



# CREATIVE COLLABORATIONS UNDERGRADUATE RESEARCH

# CONFERENCE



April 14, 2016 • 12–2:15 p.m.

University of San Diego • Hahn University Center

[www.sandiego.edu/cc-urc](http://www.sandiego.edu/cc-urc)

Office of Undergraduate Research

Student-faculty

Research

Scholarship

Creative Works

## WELCOME to the 26th Annual Creative Collaborations Undergraduate Research Conference!

This annual forum celebrates the research, scholarship and creative accomplishments of students in all disciplines. The high-quality work you see reflects the intellectual curiosity of our undergraduate students and their ability to make substantial contributions to society. Creative Collaborations also serves to showcase the commitment of our distinguished faculty in mentoring the next generation of research leaders, as well as USD's long-standing commitment to academic excellence by providing students with experiential and engaged learning opportunities.

This year, more than 275 abstracts were submitted by students, a 25-percent increase in the number of submissions compared to 2015! We encourage you to visit students as they present their research in poster, interactive and visual arts exhibits. In keeping with the university's commitment to social justice, research conducted on campus and presented today has the potential to make a real difference. Among the presentations are studies that concentrate on understanding the underlying mechanisms of neurodegenerative disease, investigating the molecular pathways important for learning and memory formation, understanding the barriers faced by Latinas — a population that has been historically underserved in the business sector — as a way to identify practices that are currently acting as obstacles, and looking at the evolution of “voice” in stories as a way to find the “narrative voice” that is able to cultivate sincerity. Other research being presented at the undergraduate research conference results in a “product.” Examples include a sunlight-powered desalination unit that will provide potable water to populations that lack safe drinking water, and a satirical work from an existing text written about 1930-1940s perspective of male/female dynamics by juxtaposing the original message to contemporary feminist perspectives.

Creative Collaborations is part of Research Week at USD (April 11-15, 2016), which showcases research activities across the university and honors students and faculty members who have challenged themselves to extend learning beyond the classroom. We invite you to view and experience a variety of presentations during this celebration of faculty-student scholarly collaboration. Congratulations to all the student presenters and faculty members participating in this year's Creative Collaborations Undergraduate Research Conference!

Sincerely,



Andrew T. Allen, PhD  
Vice President and Provost



Sonia Zárate, PhD  
Director, Office of Undergraduate Research

THE UNIVERSITY OF SAN DIEGO COLLEGE OF ARTS AND SCIENCES PRESENTS

# The Lindsay J. Cropper Memorial Writers Series



The Lindsay J. Cropper Memorial Writers Series and The Lindsay J. Cropper Center for Creative Writing were established in 2004 by Barrie and Dorothy Cropper in memory of their daughter Lindsay, an alumna of USD, English major and aspiring writer. The purpose of the center is to foster the appreciation and practice of creative writing at the University of San Diego by hosting an annual writers series, sponsoring writing workshops and granting awards for creative writing.

## THE CROPPER CENTER FOR CREATIVE WRITING: SENIOR READING

Thursday, April 28, 2016

7 p.m., free and open to the public.

Friends & Family welcome!

Mother Rosalie Hill Hall (MRH), Room 102 ("SOLES")

Dessert Reception to follow.

SENIORS graduating from the English major Creative Writing Emphasis will read from their own works. The English Department's Creative Writing Emphasis (fiction, nonfiction, and poetry) is comprised of four rigorous, upper-division creative writing courses in which students practice the dedication and commitment required of the serious writer. These courses hone critical reading, creative thinking, and writing and communication skills. Such skills are not only essential to the budding writer, of course, but also are highly valued in all professional fields and are integral to the creation of a well-rounded graduate of a liberal arts college. For more information about the creative writing emphasis please go to: [www.sandiego.edu/cas/english/program/creative\\_writing/](http://www.sandiego.edu/cas/english/program/creative_writing/)

