder, Bumble, and Hinge, as well as numerous other dating applications, take away initial in-person interactions and instead rely on virtual interpersonal communication. This study investigates how the use of online dating application varies between different, sexes, gender orientations and sexual orientation, in people 18 to 35 years old, as well as determining their views on casual sex. Research was conducted through a 258 question survey that asked questions about their experience on dating applications. Out of the 408 individuals who took the survey, 348 individuals reported to have used or are currently using either Tinder, Bumble and Hinge. Out of the people who completed the survey 341 people identified themselves as straight, 11 identified as gay or lesbian, 16 respondents reported bisexual leaving 6 individuals as unsure or other which included asexual, fluid, pansexual or queer. Quantitative data analysis suggests that participants use (or used) Tinder, Bumble, and Hinge for many different reasons including hook ups, dating or serious relationships. Results and conclusions will be discussed.

### **24. Deception, Relationship Rules, and Dating Applications**

**Presenter(s):** David Taylor, Kathryn Markham, Michael Necula, and Alex Rorie

**Advisor(s):** Dr. Sybilla Dorros

The purpose of this research is to determine how deception in online dating, specifically through dating applications such as Tinder, Bumble and Hinge, is related to the frequency, duration and medium of online communication between parties involved and also their communication patterns in real life. This research further explores David B. Buller and Judee K. Burgoon's research on interpersonal deception theory in relation to online dating application users. A pool of 379(N=379) participants whose ages ranged from 18-35 years old was randomly selected to participate in an online survey in order to gauge the perceived rigidness and flexibility of relationship rules based on the amount of deception that is practiced when using dating applications. This study finds the structure of relationship rules can be predicted by a number of factors including time spent using mobile dating applications, deception practices and gender.

### **25. The Effects of Sexualization of Female Characters on Identification and Moral Disengagement**

**Presenter(s):** Madeleine Reeves, Hailey Odegard, Andrea Schwartz, and Kaitie Smith

**Advisor(s):** Dr. Riva Tukachinsky

This paper seeks to explore the relationship between sexualization of fictional female action heroes, female viewers' identification, and moral disengagement with these characters. This study hypothesizes that participants exposed to more sexualized characters will identify more with that character; it also hypothesized that participants who view a highly sexualized female

character will be more likely to morally disengage from that character. The group of participants were given a synopsis along with movie poster that included an image of either a highly sexualized female character or an unsexualized female character. The participants were then given a questionnaire to measure identification and moral disengagement, or the degree to which viewers are willing to justify questionable actions of the female lead. This study adds to the body of research regarding young women's perception of sexualization in media and their degree of identification with sexualized female action heroes.

### **26. Gender, Celebrity Behavior, and the Public's Perspective**

**Presenter(s):** Michelle Sokolov, Annie Bosch, and Isabel Vandemoer

**Advisor(s):** Dr. Riva Tukachinsky

Our study examines on the relationship between the gender of celebrities, and participants' reactions to their behaviors. We hypothesized that viewers will experience more negative affect when a male celebrity has had a physical altercation with a fan compared to when a female celebrity has had a physical altercation with a fan. We also hypothesized that viewers will be more likely to justify a female celebrity's negative behavior compared to a male celebrity's negative behavior. To test our hypotheses we conducted an experiment among college students. The participants were asked to read articles regarding male or female celebrity behaviors and then answered a survey about their reactions after the articles. The questionnaire included a section containing the PANAS scale in order to measure the participants' negative and positive affect.

### **27. Influence of Celebrity Reputation and Misbehavior on Consumers**

**Presenter(s):** Alexis Trauber, Cassandra Han, Lyra Haris, and Gregory Hershler

**Advisor(s):** Dr. Riva Tukachinsky

This paper explores consumer purchasing behavior in response to negative celebrity publicity. We also examined if a previously tarnished reputation of a celebrity would affect consumers' viewpoints when she commits an immoral act as compared to a celebrity with a good reputation. In an experiment, participants were randomly assigned to read one of four fictitious celebrity news articles. The article depicts the celebrity getting into an altercation with a fan. The two celebrities featured in the study include Taylor Swift and Miley Cyrus because of their vastly different reputations (positive/negative). After reading the article, participants were asked to complete a questionnaire that assesses participants' level of emotional distress, and willingness to support music produced by the celebrity.

## **Peace Studies**

### **28. Homelessness, Shelter, and Human Rights in California and New York**

**Presenter(s):** Rebecca Wilson

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

The purpose of this project is to discuss the issues of homelessness and lack of shelter in the United States, specifically in the states of California and New York, as a human right. Due to the majority of California's homeless population going unsheltered and the large majority of New

York's homeless population receiving shelter, there are ways that California can learn from the system that New York has developed in order to more efficiently and justly provide shelter to its homeless population. This paper analyzes what has worked and what has not worked in either state in providing the human right to shelter, and why California is falling behind New York in meeting human rights standards. This is done by reviewing existing governmental and nongovernmental reports, comparing policies in California and New York, and consulting existing literature about the issue at hand. By adapting a 10 step program for making human rights a reality for the homeless in California, the goal of this paper is to propose an advocacy, networking, and education program for organizations, both governmental and nongovernmental, to use when working to shelter the homeless.

### **29. Sexual Assault in the Military: An Evaluation of Public Information**

**Presenter(s):** Jasira Woods

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

Media and the U.S. Congress have critiqued the U.S. military for mishandling sexual assault cases and for having ineffective training and policies related to this. Current criticism suggests that the military's procedures are rarely evaluated by outside entities, so this project begins such analysis. This research examines the public framing of sexual assault by the United States Army, Navy, Marine Corps, and Air Force. I compare and contrast the official websites of these military branches; each branch offers different public descriptions of their attempts to prevent and respond to sexual assault. There are several overarching themes regarding sexual assault that can be found on their websites, including: 1) addressing sexual assault is necessary to create military readiness; 2) behavioral changes needed by individuals to reduce sexual assault; 3) the importance of the chain of command, and 4) resources that contribute to the healing of victims. However, the manner in which these themes are addressed varies among the branches, and each branch frames addressing sexual assault as a component of its values.

## **Political Science**

### **30. Support for Law Enforcement Expenditures**

**Presenter(s):** Andrew Bartram

**Advisor(s):** Dr. Ann Gordon

Recent terrorist attacks around the world have led to a change in the way that people view the Government and the safety precautions it takes to ensure the public's safety. People are more judgmental of the Governments' actions and are therefore more willing to voice their opinions when they do not agree. The public's view on police and law enforcement has experienced the most drastic change over the last few years. This paper explores the national public view of the Law Enforcement system and how effective it is by covering the public's feelings on a) recent security upgrades in public places and b) the likelihood of a terrorist attack on US soil in the near future, and if these factors effect public expenditure on Police and Law enforcement. According to the ANES, when asked about recent security upgrades to public places, such as airports, results showed a negative feeling toward Law Enforcement, however when questioned about possibilities of a terrorist attack results showed that the public seemed concerned of the chances



of one occurring and were therefore more supportive of the Law Enforcement system. According to research, people believe that public places need more security, and that with the threat of a terrorist attack more money needs to be applied into defensive strategies. It seems as though the public does not approve of the actions that Police and Law Enforcement take to provide safety, but always expect to receive protection from the Law Enforcement system.

### **31. Media Outlets and Voting Turnout.**

**Presenter(s):** Andrew Calloway

**Advisor(s):** Dr. Ann Gordon

The purpose of this research is to find out the affect of the internet and social media outlets have on voter turnout during a presidential election year. The internet and social media have been and is becoming a major source for news among young audiences between the ages of 18-25. The internet has become a large medium when it comes to voting such as the television did back in the 1960 election and how it impacted voting for presidential candidates and for the years to come. This research will provide statistical data to show if young voters between the ages of 18-25 years old end up turning out to vote with the use of getting information off the internet. The research will try to answer if the internet is the next step to increasing voter turnout and if voters are voting for a particular political party and particular candidate, and if the social media sites are affecting voters to sway towards a certain ideology and view. It will also provide statistical data on what particular social media sites 18-25 years old are visiting to access information on political candidates. The data will focus on the 2008 and 2012 presidential election years and provide insight and analysis for the recent 2016 presidential election.

### **32. The Influence of Religion in the American-Israeli Alliance**

**Presenter(s):** Colin Doroshov

**Advisor(s):** Dr. Ann Gordon

Why is it that most Americans feel that it is in our best interest to maintain a strong alliance with the state of Israel when many of our allies seem to be abandoning a pro-Israel stance? Most would probably attribute this to the fact that the majority of the world's Jews are American, others might start with pointing out practical concerns like the political importance of maintaining a modern Democratic ally in a region perceived as being the hotbed for religious extremism as a logical reason for the ongoing American-Israeli alliance. The reason the United States unremittingly stands with the Jewish State is in fact an entirely different religious group, Evangelical Christians, because of the sheer size of their voting block. This paper will explore the relationship between the two countries, and delve deeper into these religious communities in the U.S. that have had, and continue to impact American-Israeli interactions using ANES data to do so. This paper intends to research the roots of the connections between the U.S. and Israel and consider the two countries' evolving socio-religious groups that are putting enormous pressure on politicians through public opinion to stand with the state of Israel. One compelling finding I have come across is the positive statistical connection between people who identify themselves as 'born again' Christians and those who see the United States support for Israel as being just about right, or not supportive enough.

### **33. Who Supports Torture**

**Presenter(s):** Alexis Elfend

**Advisor(s):** Dr. Ann Gordon

The ethics of torturing suspected terrorists is an issue that has remained pertinent throughout political discourse. Whether for moral or security reasons, there is a clear divide between those who support the torture of individuals suspected of terrorism and those who condemn it. This paper will examine exactly what factors contribute to whether an individual is in support of or opposed to torture through analyzing data gathered from the 2012 National Election Studies Polls. The demographics I will be analyzing to determine their impact on an individual's support of torture will be; a) gender, b) party that the voter most identifies with, and c) other identifiable pertinent characteristics of the public. Each of these factors will provide insight regarding why an individual is for or against torturing suspected terrorists.

### **34. Security at What Cost**

**Presenter(s):** Vafa Fanaii

**Advisor(s):** Dr. Ann Gordon

The purpose of this research is to understand the extent to which patriotism escalates or declines as a nation becomes involved in foreign conflicts and if the level of patriotism does rise will the public allow the government to infringe upon its citizens constitutionally given rights in the name of national security. The goal is to demonstrate how in times of conflict even nations that consider themselves great ambassadors of individual freedom, such as the United States, deviate from their core beliefs in the name of national security. Upon further research, it becomes apparent that wars and foreign conflicts involving western countries, in specific the United States, have involved a new age threat post-September 11, dubbed Terrorism. As a response to this new threat the United States has implemented controversial tactics, largely enacted by the Bush administration, which include but are not limited to the use of wire taps, drones/UAV's, and various torture tactics. The relevance of the stating the usage of these tactics is to understand how a country's reaction to a threat either unifies the nation or divides it. In essence the core of this research is centered around the idea that strong patriotism can lead to either strengthening a country or blindness and naivety towards the domestic and foreign misdeeds of the central government during foreign conflicts.

### **35. Understanding American Attitudes Toward Affirmative Action Policies**

**Presenter(s):** Annika Ford

**Advisor(s):** Dr. Ann Gordon

In this paper I use ANES data to understand how one's race, education level and gender affects support for or against affirmative action policies. And, more specifically, how American society understands the role of the government in guaranteeing equal treatment versus equal opportunity. For example, the post-Civil Rights era saw a rise in the acceptance of the notion of "color-blindness", or neutrality in education and hiring practices that do not take into account race, gender, and other social factors. Yet current socioeconomic indicators would suggest that neutrality has only perpetuated racialized social and economic conditions that favor whites, in

spite of the law. Initial findings suggest that attitudes toward equal opportunity are significantly shaped by one's race. Additionally, judgment of affirmative action policies shifts depending on how the respondent is asked about equal opportunity in America.

### **36. Gender Influence in Government Size**

**Presenter(s):** Natalie Gallardo

**Advisor(s):** Dr. Ann Gordon

The citizens of the United States have had stark opposing views on the size of government, causing a divided nation on the issue. The issue of government size plays a critical role in determining how the United States government functions and how involved it is in the lives of its citizens. There seems to be a significant divide between those who maintain that the current government is large because of big issues or simply because it has overstepped its boundaries. Looking at the demographics, particularly that of gender, I aim to distinguish who favors small government and who favors large government. Previous research has shown there is a correlation between opinion of size of government and gender.

This research, however, has been invalidated by data from the American National Election Studies (ANES) in 2012. After running correlation and mean tests on the variables of gender and the role of government from the ANES by using SPSS, a statistical analysis program for data, there now seems to be no correlation between the two. I aim to gain insight on why not only this gender gap is disappearing, but if there are also other demographics that play into this. These new findings, not yet discussed, will bring attention to a recently discovered topic. This information could shed light on the closing gender gap in size of government and also open new studies to see if the same is occurring within other variables.

### **37. Who Doesn't Vote?**

**Presenter(s):** Dania Garcia

**Advisor(s):** Dr. Ann Gordon

It has been assumed that whether a person votes or not can be predicted by the education level of the individual, yet why is it that as more people obtain higher degrees the voter turnout drops? What is it that increases voter turnout? The United States is one of the countries with the lowest voter turnout rate in the world. During the 2012 elections less than 55% of the voting age population participated in the elections, it hasn't been this low since the 1920s. I will be looking for variables among non-voting and voting individuals, relying on the American National Election Studies. Concluded from the data education level cannot predict whether an individual votes however, it can predict individuals who will not vote. I will explain this in detail and show the data that backs up the theory and present to you the individual who is not likely to vote. I will also look at social class as a possible variable in determining voting behavior. Social class is also assumed to be a determining voter turnout variable. Not only will I look at what type of individuals vote but I will also look and what type of individual doesn't vote and conclude what could possibly be the reasons for low voter turnout. The findings may be useful in determining what changes can be made to increase voter turnout in the United States, an issue that shouldn't, but does exist.

### **38. Political Psychology: A Study of Presidential Candidate Traits and the Feelings They Bring Out in the Electorate**

**Presenter(s):** Claire Gatzke

**Advisor(s):** Dr. Ann Gordon

The 2016 election continues to be one of the most tumultuous, interesting, and unique political campaigns ever and has brought previous research about character traits that voters look for when supporting and voting for presidential candidates into question. Research has been done that examines what socioeconomic and cultural circumstances cause voters to use either candidate traits, policy issues, or ideology to make candidate evaluations, but there has not been much analysis on what specific candidate traits voters respond more positively to. Some studies have shown that voters prefer candidates that have character traits showing both competence and warmth but according to research, voters place a higher value on candidate character traits having to do with competence than ones that have to do with a candidates' warmth and personability. In light of the 2016 campaign, some competency-related character traits in presidential candidates may not be as valued as they were thought to be in comparison to other traits, as American culture and society continues to change. In relation to this, the following will analyze competence-related character traits in presidential candidates and examine which specific trait; perceived leadership ability, knowledgeability, or morality, potential voters respond most positively to when looking at presidential candidates. Using the NES 2012 data set, current results indicate a stronger correlation between perceived competency-related traits and feeling thermometers amongst the electorate for Democratic presidential candidates than for Republican presidential candidates.

### **39. Modern Political Voting Behavior**

**Presenter(s):** Kai Hamilton Gentry

**Advisor(s):** Dr. Ann Gordon

This research attempts to identify the factors in the American populous that determines political involvement. Analyzing voting behavior can help us understand why turnout is lower than other nations and can tell us what factors influence people to vote the way they do. In this case, political involvement is being defined as either monetary donations to a campaign or volunteering of ones' time to a presidential campaign. The end goal is to synthesize a variety of work in an attempt to discover the most impactful traits and behavior that drives involvement. Factors being examined include gender, socio-economic status, party affiliation, and religious affiliation. By examining these factors, it will be possible to determine what specifically has the highest level of influence on a political campaign.

Some notable findings thus far have shown that the level of education does not have an effect on voter turnout and that the gender of the citizen does not affect the frequency of campaign donations. These findings contrast the current literature which gives an entirely different profile of the typical political donor and insists that education drives voter turnout.

#### **40. Patriotism Playing Its Part in Politics**

**Presenter(s):** Drew Knepley

**Advisor(s):** Dr. Ann Gordon

While being a patriot may include an American flag on the lawn and a sense of civic duty, patriotism in the United States is often closely related to support of the U.S. military. 'Support the Troops' is a common phrase in American politics and civil life. This paper aims to investigate the idea that higher senses of Patriotism result in more support for military actions abroad. The paper looks at variables in the ANES Survey of 2012 such as feelings when looking at a flag and feelings when hearing the national anthem and see if respondents with high senses of patriotism also have higher propensity to support US military action abroad. The data looked at in the study suggests a strong correlation between patriotism and support for US foreign policy, especially support for anti-terrorism actions. The study looks at other factors that may play into patriotism like feelings towards equality, trust in government, and even conspiracy theories.