## Schedule

### Welcome

**12:00 p.m.** Sonia Zárate, PhD  
Director, Office of Undergraduate Research  
Hahn University Center Forums

### Student Presentations

**12:10 to 2 p.m.** **Visual Arts Exhibits:** Student Life Pavilion Exhibit Hall

**12:10 to 1 p.m.** **Session One (Presentations 1-138)**  
**Poster Presentations:** Hahn University Center Forums  
**Interactive Exhibits:** Hahn University Center Forums, alcoves,  
La Gran Terraza Patio

**1:10 to 2 p.m.** **Session Two (Presentations 1-138)**  
**Poster Presentations:** Hahn University Center Forums  
**Interactive Exhibits:** Hahn University Center Forums, alcoves,  
La Gran Terraza Patio

## ABSTRACT BOOK

In keeping with USD's commitment to sustainability, the 2016 abstract book is available on the mySDmobile app during Research Week, and can be found online at [www.sandiego.edu/cc-urc](http://www.sandiego.edu/cc-urc).

## RESEARCH WEEK April 11-15, 2016

Creative Collaborations Undergraduate Research Conference is part of USD's 2nd Annual Research Week. For more information about offerings, please visit [www.sandiego.edu/osp/research-week/index.php](http://www.sandiego.edu/osp/research-week/index.php).

## OFFICE OF UNDERGRADUATE RESEARCH

Established in September 2011 with a grant from the W.M. Keck Foundation and funding from individual donors, the mission of the Office of Undergraduate Research is to support undergraduate students in research, scholarship and creative activities. Underlying our mission is a commitment to equity and access, to ensure that all students are able to participate in and benefit from research activities both in and out of the classroom. The office provides services to both students and faculty members who mentor them in research activities, and encourages collaborations across departments, disciplines, and with the local and global community.

The University of San Diego is an enhanced institutional member of the Council on Undergraduate Research.



Session I: 12:10 to 1 p.m.  
La Gran Terraza Patio

## Exploration in Visual Arts and Printed Work

NATALIE EARNHART, BRIANA JURRIES, MILES PARNEGG, BRANDON REITER, RYAN SAMSON, PETER HILBURN, KYLIE BJELIC, ELLIOT HERSANT, BRIANA HARRINGTON and Malachi Black

In combining literary works (poetry, fiction, creative nonfiction) with visual art we seek to come to a greater understanding of both aesthetics and our own humanity. The goal is to generate a prismatic compilation of student art and display it through a printed medium. In attempting to dismantle the lines between artistic genres (both literally and abstractly) we can begin to dismantle the human borders that separate us as individuals. This compilation of creative writing and visual art (all produced by USD undergraduates) enhances both the experiences of the printed word and of the still-life image.

Session II: 1:10 to 2 p.m.  
La Gran Terraza Patio

## Against Irony: Play and Narrative Voice in “The Emmett Stories”

MILES PARNEGG and Halina Duraj

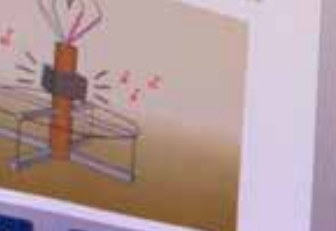
Over the course of my senior year I've been working on a collection of short stories, all connected by a single character. The purpose of this project has been to explore a variety of structural approaches to the short story and to cultivate a sincere and captivating narrative voice in a series of related stories. The narrator of these stories, Emmett, struggles with all aspects of intimacy: familial, emotional, physical, and so on. He offers unsolicited romantic advice to his younger sister; he bonds with his high school ceramics teacher over a mutual love of Al Green; he bungles relationship after relationship, wondering what the phrase “it's not you, it's me” really means. In developing Emmett's character I've found that irony and self-consciousness are the prime enemies of art, and that cultivating some form of sacred sincerity is maybe the best hope we have.

# Acoustic Symphony: Interactive Art Installation

by Anna Blair, Hannah Halopoff, Stephanie Harrison  
Faculty of Engineering, Advisors: Dr. Kramer, Dr. Gibb

## Design Overview

The goal is to combine the talents of an art and engineering student to create an interactive art installation. The installation consists of four heart rate monitor stations where participants' heart rates are converted into a musical output. As participants move through the stations, their heart rates will be processed by a microprocessor. The resulting music will then be played at the participants' stations. Additionally, there will be an LED display composed of four stations. Each participant will see their heart rate in beats per minute on an LCD at the station.