#### **41. H.R. 158 : The Strengthening of the Visa Waiver Program**

**Presenter(s):** Robert Nelsen

**Advisor(s):** Dr. Julye Bidmead and Dr. Donald Booth

When millions of New York City residents woke on a Tuesday morning in early September of 2001, they were thankful to see a clear blue sky rather than storm damage from Hurricane Erin. Author George McKenna would later describe in his book, *The Puritan Origins of American Patriotism*, that the sky on this morning "was not just blue, it was a light, crystalline blue, cheerful and invigorating." But another storm of monumental consequences was already on its way. It was the morning of September 11, 2001. In a series of unbelievable images, American Airlines Flight 11 was flown directly into the World Trade Center North Tower by Al-Qaeda terrorists, and 17 minutes later, United Airlines Flight 175 crashed into the WTC South Tower. Within two hours both 110-story Towers collapsed to kill 2,606 workers, fire fighters, police and visitors. But it would take another 15 years and the deaths of 6,000 American soldiers killed in Middle East wars along with several smaller terrorists attacks inside the United States before Congress would finally pass legislation to strengthen previously ineffective visa and border security regulations. When U.S. Representative Candace Miller (R) of Michigan's 10th congressional district introduced H.R. 158 on January 6, 2015, she explained, "On 9/11, this country experienced devastating loss as a consequence of a failed process. My legislation is intended to help prevent failure and improve our ability to protect the Homeland from the ever-evolving threats posed by international terrorist organizations" (Miller 2015 Press Release).

#### **42. Economic Perceptions' Effects on Voting Behavior**

**Presenter(s):** Maxx Sharp

**Advisor(s):** Dr. Ann Gordon

The goal of this research is to find out how personal economic issues and perception of economics affects voting behavior. The economy has been argued to be the best predictor of voting behavior by Downs in 1957. In 1966 Key found that the incumbent party is usually blamed or praised for economic changes. While these studies used the two main schools of thought, one being pocket

book voting, where the voter votes on whatever will help their own economic interests. The other is sociotropic voting, where the voter will vote with the intention to benefit what they perceive as the national economy. However, analysis of 2012 ANES survey data contradicts many past predictors of voting based on economic perception. A key finding is that people that who are worried more about their economic situation voted for the incumbent president, under whom the economy worsened. The purpose of this research is not simply to provide evidence that pocketbook and sociotropic voting hypotheses were ineffective predictors in the 2012 elections, but instead to find why the theories failed in this situation and hopefully develop a hypothesis.

#### **43. The Judicial Branch: Removal of the Supreme Court**

**Presenter(s):** Morgan Sielski

**Advisor(s):** Dr. Ann Gordon

One of the major questions coming to light within the U.S. political system is the power of the Judicial branch and the role it plays in legal affairs as well as politics. The unique quality setting the Judicial branch apart from the Executive and Legislative branches is the proposed absence of politics. If the question arises to have the U.S. Supreme Court removed, this will greatly impact the role of the two other branches as political and legal actors. With each branch designed to focus on one section of government structure, removing this branch would then require reapportioned legal responsibilities to the other branches, taking away from the check and balance system. This study will focus on the impact of the removal of the U.S. Supreme Court, the influence of public opinion, and as to where and why the support for this drastic change may have developed. Three of the major variables to be examined in this study will be that of party affiliation, level of education, and voting statistics. The predicted hypotheses will state that the individuals affiliation to a party will determine how they feel in response to the idea of removing the Court. Furthermore, education will provide a data analysis that the higher the education, the more likely to support the Court. Age, associated with voting statistics will provide a variable that will demonstrate different generations participation or apathy regarding decisions made towards the U.S. government and the systems and policies in place. The data found supports the claim that party affiliation strongly correlates to the ideas an individual may have on the removal of the Court. In a study focusing strictly on party affiliation in a bivariate study with the removal of the Court showed strong correlation at .659 with a strong statistical relationship and significance of .000. This study is only further supported by bivariate studies ran on how strong a persons party affiliation as well as political leaning. Results found concerning how strong an individuals party affiliation is showed a strong correlation at .659 with a strong statistical relationship ad significance with a finding of .000. Concerning political leaning, with the bivariate studies ran there proved to be a strong statistical relationship of .000 and weak to moderate correlation at .484.

#### **44. Does Religion and Gender Stereotypes Affect Americans Gender Bias In the Polls**

**Presenter(s):** Brittney Souza

**Advisor(s):** Dr. Ann Gordon

The 2016 United States Presidential Election brings the revolutionary idea of a woman president with the Democratic candidate of Hillary Clinton. The current opposition for a woman president have been generalized gender stereotypes that she will be incompetent, too sensitive,

temperamental and fickle with other world leaders. Many studies show that these arguments lack evidence in current female leaders and many commanding women in democracies have proven to be sufficient leaders to their male counter parts. Using the American National Election Survey a voter's religious identity and how they feel towards a woman president is statistically significant but has a very weak correlation, proving that religion does not play a direct hand in American's vote. However gender stereotypes, in regards to voting for a woman president, are both statistically significant and presents a moderate correlation. Judeo-Christian religious values play an important identifying factor for many Americans and provide the building blocks of foundational views on gender roles in society. Those who identify with strong Judeo-Christian religious beliefs will be more likely to believe that women should play a secondary private role in the household and remain absent from the political public sphere. The more likely an individual will believe in the fundamentalist gender stereotypes rooted in Judeo-Christian beliefs, the more opposition they will feel towards a woman president. After September 11th, 2001, the likelihood of a woman president has declined due to the belief that male presidents are better leaders in times of war and terrorism.

#### **45. Government Skepticism and Expectations for the Future: Evaluating Attitudes About the Future of the USA**

**Presenter(s):** Grant Wiede

**Advisor(s):** Dr. Ann Gordon

This paper will examine the relationship between voters' skepticism towards government and future expectations of changes in the economy and standard of living in the United States, using data from the ANES 2012 voter survey. This paper theorizes that the greater the skepticism of voters towards the government, the more likely voters are to have a pessimistic outlook towards future changes in the economy and standards of living. Previous research conducted on this question is relatively significant, yet changes in the attitudes of American voters since the Great Recession mean that expectations may have significantly changed. The Pew Research Center has published recently about similar topics, but this study will confine itself to analyzing data exclusively from the ANES 2012 survey.

#### **46. Post Conflict Cash Transfer Analysis: How Can We Know if They "Work"?**

**Presenter(s):** Rebecca Wilson

**Advisor(s):** Dr. Crystal Murphy

Cash transfers are a growing in popularity as a poverty alleviation tool. They are being tried out in various places and contexts across the world, such as World Food Program's Livelihoods Program in Uganda and World Food Program's "Cash for Assets" Initiative in Kenya, and are being evaluated on their efficacy. However, each evaluation uses a distinct set of independent and dependent variables to declare whether or not the tool works in the given context. As many past approaches do not account for conflict conditions, what does investment mean in temporary displacement communities? And how can agencies like the World Food Program, who are deploying cash transfer interventions, develop frameworks for evaluating the effects of cash transfers in both temporary displacement communities? This project explores past approaches to evaluating cash transfer interventions so as to mobilize effects on a case in a conflict region.

#### **47. Immigrant America**

**Presenter(s):** Celeste Zamudio

**Advisor(s):** Dr. Ann Gordon

Ever since our founding, immigration has been a hot-topic in the United States. Over the last decade, almost fourteen million immigrants have made the United States their home, bringing the total of all documented and undocumented immigrants currently in the nation to over forty million. It is evident by some of the darkest times in America's history, that the United States has long exhibited an unjust indifference to the rights and interests of those targeted groups perceived as "different" or somehow less deserving unauthorized immigrants. This paper conducts an analysis on public opinion data to assess the public's outlook on the proposal to grant citizenship to some illegal immigrants, as well as the public's opinion on the U.S. government policy toward unauthorized immigrants. The results show that more people believe that immigrants should be granted U.S. residency under certain conditions. Moreover, results emerge when testing the correlation between public opinion on immigration levels and one's political party affiliation. Through bivariate correlation, results show that as one identifies themselves as Democratic, views on immigration tend to increase, whereas the opposite is true for Republicans. This implies that ideology is a significant factor towards one's opinion on illegal immigration. Americans are often torn between the ideological differences between welcoming the masses of immigrants who long for freedom and a chance at the American dream, while others feel that immigrants deprive native citizens from resources and jobs and weaken the economy.

### **Religious Studies**

#### **48. Moses' Women: The Untold Stories of the Women in the Exodus**

**Presenter(s):** Sydney Murdock

**Advisor(s):** Dr. Julye Bidmead

One of the most well-known and celebrated stories of the Hebrew Bible is in the book of Exodus. What is ostensibly left out is the story of Miriam, Moses's sister, Zipporah, Moses' wife, and other women that impacted his life. Though many of these women saved Moses's life in one instance or another, their stories remain in the margins of the Torah. My thesis will explore the important role of these women.

### **Sociology**

#### **49. Space and Place: A Study of the Santa Ana Zoo**

**Presenter(s):** Taylor Dwyer

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

This project examines the intersection of recreation, education, and the construction of "nature" at the Santa Ana Zoo. My fieldwork focuses on how the zoo physically employs spatial tactics to orient viewers to cultivate their experience. I will analyze both social media publications, such as the zoo's website, as well as signage and visitor information at the zoo. I will draw from proxemic



analysis to study how individuals and groups move throughout the zoo and how they engage with the exhibits, comparing their movements to how the zoo promotes specific exhibits over others.

My research will also explore what motivates individuals and groups to attend the zoo, what they're expectations of the zoo are, and how the space meets or fails to meet said expectations. I am specifically interested in the dual function of the zoo as a recreational and educational space. I will conduct interviews and observe behavior, as well as profile zoo visitors, to analyze who uses the space and for what purpose.

This project is ultimately a study on how space is constructed into "place." Individuals and groups behaviors are informed by the space they inhabit. This project specifically aims to understand how American culture has constructed entertainment or recreational spaces as an oasis from modern, urban life. My research aims to show how the zoo is far from "natural," but, rather is a constructed landscape.

### **50. Farmers Markets: The Authentication of the Farm to Table Movement and Its Effects on the Vendors**

**Presenter(s):** Elizabeth Fudge

**Advisor(s):** Dr. Roberta Lessor

This study examines farmers markets in the Orange County area as well as what the effect the local food movement has on the language, status and legitimization of the markets. The analysis of this paper draws on major sociological paradigms including Conflict Theory and Symbolic Interactionism while also touching on several specific theories such as framing theory, non-alienated labor theory and conscious consumption. Data collection occurred through participant observation and informal interview with vendors as well as customers. A review of existing literature on farmer markets allowed for a brief history and a greater understanding of how farmers market are growing along with the acknowledgement of the farm to table movement. Through data analysis three major themes occurred: vendor's reasons for joining the markets, establishing market status and the growth of the farm to table trend. This can be seen through the language used within the markets as well as through how the vendors attempt to frame the farm to table movement. In order for the markets and the farm to table trend to be legitimized in the eyes of the public the vendors and the non-profits would need to change several factors such as market education to the public, organized values of the market and the allowance for vendors to expand their product lines.

### **51. Creating a Kodak Moment: Boredom and "Planning Memories" in Dungeons and Dragons**

**Presenter(s):** Devin Marcus

**Advisor(s):** Dr. Roberta Lessor

This study examines the culture surrounding the board game Dungeons and Dragons. The analysis relies on a sociological perspective known as "commitment theory" to explain how players stay engaged in what can be a lengthy and at times boring enterprise by making what is known as "side bets." Research was conducted over four months of participant observation at a local game store where Dungeons and Dragons was being played weekly. There was not much precedent for

Dungeons and Dragons research, as the few papers that examined it tended to focus on the players and not take into account the playing of the game itself. The findings suggest that Dungeons and Dragons players, while playing, create “side bets” that take the form of “making references” to increase credibility and “planning memories” and thus have multiple reasons for playing over and above winning the game per se. It can be demonstrated that playing thus fulfills more than one purpose. This idea of using side bets to make an unappealing activity more interesting can also be applied to “selfie” culture and internet sociality in general.

## **52. Popular Science and The Debate for Social Responsibility**

**Presenter(s):** Hotaru Morita

**Advisor(s):** Dr. Zeynep Akyol Ataman, and Dr. Alexander Bay

In the last few decades, technological and medical advancements have greatly raised the human life expectancy and immunity to disease. Smallpox and rinderpest has been officially eradicated, polio and malaria are also arguably close. Such advances will not have been possible without collective social cooperation of the masses. However, public attitudes have arguably shifted in current society as discredited scientific theories have sparked an alternate, public science movement. One such theory is the early vaccination as the causation for autism, has been paraded and largely taken up by concerned parents throughout the United States. Extensive media coverage has only exemplified and further elevated these theories. It has become an issue that has even required addressing in the early Republican debate. In terms of scientific debate, vaccination is only effective when majority of the population participate. This increasing void between scientific consensus and popular science is detrimental to social cooperation. Henceforth, for the purpose of this paper I argue that media is further widening this gap with wider coverage.

## **53. Racial Equity in American Wilderness Spaces**

**Presenter(s):** Lindsay Robb

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

America’s National Park System was established in 1872 “as a public park or pleasuring-ground for the benefit and enjoyment of the people” (National Park Service, 2015). Featuring stunning and well-preserved natural beauty, these parks are often described as America’s greatest asset, but can they truly live up to this standard if they only serve a limited portion of the population? There is ample research documenting the fact that the parks are used disproportionately by different racial groups, with 35% of Whites visiting national parks in the past two years, a rate more than double that of Blacks, of whom just 13.9% visited a national park in the past two years (Krymkowski, Manning, & Valliere, 2014, p.35). Latinos represent a less dramatic, yet still significant difference in park use, with only 30% of Latinos visiting a national park in the past two years (Krymkowski, Manning, & Valliere, 2014, p.35). Existing literature on this topic provides ample quantitative research, but fails to tell the nuanced stories of people who are visiting these parks, and those who are unable to visit. This study examines the underlying factors of these disproportionate park visitation habits, using qualitative data to explore differences in outdoor recreation according to race. The study sample consists of Black, White, and Latino participants

and provides an in-depth exploration of barriers such as socioeconomic status, racism, cultural exclusion, and attitudes towards nature.

#### **54. Socio-Demographic Disparities in the E-cigarette Retail Environment: A Case Study of Orange County, CA**

**Presenter(s):** Lauren Sato

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

Sociologists have argued for more spatial thinking to help understand, for example, individual health behaviors. Previous studies have found that minority groups, such as Blacks and Hispanics, and low-income populations live in areas with more tobacco retailers. No research to date has examined whether the retail environment for e-cigarettes exhibits similar patterns to tobacco. Yet e-cigarettes are an emerging health behavior whose health effects remain unclear. This study uses the social determinants of health framework and geospatial methods to study how various socio-demographic groups are exposed to the e-cigarette retail environment, a relatively new phenomenon. Addresses of Orange County vape stores were collected using Internet search engines. Data on income, education, and race/ethnicity were downloaded from the U.S. census bureau. ArcMap 10.3, a GIS software, was used to geocode and spatially visualize vape store density (dependent variable) overlaying the socio-demographic variables (independent variables). The resulting maps showed a potential association between the low income, low education, and non-White tracts having higher retailer density. The data was then tested for spatial autocorrelation using Moran's I and Anselin's I. The results showed that there was significant autocorrelation for retailer density (per 10 km of roadway) and for the independent variables. A linear regression also revealed spatial autocorrelation of the residuals, which violates the ordinary least squares (OLS) regression. The next steps will be to identify a regression model that appropriately characterizes the residuals.

### **World Languages and Cultures**

#### **55. French Identity Crisis at the Table**

**Presenter(s):** Juliette Rigo

**Advisor(s):** Dr. Veronique Olivier

This study aims to investigate the status of French identity through the prominence of its cuisine. I used an interdisciplinary research approach to examine how much food and cuisine reflect French identity. First, I explore the beginnings and rise of French gastronomy while highlighting historical personas that contributed to its fame. Then, I question the future of the French identity and "art-de-vivre" with the rise of globalization. In conclusion, it is apparent that while France is changing, the nation has also adapted to a more diverse population and its culinary palate shows it.