## System Logic

```
graph TD
    A[Participant Heart Rate] --> B[Microprocessor]
    B --> C[Music Synthesis]
    C --> D[Audio Output]
    B --> E[LED Display]
    E --> F[Participant Heart Rate]
```

## Microprocessor

- Raspberry Pi
- Central processing unit; controls system peripherals
- Converts heart rate output to beats per minute
- Controls LED heart rate display



## Audio and Visual

- Audio output: Mounted speakers play music synchronized to participants' heart rate
- Visual Output: Color coordinated LED lights for each heart rate monitor station



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UNIVERSITY OF  
HALLOWEEN

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Session I: 12:10 to 1 p.m.

UC Forums

### The Role of Subunit Interfaces of Malate Dehydrogenase in Protein Folding & Unfolding

JOHN ABANO, Ellis Bell and Jessica Bell

Malate dehydrogenase (MDH) is an essential enzyme for several metabolic pathways including the production of NADH as a precursor for ATP synthesis in the mitochondrion and glyoxysome. In the cytosol MDH is involved in the reduction of oxaloacetate as part of the aspartate-malate shuttle. The enzyme is a dimer of chemically identical subunits and while much is known about the enzymatic steps, little is known about the folding mechanism of MDH and the link between folding and regulation or catalysis. The goal of the current project is to understand the folding process and explore the role of subunit interactions to test the hypothesis that the native dimer conformation of MDH governs the correct folding of the enzyme subunits in order to impose the observed spatial asymmetry of the subunits and facilitate active site communication across the interface thought to be involved in both overall catalysis and regulation. Clustal analysis identified a number of interface conserved residues and 4 mutants, H90Q, E256Q, S266A and L269A were constructed. The wild type protein and various mutants were expressed in E.Coli and purified using NiNTA Chromatography using the engineered His-Tag. Purity was established by SDS-Page or MALDI-tof. Quaternary structure was established by size exclusion chromatography. Reversible denaturation of wild type and mutants was studied by fluorescence spectroscopy and CD to determine tertiary and secondary structures respectively, with activity loss and regain followed by enzymatic assay. The protein unfolding/folding dynamics were also probed using limited proteolysis in conjunction with mass spectrometry.

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Session I: 12:10 to 1 p.m.

UC Forums

### A Review of E-waste Recycling Behaviors at Drop-off Centers

HANNAH ADAMS and Arthur Atkinson

To reduce the amount of waste entering community landfills, various recycling and waste reduction programs such as curbside bin and drop-off center recycling programs have been implemented. However, the success of these programs largely depends on household participation. A better understanding of individual recycling behavior will help to improve the effectiveness of recycling resources. The central aim of this report is to provide a summary of existing literature on recycling research, particularly in determining factors that affect public participation in e-waste recycling activities at drop-off locations. The findings show that demographic factors, such as age and education, convenience, and pro-recycling attitudes have the greatest influence in an individual's willingness to participate in recycling activities. Furthermore, this study relates the literature findings to the results of a survey performed at USD Electronic Recycling Center. The results of the study suggest that e-waste recycling can be intensified by promoting societal moral norms, increasing general recycling education, and making options for the public to responsibly and sustainably recycle e-waste more convenient.



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Session I: 12:10 to 1 p.m.