# Poster Session 1

## Quick Reference – Student/Poster #

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Abeyratne, Claire	18, 19	Kraus, Kristina	3
Anderson, Kelsey	9	Kuhn, Anna	5
Bartram, Andrew	30	Kwak, Eunice	18, 19
Bellman, Larisa	20	Manocchio, Caitlin	6
Benjamin, Lydia	14	Marcus, Devin	51
Bocinski, Jessica	8	Markham, Kathryn	24
Bonfert, Tayler	10	McCain, Jamie	15
Bosch, Annie	26	Morita, Hotaru	13, 52
Bridger, Georgina	23	Mulligan, Keever	18, 19
Calloway, Andrew	31	Murdock, Sydney	48
Cuber, Alicia	7	Necula, Michael	24
Dominguez, Jessica	20	Nelsen, Robert	41
Doroshov, Colin	32	Nielesky, Amanda	20
Dwyer, Taylor	49	Nudelman, Josh	23
Elfend, Alexis	33	Odegard, Hailey	25
Fanii, Vafa	34	Pickford, Charles	21
Ford, Annika	35	Planto, Dani	11
Friedman, Joely	20	Potashnick, Emily	22
Fudge, Elizabeth	50	Qasem, Hadeel	23
Gallardo, Natalie	36	Reeves, Madeleine	25
Garcia, Dania	37	Rigo, Juliette	55
Gatzke, Claire	38	Robb, Lindsay	53
Griffith, Emmett	4	Robbie, McKenna	12
Griganavicius, Emily	21	Rogers, Amanda	23
Hamilton Gentry, Kai	39	Rorie, Alex	24
Han, Cassandra	27	Sato, Lauren	54
Haris, Lyra	27	Schwartz, Andrea	25
Henderson, Lauren	17, 18, 19	Sharp, Maxx	42
Hershler, Gregory	27	Sielsk, Morgan	43
Heuer, Brad	22	Simpson, Molly	23
Hirsch, Sage	22	Smith, Kaitie	25
Hisamoto, Dennis	1	Sokolov, Michelle	26
Hutcheson, Tiffany	21	Souza, Brittney	44
Inaba, Holeka	2	Stein, Samantha	16
Jacobs, Sydney	22	Stewart, Dominique	2
Knepley, Drew	40	Strahl, Madison	21

# Poster Session 1

## Quick Reference – Student/Poster #

---

Taylor, David	24
Trauber, Alexis	27
Vandemoer, Isabel	26
Velloso, Kayla	22
Warbrick, Rebecca	20
Wielde, Grant	45
Williams, Michelle	3
Wilson, Rebecca	28, 46
Wimberley, Mark	21
Woods, Jasira	29
Zamudio, Celeste	47

**Poster Session 2**  
**Abstracts**

**Behavioral, Health, and Natural**  
**Sciences**



# Graduate Students

## Schmid College of Science and Technology

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### Food Science

#### **1. Comparison of DNA and Protein-Based Methods for the Detection of Beef and Pork in Processed Meat Products**

**Presenter(s):** Adam Perestam, Kayleigh K. Fujisaki, and Omar Nava

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

Mislabeled ground meat products can occur when meat species are mixed together or purposefully substituted for cheaper alternatives. This practice can lead to unfair economic gain, infringe on religious practices, and create potential health risks. Two commonly used methods for species detection within ground meat products are real-time polymerase chain reaction (PCR), a DNA based method, and enzyme-linked immunosorbent assay (ELISA), a protein based method. While ELISA is used by the USDA, real-time PCR is also a well-established method for this purpose. To determine the optimal method for species identification within processed meat products, both methods were directly compared based on sensitivity, specificity, agreement among duplicate samples, cost, time, and ease of use. Fifteen reference samples containing known percentages (0.1-99.9%, w/w) of pork and beef were analyzed in duplicate using both methods. Thirty commercial products, including sausages, pet treats, and canned meats, were also tested in duplicate with each method. Reference sample analysis showed real-time PCR was able to detect pork in duplicate samples at 0.10% and beef at 0.50% in the binary mixtures. ELISA detected pork in duplicate samples at 10.0% and beef at 1.00% in the binary mixtures. When both reference and commercial samples were combined, real-time PCR demonstrated the greatest agreement among duplicate samples. Both methods were successful at identifying species in ground meats, sausage, and deli meat samples; however, pet treats and canned meats proved more challenging. Real-time PCR was also found to be less expensive while ELISA was less time-consuming and easier to perform.

#### **2. Greening, Antioxidant and Antiglycation Capacity in Sunflower Butter Cookies as a Function of Moisture Content**

**Presenter(s):** Tara Okuma, Sihui Liang, and AJ Rafter

**Advisor(s):** Dr. Lilian Were

Sunflower greening, antioxidant and antiglycation capacity in sunflower butter cookies as a function of moisture content at pH 8.03 was investigated. The moisture content measured by forced draft oven, greening intensity by Hunter Lab, antioxidant capacity by trolox equivalent antioxidant capacity (TEAC) and total fluorescent advanced glycation end-product (AGE) assays in sunflower butter cookies baked at 300 and 350°F were recorded. Cookies were baked using egg or chia seed egg substitute and honey, maple, agave, or corn syrups as the moisture sources. The cookies were then stored in plastic bags versus uncovered for 48 h. Cookies with chia as the egg



substitute contained the highest moisture at 300 and 350°F, whereas corn and agave syrup contained the least moisture. Cookies containing maple syrup exhibited increased greening at both temperatures directly after baking and after 48 h. Cookies with chia used as an egg substitute baked at 300°F contained the lowest antioxidant capacity and total fluorescent AGEs. Cookies with different sweeteners (different moisture content) showed significantly different greenness, antioxidant capacity, and AGEs ( $p < 0.05$ ). A strong negative correlation of -0.891 between moisture content and a value was observed, indicating that greening increased with increased moisture. The results suggest that greening intensity and total AGEs increases as moisture content increases, while antioxidant capacity decreased in sunflower butter cookies. This study is significantly important to cookie flavor, appearance, and nutrition in the formulation and development of new products.

### **3. Color Stability of Green Trihydroxybenzacridine Derivative with Time, Heat, pH, Ascorbic Acid**

**Presenter(s):** Alexa Sarcona, Joele Atonfack Tsopkeng, and Stefani Miller

**Advisor(s):** Dr. Lilian Were

Usage of sunflower proteins in foods is limited by the formation of a green trihydroxybenzacridine derivative resulting from the reaction of 2 chlorogenic acid molecules with a primary amine to form an oxidized trihydroxybenzacridine derivative in alkaline environments. The stability of the green pigment derivative was studied with the objective of decreasing greening with pH, heat (60°C), and storage time at 4 °C after its formation in baked foods, modeled with a sunflower meal protein cookie. Sunflower protein cookie dough was stored for 24 or 48 h, and baked at 176 °C for 11 min. The pigment was not pH stable, turning dark purple at pH 2 and blue at pH 4. There was no significant decrease in greening ( $p > 0.05$ ) with storage over 48 h, but greening decreased significantly ( $p < 0.05$ ) with heating at 60 °C over 90 minutes, measured with a Hunter LAB colorimeter. The green color turned to yellow when ascorbic acid was added, reducing the pigment. Information pertaining to decreased greening was applied to cookies. Ascorbic acid from lemon juice (0.55%) was added to the dough after formation of the green pigment. Dough with ascorbic acid reduced the pigment to a yellow color, significantly decreasing  $A^*$  from -13.03 to -0.97 ( $p < 0.05$ ) after baking. Heating decreased greening in food products after formation and ascorbic acid prevented greening. Adding ascorbic acid to food products containing sunflower protein can adequately prevent undesired greening, allowing a wider usage sunflower protein in the food industry.

### **4. Antioxidant Capacity of Dried Agaricus Bisporus in Salted Cooked Ground Beef**

**Presenter(s):** Hatouf Alnoumani

**Advisor(s):** Dr. Lilian Were and Dr. Zeynep Akyol Ataman

Salt increases sensory attributes in ground beef products. Lipid oxidation (LOX) leads to detrimental nutritional (change in protein structure), quality (off aromas, flavor and color), economic, environmental and health effects (formation of HNE and oxidized lipids). Mushrooms as ingredients in ground beef products could be beneficial as they contain antioxidant phenolic (e.g. gallic acid, pyrogallol and coumaric acid) and ergothioneine compounds. The research goal was to determine the effect of adding 0, 1, 2 and 4% dried powdered *Agaricus bisporus* (DAB)

mushrooms on preventing oxidation of refrigerated cooked ground beef in the presence of 0, 1 and 1.5% salt. During 16 days of refrigerated (4°C) storage, significantly lower thiobarbituric acid reactive substances (TBARS) values were determined in samples with DAB compared to control samples. Salt concentrations did not affect TBARS values significantly in the presence of DAB. Volatile compounds as markers of LOX were also lower with DAB. Nonanal was the aldehyde in the highest concentration and it decreased by 93.9 – 99.9% in samples with DAB compared to negative control samples. The decrease in hexanal and octanal were 15.9 – 99.8 and 84.1 – 99.9% respectively. In conclusion, our data suggests that dried powdered *Agaricus bisporus* if added to ground beef prior to cooking prevents lipid oxidation.

##### **5. Relationship of Temperature and Time on Color Stability of Green Pigmented Benzacridine Derivatives formed from the Interaction of Chlorogenic Acid with Lysine at pH 3, 5, and 7**

**Presenter(s):** Steven Rogers, Norah Alfawaz, and Karen Lee

**Advisor(s):** Dr. Lilian Were

The reaction between free chlorogenic acid (CGA) and free lysine at pH 9.0 creates a green pigment that may be used as a natural green colorant in food products. The color, known as a benzacridine derivative (BzD), first needs to be isolated to separate it from any unreacted CGA and lysine, thus stabilizing the color. The compound was isolated from the unreacted products through ether extraction. The compound was tested for stability under multiple pH (3.0, 5.0, 7.0) and temperature conditions (0, 4, 25 degrees) over a one week period. Preliminary absorbance spectra taken of the compound shows differences in all pH and temperature conditions, with wavelength peaks ranging from 398 – 425 nm, implying instability of the color ( $P > 0.05$ ). Additionally, TLC comparison of the BzD to a non-isolated solution showed no differences. However, absorbance spectra between the two may show differences, ( $P < 0.05$ ), highlighting the potential success of isolating BzD.

##### **6. Evaluation of Acrylamide, Fluorescent Advanced Glycation End Products, Antioxidant Capacity, and Physical Quality Attributes in Cookie Recipes with Sunflower Protein at Two Bake Temperatures.**

**Presenter(s):** Tirtha Thakkar, Alex Hoang, and Christine Long

**Advisor(s):** Dr. Lilian Were

Dietary sources of chlorogenic acid (CGA) as found in sunflower seeds have been studied with promising potential as functional food ingredients for their antioxidant capacity. Sunflower protein flour was substituted for wheat flour at 40%, 60%, 80%, and 100% in a cookie recipe and evaluated for antioxidant capacity, fluorescent advanced glycation end products (AGEs), and acrylamide (AA) when baked at 3000F and 3500F and compared to the control cookies made only with wheat flour. AGEs and AA are produced usually due to the thermal processing associated with baking of cookies and exposure to these compounds over a long period of time are detrimental to human health. Cookies baked at 3000F with 40-60% sunflower protein substitution exhibited greatest antioxidant capacity, while AGEs were lowest at 100% SFP. SFP substitution and bake temperature altered colorimetric values and impacted other physical quality attributes such as pH, moisture, and texture. Results indicate that sunflower protein substituted between 40-60% in a cookie recipe showed promise in maximizing antioxidant capacity, inhibiting fluorescent AGEs, along with retaining physical quality attributes.

# Undergraduate Students

## Crean College of Health and Behavioral Sciences

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### Athletic Training

7. **Characterization of Athletic Training Services Using Patient Related Outcomes for Time Loss Upper Extremity Injuries: A Study from the Athletic Training Practice-Based Research Network**

**Presenter(s):** Alyssa Ransom, Jose Del Rio, Jamie Ralph, and James Siy

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

Many health care providers utilize patient related outcome (PRO) measures to determine patient progress and the effectiveness of treatments. The Disabilities of the Arm Shoulder and Hand (DASH) is a region-specific PRO measure that evaluates patients' difficulty with daily and sport-related activities due to upper-extremity impairment. In current athletic training (AT) clinical practice, there is a need for better documentation of patient related outcome measures and objective data to support the value of the athletic training profession. The purpose of this study was to determine the effectiveness of athletic training interventions on improving scores on the DASH in patients with time loss upper-extremity injuries using de-identified patient data. The study was conducted at colleges, high schools, and rehabilitation clinics affiliated with Chapman University. The DASH was administered following initial injury evaluation and every seven days thereafter until the patient discontinued treatment or was discharged. Initial and final DASH scores were used to determine the effectiveness of the AT services provided. Results of the study were inconclusive with 6/10 (60%) participants showing clinically significant improvements in upper extremity function. These results are likely due to small sample size, and poor patient and clinician compliance with completion of required paperwork. Poor compliance was due to limited internet availability and the large time demand for completion of paper work. Further research is needed to better characterize the effectiveness of AT services. It is also suggested that research be conducted on how to effectively implement PROs in AT settings.

### Psychology

8. **Perceptions of Sexual Consent and Assault: Gender Differences and The Effect of Passive Voice and Consent Cues**

**Presenter(s):** Crystle-Joie Agbayani

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

This study examines whether there is an effect of passive or active voice, as well as the presence or absence of verbal and physical consent cues, on participants' identification of sexual assault and their perceived severity of sexual assault. In addition, we investigate whether gender differences exist on these measures. This study will utilize a 2x2x2 ANOVA to determine the effects of gender, passive vs. active voice, and presence vs. absence of verbal and physical

consent cues on participants' identification and perceived severity of assault in written sexual scenarios. Consistent with findings from related studies, we predict that participants will rate sexual scenarios as more consensual and less punishable when they are written using the passive voice, or when they include consent cues, than when the scenarios are written using the active voice, or when consent cues are absent from the scenarios. Furthermore, we predict that there will be a gender-based interaction; specifically, we predict that male participants will rate sexual scenarios as more consensual and less punishable in general when compared to female participants. Results from this study could identify discrepancies between how sexual assault is defined by California's affirmative consent law and how sexual assault is perceived by individuals operating under that law. That information could be used in turn to design or improve sexual education state- or nationwide.

#### **9. A Preliminary Analysis of the Effects of Well-Being on Physical Activity**

**Presenter(s):** Aylin Gann, Samira Amirazizi, Kelsey Banning, Samantha Goulding, Michelle Nguyen, Roxana Nouri, and Karynna Okabe-Miyamoto

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

Positive psychological well-being has been found to be related to better health outcomes, perhaps because it encourages healthier behaviors. However, it is unclear whether well-being directly causes healthier behaviors, so the current study investigates whether well-being causally influences physical activity. It is hypothesized that greater levels of well-being will lead to longer persistence in physical activity and choosing to be active versus sedentary. An initial sample of 11 healthy women and men over the age of 25 participated in the study. Over the course of 3 weeks, participants completed three writing tasks to induce their randomly assigned condition of positive emotion, optimism, or control. At week 3, participants visited a research laboratory where they were asked to engage in physical exercise tasks including squeezing a handgrip exerciser, jumping, and choosing to sit or stand at a desk. Persistence and willingness to engage were measured with these activities. Preliminary data indicated that there was not a significance difference in grip time for dominant or non-dominant hand or jumping time. In regards to the choice of sitting or standing, there was no significant difference between the control and treatment conditions. With only 11 participants thus far, this data is very preliminary and can only demonstrate the feasibility of conducting such studies. No significant differences between the conditions were found, but with a very small sample size analyses are severely underpowered. Before making any conclusions about our hypotheses, we plan on recruiting more participants to add greater validity to our study.

#### **10. To Type or to Talk? That is the Question.**

**Presenter(s):** Samira Amirazizi, Adriana Ariza, Amy Cohen, and Mackenzie Smith

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

Why do people debate about politics? Are elections important events? One question is a yes/no response, the other invites deeper-level thinking. In moving away from key-press tasks to elicit deeper-level thinking, talk aloud methodologies (Shears et al., 2013; 2014) previously employed three-level questions (surface, counterfactual, and inference). Readers provided verbal responses, which demonstrated causal inferencing for the inference level questions, after reading stories

relaying a fictional character's emotions. The presence of an experimenter during reading and responding may have impacted reader's responses. Here, readers provided typed responses to three-level questions following positive, negative, or neutral stories. If readers are forming causal inferences, then the inference-level questions should result in longer response onset, duration, and higher accuracy, relative to surface or counterfactual questions. Results show that typing responses elicits the expected hierarchy in response times and accuracy. Readers may be using inference-level questions to form causal connections whether typing or talking.

### **11. More Than Man's Best Friend: Effects of Dog Presence on Cognition**

**Presenter(s):** Mackenzie Smith

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

Research demonstrates that animal presence is associated with reduced stress levels in humans (Friedman, Thomas, Heesock, Chapa, & McCune, 2013; Polheber & Matchok, 2014). Further, stress prevents humans from reaching full cognitive potential (Meijer, 2001; Northern, 2011 & Burton, 1998). Our study investigates whether this "good feeling" from being with dogs empirically translates to better cognition. We hypothesize if stress reduces cognition, then cognitive scores will be lower when stress is induced and if dog presence reduces stress, then cognitive scores will be higher when a dog is present. Results show main effect on HR from the stress or neutral condition,  $F(1, 101)=3.93, p<.05$ . HR increased from baseline (-1.87) after stress and decreased after neutral (2.75). A trend presented in pre-post cognitive scores for the dog/no dog condition,  $F(1,101)=2.02, p<.16$ . Cognitive scores increased more when dog was present (-30.10) than when dog was absent (-4.00). Further supporting our predictions, dog presence reduced HR,  $F(1,101)=3.08, p<.08$ . After stress, participants' HR decreased more when dog was present (3.61) than when dog was absent (1.90). From our results, we can see that dog presence is associated with increased cognitive scores, and clearly reduced HR and trend toward higher cognitive scores suggest the benefits of dog-human relations.