UC Forums

## Construction of a Beowulf Cluster for High Efficiency Computing

NICK ADDIEGO, SHANNON BAILEY, Carson Edwards, David Mayhew and Frank Jacobitz

The goal of this project is to develop and maintain a Beowulf cluster of Odroid single board computers in order to examine and utilize their resultant computational capacity. In addition, the power consumption of individual cluster nodes will be monitored and analyzed over varying computational loads. These consumption values will be used to compare the power required to complete identical calculations with a desktop computer. This project requires the development of a network environment in which these single board computers can assign and distribute data, as well as the design of an assembly to house all relevant equipment. The Odroid computers use the Ubuntu-Linux operating system and the Open-MPI software for the communication between nodes via network connections. Through the use of Open-MPI, a previously distinguished “head node” divides large data sets and delegates other node computers’ unique sections of each set. Results of each calculation are then returned to the head node to be analyzed by the operator. The advantage of using a set of computers in this configuration is that it helps to greatly reduce the time required to process large numerical loads by dividing them among many CPUs. We have proved this in a 16 node cluster earlier this year and are planning to scale our findings to utilize 64 nodes in the upcoming semester. Along with this, the team is busy developing mounting plates that allow for easy access to each one of the boards. Frank Jacobitz

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Session I: 12:10 to 1 p.m.

UC Forums

## Data Centers: The Distribution of Mega-Data Centers Based on Energy Costs

JOYLENE AGUIRRE and David Mayhew

Data centers account for 1.7-2.2% of energy consumption in the United States and are expected to consume even more in the coming years. As the demand for energy rises, consumers are forced to pay inflated rates due the cost of producing the necessary energy. In order to reduce the demand for grid energy caused by data center consumption, an alternative source can be built at data center sites, which will allow for energy to be consumed where it is produced. Although current individual alternative energy technology can provide a sufficient source of power, a hybrid source will allow for data centers to be placed in nearly any environment and still provide optimal power. By analyzing efficiencies of current alternative energy sources such as wind turbines, water pumps, and solar panels, my research hopes to find the most effective combination of the three in order to provide a self-sustaining source of energy for data centers, thus reducing their consumption of grid energy and allowing for data centers to be placed in the most efficient environments, rather than those which would be less costly to connect to the grid.

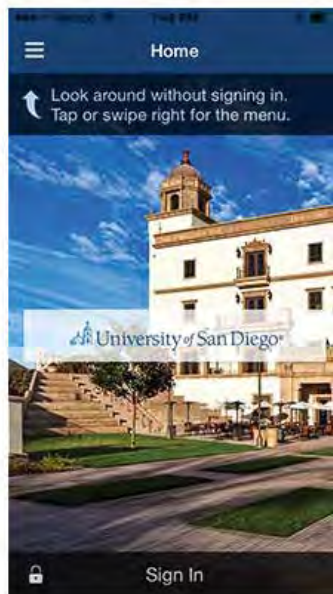
## Economic Factors that Influence the Sale of Hybrid-Electric Vehicles

JAKE ALLEN and Alyson Ma

In recent years there has been a huge push by car manufacturers to modify their fleet of cars to produce lower emissions. This is likely due to the ever present threat of climate change and stricter thresholds set by the government, on car manufacturers. Larger Companies such as Toyota, Honda, Volkswagen and Chevrolet have started to cater production towards more environmentally friendly automobiles, that produce low emissions and have high miles per gallon. The hybrid-electric car industry is dominated by the Toyota Prius, the Tesla Model S, and the Chevy Volt. Since the national release of the Toyota Prius in 2000, car companies have been producing more hybrid-electric vehicles and consumers have been purchasing them in greater numbers. Sales of these environmentally-friendly vehicles have been steadily increasing since the emergence of the hybrid-electric vehicle market. The prices for electricity, emission taxes, prices per barrel of Crude oil and the cost of gasoline cars have also all fluctuated greatly in recent years. The purpose of this research will be to see if there is a correlation between these socio-economic factors and the sales of hybrid-electric Vehicles.

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Download at



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Session I: 12:10 to 1 p.m.

UC Forums

## Does Your College Choice Influence Earnings?

NASER ALSABAH and Alyson Ma

Does college choice influence alumni earnings? How can you maximize your earning potential? These are the type of questions which I would investigate in my paper. This study was conducted due to the fact that many ranking agencies do not take into account the institution characteristics which benefit students the most, since they mainly focus on the selectivity of universities when ranking them. In this paper I will investigate how institutions that are not as selective could be as beneficial to students in terms of developing their skills. A panel data will be used to examine the relationship between institution factors to alumni success, holding constant student characteristics. Variables such as; faculty salary, graduation rates, attendance rates and student to faculty ratio would be investigated in order to estimate students future economic success. Data from the IPEDS, National Center for Education Statistics, Payscale.com and a variety of different sources are used. This paper would aid students in terms of deciding which college to attend, since different students have different abilities/needs therefore the value attained from a specific university differs across students.