### **12. The Effects of Virtual Stimuli and Pre-existing Levels of Internalizing Behavior on Heart Rate and Antisocial Behavior.**

**Presenter(s):** Natasha Hamilton

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

In an effort to one day develop more effective treatment methods for offenders, researchers are now trying to pinpoint cognitive-behavioural characteristics that make some individuals more likely to commit antisocial acts-- one such characteristic is level of internalizing behavior. Research indicates a negative correlation between severity of conduct disorder and internalizing behavior; the higher the internalizing behavior the less severe the conduct disorder (Pardini et al., 2012; Bilgic et al., 2013). Antisocial behaviours are challenging to investigate and this study is the first of our knowledge to examine the effects of internalizing behavior empirically. This experiment tests whether an individual's propensity to repeatedly commit antisocial behavior, specifically lying about stealing, increases in participants who watch a moral video relative to a control video based on pre-existing levels of internalizing behavior. We hypothesize that individuals who exhibit antisocial behavior, even on a minor scale, and those who do not, can be evaluated based on levels of internalizing behavior and measured by changes

in physiology. Results indicate a marginally significance main effect of video condition on heart rate. Results also indicate a significant interaction effect between level of internalizing behavior and video type. Data were examined by planned comparison, and a significant interaction was found between level of internalizing behavior and video type in the 'told one lie' group. With more empirical research, psychologists may better understand the nuances that make up antisocial behavior.

### **13. Level Up: The Effects of Video Games on Cognition**

**Presenter(s):** Joshua Whitesides

**Advisor(s):** Dr. Connie Shears and Dr. Edward Dana

Video games involve no physical activity, are performed in isolation, and described as detrimental, a potential cause of self-destructive behavior (Fergusen, 2007). However, there are those who believe in positive, constructive aspects of video games, involving reasoning ability, greater fluid intelligence and working memory (Baniqued et al., 2012). Considering video games could potentially impair or improve cognition, this study examines effects of game speed on cognition. More specifically if an individual with high working memory span plays a fast video game compared to a slow game, one will improve cognitive scores. Game speed did not affect cognitive pre vs. posttest scores. There was significant effect on high working memory participants compared to low working memory  $F(1, 122) = 10.477, p = .002$ , regardless of game speed, high working memory individuals increased post cognitive scores (3.13) compared to low working memory participants (2.60). This data may influence the way video games are perceived by society.

### **14. Effects of Media on Body Image: Pioneering a New Method of Measurement**

**Presenter(s):** Morgan Bates

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

A recent comprehensive meta-analysis of correlational and experimental research found that exposure to media images does not cause women to feel worse about their bodies. This study combines experimental, survey, and qualitative methods to show that media exposure does, in fact, impact women, proposing that the failure of past research to identify this effect is an artifact of measurement issues rather than a true null effect. Objectification theory proposes that women are routinely exposed to sexualized and digitally enhanced photographs of the female body that set a standard for beauty in media that is difficult to attain (Fredrickson & Roberts, 1997). Many women are dissatisfied with their bodies, and this dissatisfaction is linked to a range of negative psychological and health outcomes (Tiggeman & Boundy, 2008). Combatting the supposed negative effects of media on body image has been a central part of many body interventions, including media literacy programs. I propose that the standard measure used to assess women's body image after viewing media imagery are not sensitive enough to detect the changes taking place, and that a more direct approach to assess the way women perceive the effects of the images will yield more accurate results.

## **15. Gluten-Free and Casein-Free Dietary Intervention for Children with Autism Spectrum Disorder**

**Presenter(s):** Avalon Derlacki

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

In the United States, autism spectrum disorders (ASD) had a prevalence of 1 in 150 children in 2000. In the year 2012, the prevalence of ASD in the United States jumped to 1 in 68 children (Centers of Disease Control and Prevention, 2012). Due to the increase in diagnoses of ASD, researchers have sought out different ways to help decrease maladaptive symptoms associated with ASD's. Many parents of children diagnosed with ASD administer a gluten-free and casein-free (GFCF) diet to their children in hopes of reducing their maladaptive symptoms. The project hypothesis states that if a child under the age of 16, who was diagnosed with Autism Spectrum Disorder (ASD) after the age of 2, is administered a gluten-free and casein-free diet, then the child will show a reduction in maladaptive symptoms compared to a child under the age of 16 who was diagnosed with ASD after the age of 2 who does not following a gluten-free and casein-free diet. Through this literature review, findings show a wide range of results both supporting and refuting the dietary intervention of a GFCF diet for children with ASD. Important dependent variables include age of children, severity of symptoms and length of time following the GFCF diet. In conclusion, administering a GFCF diet to children diagnosed with ASD tends to help decrease symptoms of hyperactivity, non-verbal communication and inattention in children aged 2-16 years.

## **16. Effect of Explanation on Learning**

**Presenter(s):** Alyssa Lawson, Talia Banayan, and Andrea Fernandez

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

The research proposal of this study intends to test self-explanations against other kinds of explanations to determine what method(s) improve learning the most. Self-explanation is generating an explanation to oneself during the learning process. Prior research has shown that self-explanation is a very effective tool in learning new material and leads to enhanced performance in mathematics and science. In the literature, self-explanation has been tested almost exclusively against "no explanation" control conditions (extra study time, more practice, additional worked out examples). Thus, it may be the case that the self-explanation effect is simply due to the presence of an explanation itself rather than the self-generation of an explanation. In addition, studies on problem-solving have indicated that emphasizing the causal relationships among events improves understanding and leads to an enhanced ability to learn new material. This study helps to tease apart the relative contributions of the quality of explanation (causal vs. non-causal) and the source of the explanation (self-explanations vs. educator-generated explanations) on the enhancement of learning. It is predicted that (1) if the self-explanation of an explanation is critical for learning enhancement, then the self-explanation conditions should outperform the educator-generated conditions on post-tests and (2) if discovering causal relationships enhances learning, the effect of self-explanation should be greater in the causal group than the non-causal group.

**17. Using Attention to Remember Verbal Information: An Exploration of Evidence for Mental Refreshing in Humans**

**Presenter(s):** Sara McAllaster

**Advisor(s):** Dr. Carolyn Sherff

Working memory is the system devoted to the storage of information over a brief period of time. It has been proposed that people use attention to maintain items by briefly reflecting on each in a serial manner. This is called refreshing. This study seeks to establish the time range within which refreshing occurs. A probe-span task was used to compare subjects' response times (RT) to probes as a function of the time available for refreshing (the delay). A previous study using delays of 200, 400, 600, or 800 ms found faster RT from 200 to 400 ms, but not after longer delays. This study will investigate refreshing before 200 ms by incorporating delays of 100, 200, or 400 ms. The underlying rationale was that faster RT would be observed for more active memory items, a result of an adequate time available to refresh items. The memory item at the highest activation was expected to vary depending on which item had been most recently refreshed. The results confirm that increasing the delay from 200 to 400 ms resulted in faster RT, while RT remained largely unchanged between 100 and 200 ms. The window between 200 and 400 ms after the presentation of a memory item might be crucial for refreshing. This study contributed to an overall project that found that probes corresponding to the last and first items had the fastest RT, not supporting the hypothesized variance of RT among items in all positions due to serial refreshing.

**18. Maternal, Environmental, and Social Context Predicts Diarrheal Infection Incidence in Young Children in Sundarbans, India**

**Presenter(s):** Sohini Mukherjee

**Advisor(s):** Dr. Laura Glynn

Diarrheal infection is the third leading cause of childhood mortality in India and is responsible for 13% of all deaths per year in children under 5 years of age. The Sundarbans in West Bengal is amongst the poorest regions of India and is the epitome of abject deprivation. The objective of the current study was to investigate sociodemographic, psychological and environmental factors associated with diarrheal infection in children in West Bengal. A structured interview was administered in Bengali to women who were mothers to children aged five and under in 150 households in the village of Mosjidbati of Ramchandrkhalai in West Bengal. Door to door data collection was carried out on a random sample of the entire village. A validated Bengali version of the Multidimensional Scale of Perceived Social Support (Zimet et al., 1988) was administered which assesses perceptions of overall social support, as well as particular support from significant others, family, and friends. In addition, mothers were asked to answer questions regarding their beliefs about the causes and methods of prevention of diarrhea. Among children five and under, 75% of males and 73% of females had at least one incidence of diarrhea in the past year (mean = 2.7). Predictors of incidence included household income, religion, type of home, and perceived social support (all  $p$ 's < .05). There were no significant associations between the age of the mother, education level and incidence of diarrhea. Notably, the effects of social support remained after adjusting for income, religion, and type of house.



## **19. The Impact of Psychological Stress on the Consumption of Palatable Foods in Adults**

**Presenter(s):** Olivia Valdez

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

Does one consume more high sugar, high fat food when put under psychological stress? With both high-calorie foods and life stressors readily available in the United States today, this project analyzed how adult individuals experience the stress-eating relationship with respect to direction and intensity. It was hypothesized that an adult who experiences high psychological stress will have an increased consumption of palatable foods compared to an adult who experiences low psychological stress. This project analyzed and reviewed current literature to test the hypothesis. Findings indicate selected support of the project hypothesis. In almost all of the studies analyzed, women were particularly likely to increase consumption of palatable foods under stress conditions. Additional findings on men, on the other hand, found that consumption of palatable foods decreased under stress conditions or rate of increase was slight. The project findings indicate that palatable food consumption is influenced by various factors including stress severity, stress frequency, stress reactivity level, and gender. Further research is needed to expand on male stress reactivity as well as on longitudinal studies using naturalistic circumstances to more fully understand the long-term stress-eating relationship.

## **20. Fractal Conflict Scaling in Dating Relationships: Lots of Little Conflicts Go a Long Way**

**Presenter(s):** Alyia Williams and Jessica Beyer

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

Interpersonal relationships are complex adaptive systems, and thus can be studied using models and methods from nonlinear dynamical systems theory. Nonlinear dynamical systems theory includes a variety of modeling approaches designed to understand the behavior of systems that might otherwise appear random. Previous research indicates that small group dynamics are self-organizing, producing fractal (i.e., inverse-power law distributed) recurrence patterns of conversational turn-taking dynamics. Further, conflict has been shown to be a key control parameter – with higher levels of conflict making fractal interaction patterns more rigid. The present study proposes to extend this line of research, predicting that: (1) conflict dynamics of dating couples will conform to a fractal distribution, with exponentially more small conflicts than large ones. If conflict patterns are indeed fractal, then it may follow that intimate relationships could be studied using similar theory and methods as other natural complex systems, such as earthquake patterns or evolutionary extinction events. It is further predicted that: (2) higher flexibility in conflict dynamics (measured as fractal dimension) will be associated with higher levels of relationship satisfaction and relationship stability over time. Participants in this study gave themselves ratings on a conflict scale three times a day for thirty days. Preliminary results suggest that conflict dynamics distribute themselves in a fractal pattern. Further study will return results on the second hypothesis.

# School of Pharmacy

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## Pharmacy

### **21. Structural Basis for the Positive Modulation of SK2 Channel by Riluzole**

**Presenter(s):** Tia Alexander, Sara Ali, and Stephen Chiang

**Advisor(s):** Dr. Miao Zhang

Amyotrophic lateral sclerosis (ALS) is a devastating neuromuscular disease resulting from neurodegeneration of motor neurons in the motor cortex and the brainstem/spinal cord. This causes patients with ALS to slowly lose motor function and eventually become completely paralyzed. Prior studies indicate that the hyperexcitability of ALS patient motor neurons plays a role in the progression of the disease. It is known that small conductance Ca<sup>2+</sup>-activated potassium (SK) channels play important roles in regulation of membrane excitability in motor neurons. Positive modulation of SK channels has been suggested as a potential therapeutic strategy to reduce this toxic hyperexcitability and improve survival of motor neurons. Riluzole, which positively modulates SK channels, is the only FDA approved drug for ALS, however, its therapeutic effects are limited. One factor believed to limit the therapeutic effects of riluzole is its low potency on SK channels. In this research experiment, we elucidate the binding pocket of riluzole in SK2 channels with crystallography. Site directed mutations in the binding pocket effectively change the potency of riluzole to potentiate the SK2 channel. The data suggests that the binding pocket identified by crystallography is the functional binding pocket through which riluzole exerts the positive modulation of channel activity. The studies lay the foundation for structure based drug discovery research with the goal of developing more effective therapeutics for ALS treatment.

### **22. Solid Phase Synthesis of Modified iRGD Peptide for Tumor Targeting and Penetration**

**Presenter(s):** Mohini Bawa

**Advisor(s):** Dr. Rakesh Tiwari and Dr. Keykavous Parang

Targeting anticancer drugs by conjugating various specific ligands has shown efficiency in tumor therapy. One well-known example of this targeting is a synthetic, cyclized arginine-glycine-aspartic acid (RGDs) containing peptide. This peptide is identified to have high affinity for the  $\alpha$  integrins, which are over-expressed on both angiogenic vessels and tumor cells. Further development of this tumor-targeting and tumor-penetrating cyclic peptide resulted in a peptide called iRGD [CRGDKGPDC]. The iRGD peptide was reported to increase drug penetration into the extravascular tumor tissue in a tumor-specific and neuropilin-1-dependent manner. There is a disulfide linkage between the two-cysteine residues in the iRGD peptide. Certain studies stated that in vivo, the disulfide linkage was susceptible to the redox condition and to glutathione (both readily cleave the disulfide bond); thereby, decreasing the half-life of the iRGD peptide. Therefore, an attempt has been made to increase the half-life of the iRGD peptide by changing the disulfide bond with an amide linkage between the side chains of the two amino acid residues at the ends of the linear iRGD peptide. The amide linkage is more stable to the redox condition and glutathione. The modified iRGD peptide with the amide linkage was synthesized using

Fmoc/tBu solid phase peptide chemistry. The cyclization of the modified peptide was optimized using different cyclizing agent. In addition, the use of D-proline was found to be essential in obtaining the cyclized product. The synthesized peptide was characterized by using mass spectroscopy (MALDI) and purified by using the high-pressure liquid chromatography (HPLC).

### **23. Allosteric Modulation of SK Channels**

**Presenter(s):** Benji Whitmore

**Advisor(s):** Dr. Miao Zhang

Small conductance Ca<sup>2+</sup> - activated potassium (SK) channels play a vital role in regulating excitable cells in both the central nervous and cardiovascular system. In animal models SK channels have been linked to the pathophysiology of neurological disorders such as ataxia and alcohol use disorders. Genome studies have also associated single nucleotide polymorphisms in the SK coding region, with cardiovascular conditions such as arrhythmias and hypertension. The sensitivity of the SK channel to Ca<sup>2+</sup> binding results from interaction with calmodulin (CaM), a Ca<sup>2+</sup> binding protein. Previous work has identified positive allosteric modulators (PAMs) of the SK channel and structural studies revealed these modulator's binding pocket as located between the CaM binding domain and CaM. This observation motivated us to introduce mutations in the PAM binding pocket which also result in changes in the Ca<sup>2+</sup> sensitivity of SK channels.

## **Schmid College of Science and Technology**

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### **Biological Sciences**

#### **24. The Influence of Antipredator Behaviors on Depth in Intertidal Hermit Crabs.**

**Presenter(s):** Ariana Bickell

**Advisor(s):** Dr. William Wright

Intertidal species are known to alter their behavior in response to predators with implications for intraspecific distribution, abundance and community structure. For example, hermit crabs increase movement as an antipredator response. However, how hermit crabs utilize depth to avoid predators is less explored. The antipredator behavior of the hermit crab, *Pagurus samuelis*, was observed in a novel, artificial habitat, which eliminates refuge for the animals. The hermit crabs are only able to increase or decrease their depth in the presence of a predator. Based on our data, depth does influence antipredator behavior; but there is high variability between individual experiments. We conclude that there may be other intraspecific interactions influencing antipredator behavior in hermit crabs.

#### **25. Behavioral Acclimation to Warmer Temperatures in the Territorial Owl Limpet, *Lottia Gigantea***

**Presenter(s):** Nelson Gould, Tracy Gunanto, and Jessica Martinez

**Advisor(s):** Dr. William Wright

In the coming years, the success of a species will depend on its ability to adapt, both physiologically and behaviorally, to global climate change. Due to the natural variability of the intertidal, resident species may more readily acclimate to climate challenges than species living in

less variable environments. Individuals of the intertidal limpet, *Lottia gigantea*, have been suggested to have potential acclimation to high heat in physiological heat stress models. However, individual's survival also depends on an ability to effectively forage and engineer their microhabitat through territorial defense. Any degradation to these territorial behaviors would threaten the survival of territory holding *L. gigantea* and alter microhabitat dynamics. We tested whether heat-spells might change the territorial behavior of *L. gigantea*. In an experimental approach, we tested movement and territorial behavior of experimentally heated individuals of *L. gigantea* living in cooler, shaded microhabitats and compared these behaviors to unheated control limpets. In an observational study, we tested the behavior of individuals living in hotter microhabitats and compared them to the results of the experimentally heated limpets; both groups reached temperatures between 26-36°C. The experimental study showed heated limpets were four times less likely to move than their unheated controls. However, *L. gigantea* living in naturally hotter microhabitats did not show these same degradations in behavior. This suggests that individuals of *L. gigantea* can to some extent adapt to a warmer environment, while at the same time underlining how strong heat spells might compromise the territorial behavior of individuals living in cooler microhabitats.