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Session I: 12:10 to 1 p.m.

UC Forums

## Water Leak Detector

Almonther Alshareef, Alec Sarner, Eric Robbbaro and Kathleen Kramer

Our product responds to some common necessities of homeowners in regards to water conservation, reducing their water bills, and maintaining their houses. To achieve this, our product will detect vertical water leaks and alert the homeowner(s) via SMS messages and audible tones. Once our design is complete, we will have a product that aids homeowners in their costly struggle against water damage and raises awareness about water conservation. The final product will be a small device that can be either attached to plumbing via a strap or placed near leak prone areas on a surface. It will help to monitor water leaks and abnormalities. The device will alert the customer through an audible alarm noise if there is an abnormality, so that the customer/homeowner can take reparative actions. The team is coming ever closer to this goal, having completed the conceptual and design development phases over the past several months. Through this time our sensors have been changed, power sources have been reconsidered, and code has been improved, which have been all been integral in designing and perfecting the product. Now, with a comprehensive design, the team has worked through the prototype construction and experimentation phases for the past three months. The team aims to present a functional prototype of the design by May 3rd and demonstrate it at the "Engineering Showcase".

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Session I: 12:10 to 1 p.m.

UC Forums

## Don't Waste It! An App to Help Reduce Food Waste

DION AMINI and Eric Jiang

The USDA published a report in 2014 finding that 31 percent, or 133 billion pounds, of food in the US went uneaten with a loss value of about \$110 billion solely at the consumer level. Don't Waste It! is an iOS app created to combat food waste and provide a practical tool for users about their soon-to-expire foods. It provides users with an ability to track and monitor their food inventory with the convenience of predefined or custom timing reminders. With a reminder to the user encouraging them to use their food, the user can help lower the levels of American food waste through personal action, saving money, and even reducing the environmental by-products of food waste. Don't Waste It! aims to bring attention to the amount of food waste in the U.S. as well as contribute to the reduction and elimination of food waste.

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Session I: 12:10 to 1 p.m.

UC Forums

## Factors Affecting Environmental Policy Implementation in Democratic States

KELLY ANDERSON, and Andrew Tirrell

I will examine which factors, including Environmental Non-Governmental Organization Presence, International and Political Elite Support, and Media Cycles, most affect public perception of environmental regulatory and climate change mitigation policies within democratic states. I will then create a “checklist” that states may reference in order to move toward improving public perception and enacting climate change mitigation policies. I hypothesize that these factors, or precursor variables, contribute to a public perception of climate change mitigation that ultimately impacts the success or failure of policy implementation.

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Session I: 12:10 to 1 p.m.

UC Forums

## Are Crime Rates Lower in Rural Areas?

HAWI ANGASSA and Alyson Ma

This research explores the different factors leading to increased crime rates but more importantly the model focuses on crime rates in rural versus urban areas. The study examines whether crime rates are more prevalent in urban or rural areas. Crime rates differ across states, but this study will target just the state of California and its specific regions. The study focuses on the increase/decrease in crime rates in rural versus urban areas and uses a panel data as a regression model of the cities in California between 2005-2015. Data will be gathered from the Federal Bureau of investigation, & regional police departments to conduct the research. This study will incorporate past literature to find which factors lead to higher crime rates and utilizes the results to find deterrence measures of crime rates. Crime rate is the dependent variable of the empirical equation and explanatory variables include income, education, pop., unemployment, gun control and a dummy variable for rural. The study expects to get the result that crime rates are higher in rural areas rather urban areas and this can be due to the resources available to rural areas, geographic isolation, law enforcement, availability of guns, and social control.

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Session I: 12:10 to 1 p.m.

UC Forums

## Role Of The Medial Entorhinal Cortex In Odor Sequence Learning In Rats. Biochemical and Biophysical Characterization of Wound Inducible Transcript 3.0 to Investigate Suppressor of Ikk Epsilon Function

CHANELLE ANKENEY, Mariam Dawood and Jessica Bell

Early wound contraction is facilitated by fibroblast migration and is essential in the initial healing process. The cytoskeleton and associated proteins play a role in this migratory system. Wound inducible transcript 3.0 (wit3.0) is a novel cytoskeleton molecule that regulates fibroblast migration and initiates rapid wound closure, as exhibited in the oral mucosa. Wit3.0 is able to dimerize and oligomerize by coiled-coil structures and interact with cytoskeleton networks in oral wound fibroblasts. Wit3.0 shares sequence homology with suppressor of IKK epsilon (SIKE), whose primary function remains unknown. A new signaling pathway identifies SIKE as an alternate substrate to TBK1 and suggests it is potentially involved in the antiviral response pathway. SIKE also forms interactions with cytoskeletal proteins. Based on the shared sequence homology (~70%) and protein interactions between SIKE and wit3.0, we hypothesize that SIKE and wit3.0 will have a similar function. To further compare wit3.0 to SIKE, size exclusion chromatography, circular dichroism, fluorescence-based thermal shift assays, and the building of a potential three-dimensional model of wit3.0 have been completed to determine if these attributes are shared between these two proteins. Confirmation of the shared

biochemical and biophysical characteristics would further support a role for SIKE in cytoskeletal rearrangements and would further suggest that SIKE and wit3.0 work together in the cytoskeleton. By drawing conclusions on how they are potentially alike and the qualities that make them unique, we are able to understand how they assist the immune system in wound healing and immune responses to viral infections.

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Session I: 12:10 to 1 p.m.

UC Forums

## Changing First Year Student Misconceptions about Science

TAYLOR ARCHER and Patricia Kowalski

First year students often begin their college careers with a mixed understanding of science, blending facts with misconceptions. This confusing of information causes an assimilation paradox where the new information taught by professors is disregarded by the student when it does not coincide with their long established beliefs. Therefore misconceptions block the acquisition of new, evidence based information. The primary goal of this research project is to determine the level of student misconceptions and they change overtime. The study will first examine misconceptions about science in general. It will also look at possible correlations between student characteristics and change in their misconceptions. Finally, it will see if this change is related to the LLC program with specific focus on the Natural World group. The project will serve as a foundation for future research as well as lend insight into possible teaching techniques that may enhance the extinguishing of misinformation.

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Session I: 12:10 to 1 p.m.

UC Forums

## Investigation of Peptide Starch Conjugates to Improve Peptides as Drugs

DANNY ARIAS, Francisco Hidalgo, Praveen D. Wickremasinghe, Olnita Martini, Peter Iovine and Joan Schellinger

Peptide therapeutics are a burgeoning area of drug discovery, offering significant advantages over traditional small molecule drugs, such as biocompatibility and low toxicity. Even as peptide-based agents offer a potential doorway into the future of therapeutic medicine, obstacles such as enzyme degradation that reduce peptide-based drugs' bioavailability exist. There are various ways to increase the bioavailability of peptides such as the covalent attachment to polyethylene glycol (PEG), and this chemistry is well established. Our group is focused on the design and preparation of novel hybrid biomaterials composed of peptide and starch, because starch has the advantages of biocompatibility, biodegradability, and lower immunogenicity. Our synthesis centers on a modular platform containing three essential molecules: starch, peptide, and a small molecule linker. We utilize different orthogonal chemical reactions such as reductive amination, copper-catalyzed azide-alkyne cycloaddition or "click chemistry" and dibromomaleimide thiol exchange chemistry to create our conjugates. Two routes of conjugation were investigated. The first involved the conjugation of the end-functionalized starch to the small molecule linker followed by peptide addition. Route two switched the order of conjugation. Each route was investigated to determine the optimal synthetic pathway to maximize the peptide conjugated to starch, ensure peptides would be conjugated under "click" conditions, or in a sterically hindered environment. We have synthesized our initial conjugates and are currently analyzing and characterizing our conjugates by NMR spectroscopy and other analytical techniques. We surmise that the joining of starch to a peptide will impart favorable characteristics to the peptide such as increased physiological stability and biocompatibility. These materials could potentially be used in peptide delivery and more.