## **26. Learning Near Life's End: Are Age-Related Deficits Really Age-RelatedSuppressions?**

**Presenter(s):** Alexander Himstead

**Advisor(s):** Dr. William Wright

Learning impairment and memory loss are symptoms of aging, which are traditionally explained by the breakdown of neuronal processes. However, a recent study using *Drosophila melanogaster* found that the best learners have a reduced lifespan, indicating there may be an opportunity cost to learning. If this is true, perhaps when animals reach the end of their lives the cost of learning exceeds the benefit, and animals that suppress learning would be at an evolutionary advantage. The idea of an adaptive benefit to age-related memory loss starkly contrasts the traditional understanding of neuronal senescence. *Aplysia californica* is a powerful model for the study of the neurobiology of learning. This model has recently been extended to age-related deficits in a simple form of learning called sensitization, which is a generalized increase in defensive reflexes after experiencing a noxious stimulus. The increase in reflex is caused in part by increased excitability of sensory neurons (SNs). Previous research has shown that this noxious stimulus-induced increase in excitability is compromised in old *Aplysia*. We found that this decline can be partially revived by treatment of aged *Aplysia* with pertussis toxin (PTX). PTX blocks an inhibitory Gi-protein, suggesting that increased expression of this Gi-protein may suppress sensitization in *Aplysia* at the end of their lives. This suppression suggests that learning and memory deficits may in fact have an adaptive role towards the biological end of an animal's life, because there is little benefit in learning for a future cut short by death.

## **27. Using Bioinformatics Tools to Characterize the Effect of Cancer Mutations in 1 IEP**

### **Kinase**

**Presenter(s):** Nicole Hornaday

**Advisor(s):** Dr. Gennady Verkhivker

Protein kinases are a regulated set of switches that control most biological events in eukaryotic cells. They are the third most popular protein family, and they represent ~1.7% of the human genome. Protein kinase structures have had a significant impact on the development of selective and specific targeted therapies. Allosteric inhibitors typically bind outside the catalytic domain and affect kinase activity by eliciting global conformational transformations, which may confer a greater specificity and allow for a subtle modulation of kinase regulation. The equilibrium between functional kinase states can be modulated and often redistributed by activation mutations, posttranslational modifications, protein interactions, and binding of small molecule inhibitors. In previous studies, the mechanism of protein kinase regulation via dynamic equilibrium between structurally different functional states has been successfully exploited in the discovery of selective inhibitors targeting inactive conformations of the ABL kinase. Understanding of mechanisms by which conformational equilibrium between functional kinase states can be modulated upon inhibitor binding is critical for quantifying molecular basis of allosteric regulation and drug resistance. The goal of the research was to use computational modeling and biophysical simulations of the 1 IEP protein kinase, which is involved in oncology-related pathways and drug binding, to understand the role of protein dynamics in drug recognition.

## **28. Connecting the Physiological and Behavioral Response to Heat Stress in Pagurus**

### **Samuelis**

**Presenter(s):** Anastasia Kalyta

**Advisor(s):** Dr. William Wright

Intertidal communities are considered good models of the biological effects of climate change on ecosystems, as their resident organisms are subjected to heat spells during daytime low tides. The increasing heat exposure can elicit behavioral as well as physiological responses in intertidal organisms. We studied the relationship between these responses to heat stress in the blue-banded hermit crab by inducing a “heat shock” with elevated water temperature of 29 °C for 2.5 h. The behavioral effect of heat-shock was quantified using a 30-minute feeding assay, measuring the mass of a standard squid pellet consumed by individual hermit crabs. The physiological effect of the same heat shock was measured with a western blot assay on muscle tissue samples to measure HSP-70 concentration. HSP-70 is a ubiquitous and evolutionarily conserved chaperone molecule, mitigating protein damage due to heat stress in organisms. Previous work in the Wright lab showed that a 1.25-h exposure to heat-shock inhibits feeding behavior, but has little effect on HSP-70 expression relative to control animals incubated at 18 °C. Prolonging the heat-shock to 2.5 hours caused an apparent recovery of feeding behavior and provided an interesting correlation between food consumption and HSP-70 levels. Feeding was positively correlated with HSP-70 in

unheated control animals and negatively correlated in heated animals. The feeding recovery suggests that an adaptive response can be elicited, and likely takes at least 2 hours to develop. The positive and negative correlations of heat-shock with feeding behavior is an intriguing result that we don't yet understand.

## **29. Rapid Root Responses of California Plants Exposed to a Post-Drought Precipitation**

### **Pulse**

**Presenter(s):** Joanne Kim and Julie Larson

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

Precipitation events in southern California can vary in quantity and, over the next century, are projected to be less frequent with interspersed, warmer drought events. Plants living in this environment are adapted to semi-arid conditions and may be at an advantage to survive as precipitation pulses become less frequent. Roots are a critical component of nutrient and water uptake, and the rapid response of root systems to precipitation pulses could provide insight into how plants maximize resource uptake in water-limited systems. While species variation in rapid root response could have implications for survival, particularly during the vulnerable seedling stage, we know little about how strategies vary across multiple life forms. In this study, we measured short-term root growth in seedlings of 11 plant species in response to a post-drought water pulse event. Across species, below-ground growth tended to increase after the precipitation pulse. However, the extent and timing of shifts in root elongation rates and new root tip appearances varied between species. Two distinct response strategies were observed: 1-day and 2-day rapid response, and 7-day delayed response; however, growth strategy appeared to be independent of life forms. This variation could be critical to explaining performance and fitness differences among species and has important implications for how vegetation communities respond to climate change.

## **30. The Relation of IL-15 Signaling and Extracellular Related Kinase (ERK-1/2)**

**Presenter(s):** Ty Nakamoto

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

IL-15, a skeletal muscle (SKM) cytokine, has the ability to increase mitochondrial activity to treat obesity. The purpose of this study was to determine downstream pathways as to how IL-15 can alleviate obesity. The specific kinase analyzed in this project was Extracellular Related Kinase (ERK-1/2). The experiment consisted of inhibiting ERK-1/2 in the presence of IL-15 in SKM. We hypothesized that ERK-1/2 inhibition would decrease expression of transcriptional activators of mitochondria. To confirm that ERK-1/2 is the bridge between IL-15 and mitochondrial gene expression, an ERK1/2 inhibitor (PD 98059) was used in cultured SKM cells. The samples, run in duplicate, consisted of vehicle, IL-15, PD 98059 (PD), and IL-15 with PD (I+PD). Following incubation, the cells were lysed and RNA was extracted from the cells. Reverse transcription of the RNA was performed to generate cDNA. The cDNA was then amplified and analyzed by Real-Time PCR. When compared to vehicle, PPAR $\alpha$  gene expression was 22.4% lower with IL-15 treatment and 77.9% lower with I+PD. PPAR $\delta$  gene expression was nearly 4-fold higher with IL-15 and 48.1% higher with I+PD treatments. PGC1 $\alpha$  expression was induced by 2.5% with IL-15 and

was 68.8% lower in the I+PD group. PGC1 $\beta$  expression was reduced by 29.5% with IL-15 and by 40.1% for the I+PD group. ERK-1/2 may be involved in IL-15 signaling to control mitochondrial gene markers, such as PGC1 $\alpha$ . However, because of the small sample size, more experiments are required to conclusively determine the relationship between ERK1/2-IL-15 and obesity.

### **31. Genetics of Postpartum Depression**

**Presenter(s):** Nikki Shahbazi

**Advisor(s):** Dr. Jennifer Hahn-Holbrook

Postpartum depression (PPD) is a serious mental health problem, effecting approximately 13% of mothers. Research has shown that both biological and psychological factors contribute to PPD risk, however, very few studies have examined how these factors interact. The single nucleotide polymorphism (SNP) of the oxytocin receptor (OXTR) gene, rs53576, has been found to play a role in an individual's sensitivity to social cues. We hypothesized that allelic variations of the rs53576 gene would moderate the connection between social support and decreased PPD risk. 224 mothers were asked to provide DNA samples and information about PPD symptoms and social support from family and the baby's father. We found father support significantly moderated the effect of the OXTR gene rs53576 on PPD risk. Individuals with alleles associated with increased sensitivity to social cues (GG) who had higher father support, also had lower depression risk. Partner support was a less important determinate of PPD risk in individuals with the less sensitive variants (AA/AG). Our results may help to explain social support is more protective against depression in some women than others.

### **32. Determining the Role of PPAR $\alpha$ in the Pathway of IL-15-Induced Mitochondrial Activation**

**Presenter(s):** Shantae Thornton

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

Obesity is a pressing modern epidemic, a condition resulting in storage of excess energy as adipose tissue. Diet and exercise remain the primary treatment regimen, but maintaining long term weight loss has proven difficult for many. Molecular regulators of metabolism are now studied as potential treatment options. Myokines are cytokines secreted from skeletal muscle (SKM) following exercise and increase mitochondrial activity. We aimed to determine the mechanism by which the myokine interleukin-15 (IL-15) increases SKM mitochondrial activity. We hypothesized that IL-15 acts to increase mitochondrial activity through modulation of mitochondrial mediators, such as peroxisome proliferator-activated receptors (PPARs).

C2C12 SKM cells were grown in vitro and treated with vehicle control (V), IL-15 (100 ng/ml), the PPAR $\alpha$  inhibitor GW6471(GW), or a combination of IL-15 and the inhibitor (I+G); every other day for six days. Following treatment, RNA was extracted and reverse transcribed to cDNA. RT-qPCR was carried out on the cDNA to assess mRNA expression levels of PPAR $\alpha$  and mitochondrial activity regulators, UCP2 and PGC1 $\alpha$ . Expression of PPAR $\alpha$ , UCP2, and PGC1 $\alpha$ , when treated with IL-15, were significantly increased when compared to the V cells ( $P < 0.05$ ). All gene expression levels, when treated with GW, were not significantly different from the V cells ( $P > 0.05$ ). When samples were treated with I+G, expression of UCP2 and PGC1 $\alpha$  were significantly higher than V

cells ( $P < 0.05$ ). This indicates that IL-15 induces UCP2 and PGC1 $\alpha$  mRNA expression independent of PPAR $\alpha$ . These results warrant further studies exploring other targets of IL-15 to induce mitochondrial activity and in turn prevent obesity.

### **33. The Role of KV1.3 Channels in the Extracellular LPS-Induced Activation of Murine**

#### **Microglial Cells BV2**

**Presenter(s):** Rachelle Yellin

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

Activation of microglia plays an essential role in neuroinflammation, a significant etiological factor of Alzheimer's disease. Activated microglia up-regulates several pro- and anti-inflammatory molecules that determine its phenotype and function(s). The expression of Kv1.3 potassium channels is up-regulated in activated microglia in the postmortem brains from Alzheimer's disease patients, suggesting its role in this neurodegenerative disorder. Applying selective Kv1.3 channels inhibitor, HsTx1, we explored the role of Kv1.3 in LPS-induced microglial activation in vitro. Murine BV2 cells were treated with LPS and the activation was measured by (1) changes in cell size and (2) changes in the level of activation marker CD11b, an integrin receptor that is involved in both pro- and anti-inflammatory responses. The cells were labeled with anti-CD11b antibodies and coded images were analyzed using AxioVision software. The analysis revealed that 24-h treatment with LPS significantly increases the averaged cell size, consistent with an increase in the large-size to small-size cells ratio. These differences were partially reduced by HsTx1. The level of CD11b-immunoreactivity was increased in cultures treated with LPS for 3 hours, presumably due to an increase in CD11b-IR in small-size cells. The 24-h LPS treatment had no effect on CD11b-IR, whereas 24-h treatment with HsTx1 produced (albeit non-significant,  $n = 2$  experiments) CD11b-IR increase in small-size cells. This data suggest that Kv1.3 inhibitor HsTx1 modulates the response of microglia to LPS. Additional experiments are required to establish the role of Kv1.3 channels at the different stages of LPS-induced microglial activation.

### **34. Factors Effecting the Tameness of Common Loons (Gavia Immer) in Northern**

#### **Wisconsin**

**Presenter(s):** Seth Yund

**Advisor(s):** Dr. Walter Piper

Tameness of animals is interesting because it reveals how they respond to human interaction. However, few studies have looked at factors that determine tameness. In this study, we measured tameness and looked at its correlates in a population of banded Common Loons (*Gavia immer*) in northern Wisconsin. A loon's tameness was correlated with that of its parents and that of its mate and weakly correlated with age, breeding stage, and amount of lake activity. This suggests that part of a loon's tameness might be determined early in life, but that current biological and social factors also play a role.



## **Chemistry and Biochemistry**

### **35. Effect of Androgen Receptor Down-Regulation by Small Interfering RNA in Pancreatic Cancer Cells**

**Presenter(s):** Ori Barashy

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

Each year, 42,000 people die from pancreatic cancer in the United States, and another 53,000 people are diagnosed. Only 1 in 20 people diagnosed with pancreatic cancer survive for 5 years after diagnosis. The role of the androgen-signaling axis is not well defined in pancreatic cancer, although the androgen receptor (AR) is expressed. In order to investigate this hypothesis, plasmids were amplified in *E. coli* carrying either no insert (control) or two different small interfering RNAs designed to down-regulate AR expression. The plasmids were purified and used to transfect the pancreatic cancer cell models PANC-1 and COLO-357. Upon transfection, RNA was isolated and the expression of the AR was measured. The results show that both siRNA plasmids were able to down-regulate AR mRNA expression. If further studies determine that the AR is crucial for cancer cell growth and survival, our studies will indicate that the AR could be a molecular target for anti-pancreatic cancer therapeutics.

### **36. Oxidative Stress Induction in Prostate Cancer Cells by Synthetic Diarylpentanoids**

**Presenter(s):** Haili Coffin

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

Prostate cancer is the second most common cancer in American men with an incidence and mortality of approximately 240,000 and 30,000 men, accordingly. Curcumin, a natural phytochemical of the plant *Curcuma longa* and an ingredient in the spice Turmeric, has been shown to inhibit prostate cancer cell growth and has inspired the synthesis of synthetic analogs, including a vast number of structurally diverse diarylpentanoids. While curcumin has been known to be a potent anti-oxidant, more recent studies have shown that it also possesses pro-oxidant activity. The scope of this study is to determine whether structurally diverse diarylpentanoid analogs are also pro-oxidant in nature. The diarylpentanoids under investigation were chosen based on their variation of chemical moieties on the aryl rings, and for some, based on their previously shown capability to down-regulate the androgen receptor, a prominent which plays a critical role in prostate cancer development and progression, and is a major molecular target in the clinical management of prostate cancer. Accordingly, we measured the extent of oxidative stress in the human prostate cancer cell model, LNCaP, upon treatment with curcumin and its diarylpentanoid analogs. The induction of reactive oxygen species (ROS) was measured quantitatively in a 96-well assay by 2'-7'-dichlorofluorescein fluorescence normalized to cell number using Hoechst DNA stain. Thus far, our data shows structure-dependent induction of ROS that differs from curcumin. Knowledge of the molecular actions of diarylpentanoids with respect to oxidative stress will help identify the active pharmacophores of diarylpentanoids for the development of active anti-prostate cancer therapeutics.

### **37. Tuning the Properties of Oligo Ethylene Glycol MethAcrylate (OEG-MA) Microgel Self Assembly for Biomedical Application**

**Presenter(s):** Joseph Dodson

**Advisor(s):** Molla Islam

We analyzed the effect of crosslinker density in oligo ethylene glycol methacrylate (OEG-MA) microgels on their physical properties and subsequent self assembly. OEG-MA microgels have similar properties to biological tissue and are of great interest in biosynthetic applications because their properties can be tuned by various synthesis conditions. AFM analysis showed that increasing crosslinker density and synthesis temperature produced more rigid microgels that demonstrated less particle spreading on solid substrates as well as an increase in self packing and assembly. Also, we found an occurrence of dewetting assembly patterns with highly crosslinked microgels in buffer solution with ionic strength. These dewetting patterns are very interesting because of the mechanical properties in different regions. We will extend our study to find potential biomedical applications in cell culture and regenerative medicine.

### **38. Determining the Binding Capacity of the Diarylpentanoid ca27 to the Androgen Receptor Using Fluorescence Polarization**

**Presenter(s):** Chrys-Michel Esseau-Thomas

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

Prostate cancer is the second most common cancer in American men with approximately 240,000 new cases diagnosed and 30,000 men dying from the disease every year. Dietary components such as naturally occurring phytochemicals, have been shown to inhibit the mechanisms underlying cancer initiation and progression, and to reduce the risk of developing prostate cancer. Curcumin, a natural product of the plant *Curcuma longa* and the principal component of turmeric, has been shown to affect prostate cancer cell growth, and has inspired the synthesis of analogs, including the diarylpentanoid ca27. ca27 has been shown to down-regulate the expression of the androgen receptor which plays a critical role in prostate cancer development and progression, and is a major molecular target in the clinical management of prostate cancer. The mechanism of action of ca27 is not known, but could include its direct physical interaction with the androgen receptor, thereby acting as an antagonist for its natural ligand, dihydrotestosterone (DHT). We tested this hypothesis in a competitor assay featuring recombinant androgen receptor protein and a fluorescence-tagged ligand probe. Using fluorescence polarization, we tested the capability of DHT as a positive control, and curcumin and ca27 as experimental reagents to act as competitors. Our results so far indicate a potential stronger binding of ca27 to the androgen receptor compared to curcumin. Determining the binding activity of ca27 to the androgen receptor will lead to detailed structure activity relationship studies and to identify the active pharmacophores for the development of active anti-prostate cancer therapeutics.

### **39. Identification of Cryptic TP53 Mutations in Field Cancerized Prostate Tissues**

**Presenter(s):** Emily Frisch

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

Field cancerization denotes the occurrence of molecular alterations in structurally intact cells in histologically normal tissues adjacent to tumors. We hypothesize that field cancerization represents a state of pre-malignancy and supports subsequent tumor formation (oncogenesis). We have previously shown elevated expression of the key transcription factor early growth response 1 (EGR-1) in prostate field cancerization, potentially leading to the induction of downstream growth factors promoting oncogenesis. The mechanisms of EGR-1 up-regulation in prostate field cancerized tissues remain unknown. The present study tests the hypothesis that cryptic tumor suppressor TP53 mutations are inducers of EGR-1 in histologically normal tissues surrounding prostate adenocarcinomas. Accordingly, in a pilot study we tested the presence of p53 mutations R273H, R249S, and R175H in genomic DNA of tissues derived from prostatectomy and paired adjacent tissues. These mutations are known for inducing EGR-1 expression in prostate epithelial cells. Mutation-specific real time (quantitative) polymerase chain reaction was used to assess the presence of TP53 mutations as compared to wild type TP53 genes sequences. Our studies indicate that both cancerous and field cancerized prostatic tissues harbor R273H mutations, somewhat hold R175H mutations, but not R249S TP53 mutations. Our results indicate that structurally intact cells in histologically normal tissues adjacent to prostate tumors harbor TP53 mutations that define a pre-malignant state in prostate tissues promoting oncogenesis. Our findings have important clinical implications for early prostate cancer diagnosis and/or detection of prostate cancer risk, as well as for prostate cancer prevention.

### **40. Comparison of DNA Extraction Methods for Use with Meat Mixtures**

**Presenter(s):** Kayleigh Fuijsaki

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

Three different types of DNA extraction methods were tested in order to determine which resulted in the highest specificity, sensitivity, and repeatability for detecting pork DNA with real-time PCR. Four reference samples of known pork and beef percentages (0.1-99.9% w/w) and 2 species controls were prepared for extraction. Extraction methods used to test the reference samples were as follows: DNeasy Blood and Tissue Kit (Qiagen) using sample supernatant, DNeasy Blood and Tissue Kit using sample tissue, and Fast Prep DNA Spin Kit (MP Biomedicals) using sample tissue. After the identification of the most effective extraction method, 20 commercial meat samples were tested to assess the ability of the method to identify in processed products. All samples were extracted in duplicate and then tested with a real-time PCR assay specific for pork. The DNeasy Blood and Tissue Kit using sample tissue and the Fast Prep Kit both showed 100% specificity and 100% repeatability, whereas the DNeasy Blood and Tissue Kit using sample supernatant showed 92% specificity and 0% repeatability. The DNeasy Blood and Tissue Kit (tissue or supernatant) resulted in the lowest level of detection, at 0.1%, while the Fast Prep Kit was only able to detect pork at 0.5%. The results of commercial sample testing with the DNeasy Blood and Tissue Kit with sample tissue showed successful detection of pork in 70% of the products. In conclusion, it was determined that the DNeasy Blood and Tissue Kit using sample tissue is the optimal method of DNA extraction for pork identification.

#### **41. Degradation Pathways of Polyaromatic Hydrocarbons**

**Presenter(s):** Bradley Goldsberry

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

This study illustrates the degradation pathways of various polyaromatic hydrocarbons (PAHs) by the binding of humic substances (HS) in natural waters. Polyaromatic hydrocarbons (PAHs) are commonly found in natural water systems and marine sediments and have been shown to be both carcinogenic and mutagenic in animal models and human epidemiological studies. PAHs largely result from an incomplete burning of organic matter. Forest fires, coal burning power plants, and car exhaust are all examples of PAH producers. HS are major constituents of natural organic matter (NOM) found in the sediments of streams, rivers, and lakes. Humic and fulvic acids are generated via biodegradation of organic matter and are commonly used as a plant and food supplement in the agriculture industry. An experimental procedure was designed to calculate the binding constants between different PAHs and humic substances, specifically humic and fulvic acid. The experimental method included three separate approaches, standard emission approach (EM), a manual correction for inner filter effect approach (EM\*), and an automatic correction for inner filter effect approach (EEM). Statistical analysis was then carried out to compare the different approaches. In the future, additional parameters should account for temperature and pH which is suspected to have a significant impact on the binding constant.

#### **42. Surface Catalysts for Gaseous Systems: Preparing a Lab**

**Presenter(s):** Aaron Goodman

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

Catalysis plays an important role in chemistry. Many reactions that improve peoples' lives would occur so slowly to be useful without a catalyst. The mechanisms and reaction dynamics pertaining to surface catalysts are poorly understood. Surface Enhanced Raman Spectroscopy is a form of spectroscopy that uses the inelastic scattering of light to characterize reactions. It has been a powerful tool in analyzing the mechanisms behind surface catalysts. The inelastic scattering of light is very weak and subsequently only surfaces that have a strong interaction with incoming photons are considered "Raman active". Coating a metal catalyst onto one of these Raman active surfaces has been shown to retain the activity of the substrate and the catalytic nature of the adsorbate.

This research has been performed to create a lab to study carbon dioxide formation in the presence of a ruthenium catalyst using SERS. This study requires set up and control of lasers and spectrometers as well as the creation of a reaction chamber to mimic real world conditions. Additionally, electrochemistry was used to both roughen the substrate and deposit ruthenium onto it.

#### **43. Measuring the Photochemical Degradation of Oil in Seawater**

**Presenter(s):** Sovannara Hok, Chase Griffin, and Daniel Chang

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

Salt marshes play an important role in the sequestration and exchange of organic carbon in coastal aquatic ecosystems. Organic carbon in these tidally forced wetlands is primarily a result of inputs from allochthonous terrestrial material, and loss processes that include microbial degradation, photodegradation, and export. Dissolved organic matter (DOM) levels and functionality in salt marshes often determines the degree of nutrient uptake, light availability, and overall carbon cycling. DOM chemical and physical functionality changes as the material is processed and transformed by both microbial and photochemical processes. In southern California, intertidal wetlands are often impacted by oil through marine spills, natural seeps, coastal wells, and contaminated storm water runoff. This adds an additional level of complexity to understanding the physical, chemical and biological transformation of DOM in these systems. The degree to which oil products are significant sources of organic carbon is not clear and transformations of oil products in salt marshes are poorly characterized. In this work we have used optical properties to track the photochemical changes in a range of oil products in the laboratory, from heavy crude oils to distillates from a number of different sources. Data from three dimensional excitation-emission fluorescence spectra and associated fluorescence indices will be presented and discussed.

#### **44. Comparison of Combustion Efficiency to in Situ Atmospheric Ammonia Measurements from a Miniature Chemical Ionization Mass Spectrometer in the LA Basin with the 2015 NASA Student Airborne Research Program.**

**Presenter(s):** Taylor Krause

**Advisor(s):** Dr. Matthew Gartner

Atmospheric ammonia (NH<sub>3</sub>) has been shown to impact the environment and threaten both human and animal health, especially in heavily populated urban areas, yet to date there remains a paucity of direct measurements. Recent studies have suggested that ammonia may be generated as a byproduct of fossil fuel emissions due to highly active catalytic converters in light-duty gasoline vehicles. To investigate this relationship, an airborne miniature Chemical Ionization Mass Spectrometer (miniCIMS) was used to directly measure atmospheric ammonia and combustion reaction products in the Southern California LA Basin, during the 2015 NASA Student Airborne Research Program (SARP). The temporal variability in measured ammonia, and the relationship to combustion efficiency will be compared to mobile ground-based measurements from the NASA DISCOVER-AQ campaign, and implications of the findings will be discussed.

#### **45. Effects of Novel Diarylpentanoid Analogs on Prostate Cancer Cells**

**Presenter(s):** Victor Levi

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

According to the American Cancer Society, prostate cancer was the cause of approximately 26,000 mortalities amongst 181,000 cases in 2015 in the United States alone. Science has proven that dietary components affect prostatic health and impact the possible mechanisms underlying

cancer initiation and progression. The consumption of naturally occurring phytochemical compounds can reduce the risk of developing prostate cancer. In previous research, we have demonstrated the diarylpentanoid analog ca27 of the natural product curcumin (diferuloylmethane) from the plant *Curcuma longa* and an ingredient of the spice Turmeric to exert inhibitory effects for prostate cancer cell growth and androgen receptor expression; therefore suppressing prostate cancer development. The two purposes of the present study were to conduct functional structure activity relationship (SAR) studies for analogs of ca27 (c27, c58, c65), as well as analyze each structure at the protein level. Close attention was paid to the symmetric position of the hydroxyl moiety on the aryl rings, as well as their substitution with other chemical structures, including methoxy groups. The effect on cell proliferation was determined using mitochondrial dehydrogenase mediated formazan salt conversion representing cell metabolism (WST absorbance assay; 96-well tissue culture format). Once protein extracts were obtained from each analog, Bradford assays were used to determine the protein concentrations to later be used in gel electrophoresis. Ultimately the analogs were analyzed at the protein level with Western Blot techniques. Ten micromolar concentrations of the drugs validate that elevated anti-proliferative potency is associated with ortho-positioned hydroxyl groups (ca27) compared to those that are meta or para-positioned (c58 & c65). Methoxy substitutions were also taken into consideration in a comparative manner. We conclude that diarylpentanoid analogs of curcumin may be new anti-prostate cancer lead compounds.

#### **46. Analysis of Nicotine and Solvents in Electronic Cigarette “E-liquid” Using High Performance Liquid Chromatography**

**Presenter(s):** Austin Matranga and Olivia Sellers

**Advisor(s):** Dr. Matthew Gartner

Electronic cigarettes, also known as an e-cigarette, are battery-powered devices that use a heating element to convert a liquid (“e-liquid”) into an inhalable aerosol. Their advertised use is as a nicotine delivery system minus the harmful chemicals. Since “e-liquids” and the electronic cigarettes are not regulated by the Food and Drug Administration, it is not well known under what conditions, if any, carcinogenic compounds are produced. There has been little research on the toxicity of electronic cigarettes. The aim of this study was to determine if formaldehyde or acetaldehyde are formed from the e-liquid by the high heat of the electronic cigarette. The current study focused on detecting volatile organic compounds, namely formaldehyde and acetaldehyde, in the vapor produced by the electronic cigarettes. Vapor was produced using a Kangertech Dripbox which has a max output of 60 watts. The vapors were trapped in a solution containing acetonitrile and 2,4-dinitrophenylhydrazine (DNPH) to create DNPH derivatives of any volatile organic compounds that were measured with high-performance liquid chromatography. The data from high-performance liquid chromatography of the e-liquid and its vapors has been collected and is in the process of being analyzed and compared to known standards.

#### **47. Treatment of Pancreatic Cancer Cells with Curcumin Analogs and Its Effects on Androgen Receptor Expression**

**Presenter(s):** Taryn Miyake and Rima Sanyal

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

The androgen receptor (AR) is expressed in different pancreatic cancer cell lines and may play a role in cancer proliferation. Furthermore, curcumin analogs, particularly the analog 5-Bis(2-hydroxyphenyl)-1,4-pentadien-3-one (termed ca27), has been shown to downregulate AR expression in various prostate cancer cell lines. Therefore, we sought to determine whether the treatment of human pancreatic cancer cells with curcumin and various curcumin analogs will downregulate AR expression, and whether the downregulation of the AR will in turn lead to a decrease in cell proliferation or migration.

A Western blot assay was run to test for AR expression at the protein level in two pancreatic cancer cell lines (PANC-1 and COLO 357). A second Western blot assay was run to test for AR expression after treatment of COLO 357 with curcumin or ca27. The antiproliferative and cytotoxic effects of curcumin and various curcumin analogs in COLO 357 were determined via WST-1 assay and trypan blue assay, respectively. A wound-healing assay was used to determine the effects of curcumin and various curcumin analogs on COLO 357's migration abilities.

We found that COLO 357 expressed AR at the protein level. Furthermore, treatment of COLO 357 with curcumin and ca27 downregulated AR expression at the protein level. Finally, we found that c67 was the most cytotoxic and that c50 was the most anti-proliferative of the analogs tested. Further studies include an RNA interference assay to determine whether there is a direct relationship between the downregulation of the AR and the decrease in cell proliferation.

#### **48. The Role of Prostate Cancer Exosomes in Prostate Field Effect**

**Presenter(s):** Julie Nguyen

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

“Field cancerization” or “field effect” is defined as the presence of molecular alterations in structurally normal cells that reside adjacent to solid tumors. We have previously shown that the up-regulation of the transcription factor Early Growth Response Protein 1 (EGR-1) plays an integral role in prostate field effect. Up-regulated EGR-1 expression promotes prostate tumor progression.

Exosomes are biomolecule-containing vesicles that are secreted by cells to communicate to adjacent cells. Since exosomes are released more often in prostate cancer cells than in normal cells, we hypothesized that exosomes released by the prostate cancer cells are able to up-regulate EGR-1 expression in non-cancerous cells, thereby propagating the field effect. To test this hypothesis, exosomes were extracted from prostate cell medium through various rounds of centrifugation. Then the non-cancerous prostate cells were exposed to cancerous prostate exosomes for short and long periods respectively. The cells were lysed, total RNA was extracted and subjected to quantitative reverse transcriptase polymerase chain reaction to determine the change in EGR-1 expression within the non-cancerous cells treated with cancerous exosomes. In

addition, we determined the expression of potential down-stream targets of EGR-1 using the same experimental procedures.

This project was formulated to better understand how prostate tumor exosomes affect tumor adjacent tissues. This knowledge has the potential to allow the identification of therapeutic interventions able to target exosomes, which may be the prostate tumor's method of infection of adjacent non-cancerous cells.

#### **49. Oxygenated Hydrocarbons in Aqueous Systems**

**Presenter(s):** Mary Senstad and Darpan Singh

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

Oxygenated hydrocarbons are ubiquitous in the atmosphere with levels ranging from low ppt (acetaldehyde) to low ppb (methanol). As an OH sink and an atmospheric HOx and ozone source, oxygenated hydrocarbons have a direct impact on the oxidative capacity of the atmosphere. The oceans are one of the largest sources of uncertainty in current atmospheric budget estimates of these species. A better understanding of the processes that produce and destroy these species in seawater would improve our understanding of the role of the oceans in cycling these species into or out of the atmosphere. We have measured the degradation rate of ethanol in unfiltered and filtered southern California coastal waters. Rates were determined by following the concentrations of D-6 labelled ethanol in spiked (nM levels) seawater in 100ml glass syringes as a function of time. Concentrations were determined by isotope dilution purge and trap gas chromatography mass spectrometry. Rates in 0.2um filtered seawater were not measurable. Bacteria levels were also measured in all samples. Ethanol degradation rates scale with bacteria levels. Variability as a function of time, rainfall and other water quality parameters will be discussed.

#### **50. Characterization of Oxidative Stress in the Brains of Rats Exposed to Elevated Levels of As-Bearing Mine Waste**

**Presenter(s):** Anthony Torossian

**Advisor(s):** Dr. Christopher Kim and Dr. Marco Bisoffi

Glutathione, a major intracellular non-protein thiol, exists naturally in the human body and is responsible for protection against free radical damage, caused by reactive oxygen species. Arsenic toxicity is associated with the production of dimethylarsinic acid [DMA(III)], a metabolite of inorganic arsenics and a known carcinogen, which may lead to an increase in free radical production. Elevated levels of free radicals can induce DNA single-strand breaks, enhance expression of proto-oncogenes, and damage tumor suppressing genes. Oxidative stress has been linked to dopaminergic cell degeneration in Parkinson's disease, as well as the early stages of Alzheimer's disease. Thus, in order to correlate glutathione levels to human brain diseases, it is important to understand this occurrence in rat brains.

Rats were exposed to respirable (10 m particle diameter) arsenic mine waste through a nose-only inhalation for a three hour period. The rats were tracked for seven days, and properly sacrificed. One group functioned as a control, with no exposure to As-bearing mine waste. The



Enzo Life Sciences colorimetric glutathione detection kit allowed for ultra-sensitive quantification of reduced, oxidized, and total glutathione levels. The total glutathione levels in the As-exposed rats was 2.33 ± 0.01 nmoles; oxidized and reduced glutathione levels were found to be 0.05 ± 0.01 and 2.28 ± 0.01 nmoles, respectively. On the other hand, total glutathione levels in the control rats was 1.73 ± 0.27 nmoles, 0.02 ± 0.01 nmoles of oxidized glutathione and 1.71 ± 0.24 nmoles of reduced glutathione. As a result, increased glutathione levels in the exposed rats suggests a response to free radical production associated with DMA(III); but, it also indicates that more than seven days of tracking may be necessary to notice differences in oxidized glutathione levels.

### **51. Prostate Field Cancerization: MIC-1 Expression in Human Prostate Tissue**

**Presenter(s):** Lijah Vann Gardner

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

“Field cancerization” or “field effect” is defined as the presence of molecular alterations in structurally normal cells that reside adjacent to solid tumors. We have previously shown that the up-regulation of the transcription factor Early Growth Response Protein 1 (EGR-1) and its potential downstream target macrophage inhibitory cytokine 1 (MIC-1) are prominent markers of prostate field cancerization. The major scope of the present work was to expand our initial observations by determining MIC-1 expression by quantitative immunofluorescence in a selection of human prostate tissues consisting of matched cases of malignant and benign (adjacent) tissues from prostatectomies and corresponding biopsies.

### **52. Investigating the Molecular Mechanism of How the Combination of Pomegranate Juice Extract and Caffeine Inhibits Pancreatic Cancer Cell Invasion.**

**Presenter(s):** Chad Walker, John DiVittorio, Ben Geleris, Will Plaughter, and Dina Zangwill

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

Pancreatic cancer is one of the most deadly cancers in the USA. During cancer cell invasion, there is an epithelial to mesenchymal transition (EMT) in which cells lose their adhesive properties and become invasive. Several proteins become activated when cells undergo EMT. Previous research showed the combination of Pomegranate Extract (PE) and caffeine inhibited pancreatic cancer invasion. This project studied the molecular mechanism of how the combined treatment inhibits cancer invasion. It was hypothesized that there would be reduced protein and mRNA levels of the three transcription factors in cancer cells treated with the combination treatment. In order to study the molecular mechanism of inhibiting cell invasion, three transcription factors (Zeb-1, Snail-1, & Slug) involved in regulating genes that promote EMT were studied. MMP9, which is involved in cell migration, and E. cadherin, which is involved in cellular adhesion were studied as well. Real-time PCR is a method used to study mRNA levels of the three transcription factors. The analysis is not yet complete, but preliminary results show that Slug was down regulated by the treatment. Contrary to our hypothesis, initial results suggest that Snail-1 was up-regulated with treatment. At this time, data for Zeb 1 is inconclusive. Furthermore, immunoblot assays to assess protein levels are being performed to analyze how the combination treatment regulates Zeb-1, Snail-1, Slug, and MMP9. Four immunoblot assays have been completed for E. cadherin and are undergoing statistical analysis. Current studies involve studying the inhibition of cancer invasion by blocking of the Hedgehog signaling pathway.

We have previously reported similar expression levels of EGR-1 in both malignant and benign tissue samples. MIC-1 expression levels are similar between benign tissue, normal disease-free biopsy tissue, and malignant tissue. Tissue from biopsies testing positive for cancer was observed to have slightly elevated expression of MIC-1 compared to the other tissue groups. The next step includes analyzing tissue microarrays containing malignant, tumor adjacent, and disease-free tissues so we can quantify similarities of MIC-1 expression across these groups.

Our work contributes to a better characterization and understanding of prostate field cancerization/effect. Factors of field cancerization may be markers for better diagnosis, especially in reducing the rate of false-negative biopsies, as well as molecular targets for prevention or intervention based on the premise that both EGR-1 and MIC-1 are promoters of oncogenesis and cancer progression.

### **53. Hemoglobin Quantification Accuracy Comparison of Automated Blood Analyzers**

**Presenter(s):** Austin Wolf

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

Accurate automated hemoglobin quantification is critical for diagnosis in a clinical setting as well as for verification of non-invasive pulse oximetry measurements. The Beckman-Coulter DxH 600, Beckman Coulter LH500 and Advia 2120 are three commonly used blood analyzers that were compared for the accuracy in quantifying hemoglobin in quality control samples. The manual cyanohemoglobin method was used as a reference. The analyzers exhibited good accuracy with no statistically significant difference in bias.

### **54. Improved Data Collection for Finite Element Analysis Calibration**

**Presenter(s):** Kristen Yu, Elliot Howard, and Karl Olney

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

Component level characterization leads to better performance outcomes for the overall device. At Medtronic, an important component of a device is pericardial tissue. Collagen fibers dominate the structure of the tissue, and are spread unevenly throughout it. This heterogeneity causes the tissue to have anisotropic, hyperelastic material properties. An in-depth understanding of these material properties is a critical aspect of accurate simulations using finite element analysis (FEA). The data that allows the material properties to be calibrated for FEA use comes from a biaxial test. Current limitations of the biaxial test include a long run time, and how the data is collected. The test is time consuming due to sample prep and mounting. The data collection is restricted to only the center point, which doesn't capture the natural heterogeneity of tissue. The test is also currently run on load control, which sometimes results in unusable data.

To compensate for these shortcomings, improvements have been made to the biaxial test method. To shorten the amount of time that the test takes, grips have been implemented, and to obtain better data, digital image correlation (DIC) has been incorporated. In order to add the grips to the tester, the sample geometry had to be updated from a square to a cruciform shape. FEA simulations were run to determine the optimal cruciform shape. A new procedure for preparing a

sample was created to implement DIC. To eliminate the potential for unused data, the test runs in displacement control. With these test method updates, new data will be able to be collected that will improve the material model for FEA simulations to more accurately predict trends in full device level simulations.

## **Environmental Sciences**

### **55. 2016 Environmental Waste Audit, Waste Management and Dining Services: Residence**

#### **Life**

**Presenter(s):** Jaclyn Akers, Brett Galland, and Clayton Heard

**Advisor(s):** Mackenzie Crigger

This chapter of the 2016 Environmental Science and Policy Capstone Audit focuses on waste management in Residence Life at Chapman University. The goal of this subgroup is to improve recycling knowledge and awareness as a means of forming sustainable, environmentally friendly habits among students in residence life.

The data for this chapter was derived from waste audits conducted in campus residence halls. Based on the composition of collected trash and recycling, the research group decided to focus education on five commonly found items: Plastic Bottles, Paper Cups, Paper, Cardboard, and Plastic Utensils. Initial waste audits found that these items were being misplaced and thrown in the trash. For example, the waste audit of the fourth floor of Henley Hall trash revealed that approximately one third of items in the trash could have been recycled and thus diverted from a landfill.

Analyzing waste content in the residence halls allowed the group to determine which items were most commonly misplaced. Efforts to correct behavior included hanging posters depicting the focus items above trash bins, going door-to-door to hand out recycling and trash disposal information, and emailing students guides for proper waste disposal. A secondary audit will examine if one effort was potentially more successful in improving recycling rates than another.

Our group recommends the implementation of a sustainability program in Residence Life that equips rooms and tenants with information regarding proper waste disposal habits and simple measures that can be taken to reduce use and waste of resources.

### **56. Environmental Science and Policy Capstone Audit: Residence Life Dining Services**

**Presenter(s):** Cora Byers, Megan Mandel, and Camille Hyde

**Advisor(s):** Mackenzie Crigger

This poster focuses on the efforts of Randall Dining Commons to curb pre- and post-consumer food waste. The Weigh Your Waste event is held at college campuses nationwide. It's goal is to monitor food waste and to educate students about its costs. Three Weigh Your Waste events were held at Chapman in the Spring 2016. At the first event held on March 10th, 2016, 297 lbs. of food waste (0.32 lbs./student) were accumulated over the course of one lunch period. Randall's pre-consumer food waste, food that goes unused by Sodexo staff, was also investigated. This investigation started through an interview with Sodexo management regarding current

operational procedures of Randal Dining Commons from purchasing orders, station operations, preparations, and student preference considerations. These questions lead to insightful recommendations for improving the sustainability of these educational and operational practices.

It is recommended that the Weigh Your Waste events standardize to achieve consistent results and that Chapman's Meatless Monday programs are reworked to actually lower meat consumption. Similarly, from an operational perspective, it is recommended that more edible food waste is donated to charity through various alternative methods and more communication should occur between consumers and Sodexo chefs and managers. Increased communication will improve desired dining selections, particularly for the vegan station, hopefully to improving its popularity and therefore reducing student meat consumption and ecological footprint.

### **57. 2016 Waste Management and Dining Services Audit: Hazardous Waste**

**Presenter(s):** Amelia Cunningham

**Advisor(s):** Mackenzie Crigger

Household hazardous waste, which consists of items with electrical wiring, harsh chemicals, or reactive components, is often unaddressed in sustainability measures. Many people do not understand that items like electronics, light bulbs, batteries, and so on qualify as hazardous waste. Yet improper disposal of this waste can result in environmental crises. The average American produces seven kilograms of electronic waste a year alone, not including other types of hazardous waste like appliances or cleaning chemicals. Research is currently underway to determine Chapman specific household hazardous waste disposal needs, via data requested through the 2016 Environmental Survey and through a collection bin program in residence life. Given that Chapman University educates many students and employs many staff, the household hazardous waste produced by students, staff, and faculty of the university is substantial. Given that the university itself produces hazardous waste, there are already processes in place to handle the disposal of hazardous waste. This portion of the 2016 Environmental Waste Management and Dining Services Audit intends to recommend that Chapman University incorporate student, staff, and faculty hazardous waste collection into the pre-existing collection processes for campus generated hazardous waste. Some recommendations include temporal limitations on the university, while others include restraints by hazardous waste type, so that university officials have different feasible options moving forward.

### **58. Local Sourcing and Sustainable Food Options on Campus**

**Presenter(s):** Olivia Diaz

**Advisor(s):** Mackenzie Crigger

California's depleting water supply and practices in the food industry can not continue with business as usual to attempt to feed a growing population. Finite resources in California not limited to water, but also energy and gas make importing purchasing food more expensive for buyers like Sodexo. Promoting less resource intensive products like vegetarian and vegan options will take a strain off our California agriculture business and promote a healthier diet.

The university switched dining service providers from Aramark to Sodexo in 2002 with hopes to collaborate on effectively measuring and reducing pre and post consumer waste. Sodexo has a

standard to source local foods, but the closest vegetable being served to Chapman University is two hundred and twenty five miles. This does not fall under corporate's claim of sourcing within one hundred and fifty miles. Sodexo's open ended and outdated Better Tomorrow guidelines need to be brought up to Sodexo's management on campus to ensure the university has plausible sustainability goals as Chapman looks to feed thousands of new students. Looking at sourcing options and student's responses to the 2016 Environmental Audit Survey in contrast to work done in the 2013 Environmental Audit will gauge how current students care if their food is sourced locally and is vegan/ vegetarian. Local sourcing will add more vegetarian and vegan options and lower costs in retail. In turn, these options will lower carbon emissions from less travel to get to our plate, and choosing vegan/vegetarian options will lower California's water usage.

### **59. Reusables in Residence Life**

**Presenter(s):** Natalie Kobayashi and Nicole Morgan

**Advisor(s):** Mackenzie Crigger

Creating a culture of sustainability on Chapman's campus relies on the education of incoming freshman to foster environmentally conscious actions that will continue for the duration of their college career. This study aims to identify the main sources of waste within residential life and encourage the consistent use of reusable products.

Chapman began installing water bottle refill stations on campus in 2012 and is now home to 17 stations, making it convenient and easy to utilize reusable plastic water bottles rather than relying on single use bottles. In one 48 hour period of trash collection in Henley Hall, an on campus, freshman residence hall, 413 plastic water bottles were thrown away, suggesting the need for accessible water sources, especially on the third and fourth floors. If more stations are installed, students may also be more likely to support a campus wide ban on single use plastic bottles to reduce Chapman's environmental footprint.

Reducing waste is also achieved by promoting opportunities to utilize reusables. The project seeks to increase portions of snack food options in residence life (i.e. Doy's), provide information on how to improve sustainability in dorm rooms through an online article, and implement a reusable container program to decrease packaging waste. By increasing awareness on avenues to avoid excessive packaging and transitioning into bulkier purchasing, students can cut down on convenience packaging and put reusable dishware to use. Results from a campus-wide 2016 Environmental Audit Survey will indicate preference toward these initiatives and highlight potential areas for improvement and feasibility.

### **60. 2016 Chapman University Environmental Audit Waste Management and Dining**

#### **Services: Food Service Equipment**

**Presenter(s):** Alexandra Sidun and Devon Bloss

**Advisor(s):** Mackenzie Crigger

Chapman University accommodates over 1700 student meal plans per day through the on-campus dining services provided by Sodexo Restaurant Services. The commercial-grade kitchens found in the Randall Dining Commons (RDC) of Sandhu Conference Center are frequently used to

prepare food for students for every meal, seven days a week. The RDC kitchen facility has staff working around the clock and high consumption electrical, water, and gas appliances constantly running to parallel the high demand. The frequent use of commercial kitchen appliances results in an enormous consumption of energy and water resources leading to comparably high utility bills. Measuring the energy and water usage is a crucial component for this audit and for future audits to take into consideration, in terms of the responsible and sustainable use of finite resources.

This portion of the 2016 Environmental Audit quantifies areas of mechanical and operational inefficiencies and provides recommendations for mitigation of wasted energy and water resources from the RDC commercial kitchen. kWh meters, water volume meters, and thermal meters were placed on refrigeration, heating, and sanitation equipment to understand the resource consumption patterns and were further analyzed for operational improvements, retrofits, and environmentally friendly upgrades. Recommendations on new appliance purchases include Simple-Payback and Return on Investment financial calculations to examine the cost deferred through lowered utility bills and acquired rebates. Additionally, 2016 Environmental Audit survey data was collected from kitchen staff to provide insight on behavioral practices and future educational opportunities to aid in improving sustainable workplace habits.

#### **61. 2016 Environmental Waste Audit, Waste Management and Dining Services: Main Campus Dining Services**

**Presenter(s):** Katherine Whiteman, Ariane Jong, and Abbey Messmer

**Advisor(s):** Mackenzie Crigger

Within the research themes of Chapman University's fourth annual sustainability audit, this presentation focuses on main campus dining services and seeks to examine the amount of post-consumer waste produced at on-campus eateries and what proportion of this waste is properly disposed of. The chapter provides qualitative and quantitative values on how these dining services are excessively using disposable goods, and makes recommendations for reducing these quantities in the future. Prior to this audit, there was little educational waste sorting signage present at on-campus eateries to encourage the proper disposal of trash and recycling. We conducted two waste audits in Argyros Forum (AF) and Starbucks before and after the educational waste disposal signage was posted. The data generated from these audits provided previously unknown waste production data for different categories of disposable items, allowing us to assess whether the posting of educational signage made an appreciable difference on waste diversion rates. The results show that, more often than not, consumers are disposing of recyclable items improperly. Specifically, 190 recyclable plastic food containers were thrown into AF first-floor trash cans instead of adjacent recycling bins, while only 14 were properly recycled. Recommendations were made regarding the reduction of post-consumer waste within main campus eateries, such as offering a discounted price to consumers who provide their own reusable cup, as opposed to the non-recyclable paper cups currently offered. This chapter presents findings and recommendations on how to improve the waste education and sustainable behaviors of the Chapman community within main campus dining services.

## **62. 2016 Environmental Waste Audit Waste Management and Dining Services: Waste Management on Campus**

**Presenter(s):** Lauren Smith, Julia Williams, Marc Rosenfield, and Sarah Thorson

**Advisor(s):** Mackenzie Crigger

In 2012, Chapman University released the statement that as an institution, we “strive to foster a culture of sustainability among the facilities, operations, and classrooms of the University” (Chapman University Management, 2012). In the last four years, the university has made efforts to implement sustainable waste management practices on campus through multiple initiatives, including the placement of recycling bins in classrooms, offices, and main spaces. However, the University can further improve many aspects of waste management on campus. In order to reduce waste, recycling efforts must be improved, composting services can be introduced, sustainable classroom practices must be implemented, and sustainability trainings should be conducted.

Recycling efforts across the Chapman community can be enhanced through educational signage in order to increase understanding surrounding proper disposal and recycling importance. Sustainability education is essential to increase recycling rates and decrease waste, effective and engaging trainings for students, staff and faculty to impose campus-wide sustainability standards are recommended. The inclusion of compost services on main campus can greatly reduce waste campus-wide. Chapman University can greatly improve its image and daily practices by increasing the diversion rate on main campus, setting environmental initiatives to help our community, and creating greener classrooms, all while saving money in the process.

## **63. Arsenic Bioaccessibility as a Function of Rainfall Exposure and Time in Mining-Impacted Sediments**

**Presenter(s):** Katherine Whiteman

**Advisor(s):** Dr. Christopher Kim

Mining activities mobilize undesired trace metal(oid)s during extraction processes, exposing sediment that is easily transported by wind and rain. The presence of dangerous metal tailings is of great concern because of the implications it holds human health. The Red Hill Mine in Tustin is inactive; its surrounding land is entirely residential, potentially exposing residents to traces of arsenic daily.

This experiment examines the effect that rainwater has on arsenic bioaccessibility of Red Hill sediment. Gastric bioaccessibility of arsenic is greatest during periods of dryness, producing an increasing correlation between antecedent dry days and concentration of arsenic. Therefore, ingestion of sediment from the Red Hill Mine poses the greatest threat to human health during the consistent absence of rain over time.

Aliquots of a Red Hill sediment sample were sieved to an ingestible size fraction, then exposed to a series of wetting and drying cycles over an extended period of time and left to dry outside, avoiding contamination. Upon the conclusion of rinsing, all samples underwent a simulated gastric fluid extraction, producing data that shows the likely concentrations of As that develop

within the human body through ingestion of the fine particles. The highest As concentration was found in the control sample that was dry for over 100 days. The lowest As concentration was present in the sample that was wet day of extraction; rainwater washes the most soluble particles off the surface of the sediment particles. Data was analyzed to study the effect that rainwater has on overall arsenic bioaccessibility.

**64. Cu(II) and Zn(II) Adsorption and Retention Rate to Iron Oxyhydroxide Nanoparticles: Effects of Nanoparticle Aggregations and Sulfate Concentration**

**Presenter(s):** Lauren Smith

**Advisor(s):** Dr. Christopher Kim

Iron oxyhydroxide nanoparticles are commonly found in natural aqueous systems and are known to be effective adsorbents for metals due to their high surface area and surface reactivity. Due to naturally geochemical processes, which change the ionic strength, pH, and temperature of the environment, can cause the nanoparticles to aggregate, which affects their ability to adsorb and retain metals. Along with this as the particles move through aqueous systems the change in salinity also impacts the particles' potential to adsorb metals. The metal analyzed in this study is copper (Cu<sup>2+</sup>) and zinc (Zn<sup>2+</sup>), which contaminate aquatic systems through mine waste pollution. In a batch metal uptake experiment, synthetic iron oxyhydroxide nanoparticles, at varying aggregated states of pH, ionic strength, and temperature is exposed to dissolved copper and zinc under varying sulfate concentrations varying. The sulfate concentration range from 0.03M SO<sub>4</sub> to 0.18M SO<sub>4</sub>, to simulate the particles moving through the aquatic system towards the ocean. Each batch is separated into three samples that show the initial amount of metal adsorbed by the nanoparticles, the percent uptake after salt is added, and the retention rate of the metal when the pH is dropped. These samples are put through the Atomic Absorption Spectroscopy (AA) to analyze the amount of metal uptake. Results will allow interpretation of the role of increasing sulfate concentrations on metal adsorption and retention processes by iron oxyhydroxides.

**65. Ocean Acidification and Predator-Prey Relations: Correlating Disruption of Predator Avoidance with Chemosensory Deficits**

**Presenter(s):** Alexandra Sidun

**Advisor(s):** Dr. William Wright

One of the most destructive effects of global climate change is the increased carbon sequestering and consequential acidification of our world's oceans. The impacts of ocean acidification on marine organisms are still relatively unknown, especially effects on behavioral ecology. Avoiding predation has emerged from recent behavioral ecology literature as a critical feature in the life history of a wide array of animal species; experiments on marine fishes suggest acidic water compromises their predator-avoidance abilities. Recent assays in our lab suggest predator-induced behavior is reduced by weakly acidic water. These experiments do not address the potential factor of generalized malaise caused by acidic water. To test this malaise hypothesis, I examined whether predator-induced reduction in feeding, previously documented by the Wright lab, is eliminated by acidic water using the following treatments:



- ambient artificial seawater (ASW)
- acidic ASW
- ambient predator-scented ASW
- acidic predator-scented ASW

The malaise hypothesis predicts predator odor in acidic water would decrease feeding furthermore because the acidic water would sicken the subject. By contrast, if acidic water has a more subtle effect on hermit crab's ability to detect its predator, the hermit crabs' feeding in the presence of acidified water and predator odor should increase feeding rates to be comparable to ambient predator-free water. Preliminary experiments confirm slightly acidic water compromises predator detection, resulting in significantly more food consumption; these results discredit the generalized malaise hypothesis. This trend indicates global climate change could have significant and previously unanticipated impacts on predator-prey relations in marine communities.

## **66. Efficiency of Seal Beach National Wildlife Refuge Wetlands as an Area for Carbon**

### **Storage**

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

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

The term "blue carbon" reflects the vast amount of carbon storage in coastal wetland ecosystems, despite their relatively low areal extent. There is growing interest to capitalize on this carbon sequestration to drive wetland restoration and conservation efforts. However, soil carbon storage can be offset by the release of the potent greenhouse gases methane and nitrous oxide from wetland ecosystems. We explored greenhouse gas fluxes from the Seal Beach National Wildlife Refuge, which is the site of a thin layer sediment augmentation project to maintain the salt marsh habitat in the face of ongoing sea level rise. Our preliminary results suggest that the flux of methane and nitrous oxide from this site, prior to the initiation of sediment augmentation, are minimal and are not likely to offset soil carbon sequestration.

## **67. The Potential for Microbial Humic Reduction in Alaskan Peatland Soils**

**Presenter(s):** Zachary Ellis and Jessica Rush

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

Peatlands, a specific type of wetland characterized by highly organic soils, are very important in the global carbon cycle. These ecosystems store approximately one-third of the total terrestrial soil carbon and are an important global source of the greenhouse gas methane (CH<sub>4</sub>). Peatlands are characterized by water-saturated soils with little to no oxygen. Previous studies suggest that under these anaerobic conditions, decomposition utilizes alternative terminal electron acceptors, which produce CO<sub>2</sub> and competitively suppress CH<sub>4</sub> production. However, known microbial processes do not account for the total amount of CO<sub>2</sub> produced in many peatland soils.

Recent evidence suggests that humic substances in Arctic peatlands can act as organic terminal electron acceptors. To investigate the effect of humic substances on anaerobic microbial decomposition in Alaskan peatlands, soils were biologically and chemically reduced and CO<sub>2</sub> and CH<sub>4</sub> production was monitored over a 3 week period. Additionally, to quantify the ability of humic substances to act as an alternative terminal electron acceptor, we measured electron shuttling

capacity (ESC). Preliminary results suggests that humic substances may not be an important control on anaerobic decomposition in all Alaskan soils, evidenced by ESC being equivalent in both biologically and chemically reduced samples as well as a large amount of CH<sub>4</sub> production.

#### **68. Correlating Arsenic Bioaccessibility and Bioavailability Through In-Vivo Rat Exposures**

**Presenter(s):** Tessa Oliaro, Matt Gothong, and Fernando Silva

**Advisor(s):** Dr. Christopher Kim and Brandon Lamb

The bioavailability of inhaled arsenic is largely dependent upon two factors: the size and solubility of the arsenic particulate. The size of the particles dictates how far into the lungs and other tissues the arsenic particles will be lodged. The solubility, more importantly, determines how rapidly and completely the arsenic is absorbed into the bloodstream. The goal of this study is to determine the bioavailability, which is the rate of a substance that is absorbed in a living system at the site of physiological activity, of arsenic in rats through exposures to airborne respirable mine wastes. In the experiment, the rats were exposed to airborne particles of two different types of arsenic bearing mine wastes and sacrificed at various time periods (0-7 days) in order to measure concentrations of arsenic in the urine, feces, blood, and other target organs (lung, heart, liver, spleen, kidney) of the exposed rats. The conclusions from the experiment will be used for risk assessment of arsenic effects on human inhalation. The proposed work at Chapman includes the digestions, high-resolution ICP-MS (inductively coupled plasma mass spectrometry) arsenic measurement, and further data analysis. The trend of the rat urine and feces data collected showed that the highest count of arsenic was after post exposure day one, followed by a decrease as the post exposure days increase, until a general increase near the fifth day of post exposure. The key purpose is to track the arsenic uptake through the body and analyze correlations between the in vivo bioavailability and the in vitro bioaccessibility as defined through SGF extractions.

### **Food Science**

#### **69. Use of DNA Mini-Barcoding to Identify Poultry Species in Food Products**

**Presenter(s):** Brenda Hernandez

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

Poultry prices are expected to decrease in the coming years, thereby increasing the profitability of substitution for higher-cost species in processed products. Animal species can generally be detected using methods based on DNA analysis, such as DNA barcoding. However, DNA can become degraded during processing, making it difficult to identify species based on sequencing of the full-length DNA barcode. Therefore, the objective of this study was to investigate the ability of short DNA sequences (mini-barcodes) to identify poultry species in processed foods and to compare the results to full-barcoding. Twenty-eight products were collected for the study, including luncheon meat, ground meat, jerky, canned meat, and pet food. All products were labeled as containing chicken, turkey, or duck. Each sample underwent both full and mini-barcoding of the cytochrome c oxidase subunit I (COI) gene. Successfully sequenced samples were then analyzed and identified through the Barcode of Life Database (BOLD). The results showed that full-barcoding was more successful overall for identification of poultry species in the

products, with a success rate of 71%, while mini-barcoding showed a success rate of 46%. The difference in success rates was due to the failure of DNA barcoding to identify four canned turkey products, whereas mini-barcoding was successful with two of the four products. Samples labeled as duck were equally successful (67%) between both barcoding methods. Overall, this study showed that while mini-barcoding has the potential to be used for species identification in processed products, future studies need to be carried out to optimize this methodology.

### **70. Effect of Irradiation on Carotenoids in Kishu Mandarins**

**Presenter(s):** Maria Belen Meza

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

The following research seeks to identify the most appropriate irradiation dose at which vitamin A synthesizing compound, known as carotenoids, can be preserved in mandarins. As the importation of mandarins from China to the United States is being considered, so are the preservation techniques of this fruit. Citrus kinokuni mukakukishu mandarins were locally grown in California and treated at 0, 150 Gy, 400 Gy and 1000 Gy irradiation doses. The carotenoids in mandarin were evaluated for 3 test days: after being irradiated only, after application of irradiation plus 3 weeks at 6 °C and after irradiation, 3 week storage at 6 °C plus 1 extra week at 20 °C. These storage conditions simulate the sea shipment conditions of imported mandarins from China to U.S. Mandarin samples were prepared in triplicate fashion. Samples were subject of extraction, separation and saponification in order to obtain a pure carotenoid solution. Carotenoid identification was done based on order of elution, UV-VIS spectral data and retention times through HPLC analysis. The major carotenoids found were  $\beta$ -cryptoxanthin,  $\beta$ -carotene, cis-violaxanthin, lutein and trans-zeaxanthin. Moreover obtained results showed that irradiation doses of 150 Gy and 400 Gy are potential treatment doses for Kishu mandarins.

## **Physics**

### **71. Application of the Quantum Mechanical Two Body Problem onto a Gravitating System**

**Presenter(s):** Sovanndara Hok

**Advisor(s):** Dr. Ali Nayeri

The two-body problem in classical mechanics is a widely known problem that has been solved analytically. This solution to this problem towards a gravitational potential has provided the mathematical model to the orbits of planets. However, the introduction of quantum mechanics has given a greater subtlety and challenge to the two body problem. The two body model has been applied to the atomic structure, and has given the structure of the atom. The two body problem with regards to quantum mechanical gravity has been underexplored. The project aims to use the motivation of the two body problem and quantum mechanics and apply it onto the gravitational potential. The associated Hamiltonian, and solution will be used to model a gravitating system of two planetary bodies. Finally, the quantum corrections will be presented while checking the validity of the solution by applying the classical limits to the problem.

## **72. Interference Spectrum of the Infinite Square Well**

**Presenter(s):** Taylor Patti

**Advisor(s):** Dr. Cai Waigell, Dr. Yakir Aharonov, and Dr. Jeff Tollaksen

Certain superposition states of the 1-d infinite square well have transient zeros at locations other than the nodes of the eigenstates that comprise them. We show that if an infinite potential barrier is suddenly raised at some or all of these zeros, the well can be split into multiple adjacent infinite square wells without affecting the wavefunction. This effects a change of the energy eigenbasis of the state to a complementary basis, and a subsequent measurement of the energy now reveals a completely different spectrum, which we call the interference energy spectrum of the state. This name is appropriate because the same splitting procedure applied at the stationary nodes of any eigenstate does not change the measurable energy of the state. Of particular interest, this procedure can result in measurable energies that are greater than the energy of the highest mode in the original superposition, raising questions about conservation of energy akin to those that have been raised in the study of superoscillations. An analytic derivation is given for the interference spectrum of a given wavefunction with  $N$  known zeros located at known points. Numerical simulations were used to verify that a barrier can be rapidly raised at a zero of the wavefunction without significantly affecting it, and some general characterization of how a rapidly raised barrier affects different states is given.

# Poster Session 2

## Quick Reference – Student/Poster #

---

Agbayani, Crystle-Joie	8	Gothong, Matt	68
Akers, Jaclyn	55	Gould, Nelson	25
Alexander, Tia	21	Goulding, Samantha	9
Alfawaz, Norah	5	Griffin, Chase	43
Ali, Sara	21	Gunanto, Tracy	25
Alnoumani, Hatouf	4	Hamilton, Natasha	12
Amirazizi, Samira	9, 10	Heard, Clayton	55
Ariza, Adrian	10	Hernandez, Brenda	69
Banayan, Talia	16	Himstead, Alexander	26
Banning, Kelsey	9	Hoang, Alex	6
Barashy, Ori	35	Hok, Sovannara	43, 71
Bates, Morgan	14	Hornaday, Nicole	27
Bawa, Mohini	22	Howard, Elliot	54
Beyer, Jessica	20	Hyde, Camille	56
Bickell, Ariana	24	Jong, Ariane	61
Bloss, Devon	60	Kalyta, Anastasia	28
Byers, Cora	56	Kim, Joanne	29
Chang, Daniel	43	Kobayashi, Natalie	59
Chiang, Stephen	21	Krause, Taylor	44
Coffin, Haili	36	Larson, Julie	29
Cohen, Amy	10	Lawson, Alyssa	16
Cunningham, Amelia	57	Lee, Karen	5
Del Rio, Jose	7	Levi, Victor	45
Derlacki, Avalon	15	Liang, Sihui	2
Diaz, Olivia	58	Long, Christine	6
DiVittorio, John	52	Mandel, Megan	56
Dodson, Joseph	37	Martinez, Jessica	25
Elep, Kyvan	66	Matranga, Austin	46
Ellis, Zachary	67	McAllaster, Sara	17
Esseau-Thomas, Chrys-Michel	38	Messmer, Abbey	61
Fernandez, Andrea	16	Meza, Maria Belen	70
Frisch, Emily	39	Miller, Haley	66
Fuijsaki, Kayleigh	1, 40	Miller, Stefani	3
Galland, Brett	55	Miyake, Taryn	47
Gann, Aylin	9	Morgan, Nicole	59
Geleris, Ben	52	Mukherjee, Sohini	18
Goldsberry, Bradley	41	Nakamoto, Ty	30
Goodman, Aaron	42	Nava, Omar	1

# Poster Session 2

## Quick Reference – Student/Poster #

---

Nguyen, Julie	48	Whitesides, Joshua	13
Nguyen, Michelle	9	Whitmore, Benji	23
Nouri, Roxana	9	Williams, Alyia	20
Okabe-Miyamoto, Karynna	9	Williams, Julia	62
Okuma, Tara	2	Wolf, Austin	53
Oliaro, Tessa	68	Yellin, Rachelle	33
Olney, Karl	54	Yu, Kristen	54
Patti, Taylor	72	Yund, Seth	34
Perestam, Adam	1	Zangwill, Dina	52
Plaugher, Will	52		
Rafter, AJ	2		
Ralph, Jamie	7		
Ransom, Alyssa	7		
Rogers, Steven	5		
Rosenfield, Marc	62		
Rush, Jessica	67		
Sanyal, Rima	47		
Sarcona, Alexa	3		
Sellers, Olivia	46		
Senstad, Mary	49		
Shahbazi, Nikki	31		
Sidun, Alexandra	60, 65		
Silva, Fernando	68		
Singh, Darpan	49		
Siy, James	7		
Smith, Lauren	62, 64		
Smith, Mackenzie	10, 11		
Thakkar, Tirtha	6		
Thornton, Shantae	32		
Thorson, Sarah	62		
Torossian, Anthony	50		
Tsopkeng, Joele Atonfack	3		
Valdez, Olivia	19		
Vann Gardner, Lijah	51		
Walker, Chad	52		
Whiteman, Katherine	61, 63		