## Redefining Griot: From a Timeless Tradition to Modern Music in Senegal

Lynda Balloni and Cecily Heisser

Traditionally, griots, a type of West African bard, were hereditary musicians and storytellers responsible for maintaining their communities' history and singing the praises of the noble class. They were relegated to their endogamous caste by blood, and while they were appreciated for their talents, griots were also looked down upon for their lowly social status. When the region's hierarchical systems were broken up with French colonization, the griot tradition threatened to disappear as the former noble class was replaced with new Western-educated elites. However, in the country of Senegal, griot customs live on both in their original hereditary form and through a new avenue that emerged following their independence in 1960: popular music. By incorporating traditional griot instruments and rhythms, adapting praise songs into popular Islamic music, endorsing or opposing specific politicians and political parties, and generally singing about important social and political issues, popular Senegalese musicians have appropriated the role of the griot and modified it to have relevance in the modern world. These contemporary griots appeal to audiences that appreciate both Western and traditional music and wish to be simultaneously entertained and educated about important social and political events. While modernization continues to threaten Senegalese traditions, trends in the country's popular music have ensured that the griot ethos will endure.

## Memory Formation Within the Rat's Hippocampus

DYLAN BANKS and Curt Spanis

How are memories formed and processed in the brain? This study was designed to experimentally examine one of the most complex mechanisms, that which by the brain processes learning and memory. Extensive studies have demonstrated a specificity of the brain to unique forms of memory formation. The hippocampus is a region of the limbic system that has been shown to play a key role in the acquisition of learning and memory, specifically those involved in the formation of spatial memories. While this is just one aspect of memory, it is key to our survival and thus neuroscientists around the world have devoted their lives to better understanding the complexity of this system. After all, what are we without our memories? The research that I have conducted focused around the effects of Pentylentetrazol, more commonly referred to as Metrazol, on memory formation within the rat's hippocampus. It has examined the effects of Metrazol on both a behavioral and electrophysiological basis. Metrazol has long been used as a central nervous system stimulant, previously administered at high concentrations as a convulsive agent used to treat PTSD, depression, and schizophrenia. While there is a fair amount of literature concerning the possibility of Metrazol as a substitute for electroconvulsive therapy, its applicability to memory formation has only minimally been studied and thus there is a need for further information. This research is a follow up study to the research conducted by Mathew Webb Doust and Christopher Dupre-Rios, both previous research assistants of Dr. Curt Spanis, my current faculty advisor. These studies merit future studies because they have demonstrated that Metrazol has the potential to significantly enhance memory formation and recall when administered at lower concentrations.

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Session I: 12:10 to 1 p.m.

UC Forums

## Risk of Arsenic Exposure at Hiking Trail in San Diego

MARIAH BANKS and Bethany O'Shea

Several arsenic mines were established in Black Mountain Open Space Park during the 1920s due to demand for white arsenic, and no rehabilitation was undertaken after mine closure. Elevated levels of arsenic have been detected using field X-ray fluorescence technology (XRF) along a popular hiking trail within the park. High levels of arsenic were found up to 4000 times greater than the industrial limit, and almost 350 times greater than the average arsenic concentration in earth's crust. Exposure to low or high concentrations of arsenic due to direct consumption or indirect daily intake is known to cause cancer and may be fatal to human health. Risk assessment following EPA protocol has been done for adult and child recreational users of the Miner's Ridge Loop trail. Carcinogenic risk assessment shows a cancer risk for ingestion for both recreational users, indicating dangerous arsenic levels. This study is the first in a series of work to inform management options for the site so as to reduce risk of human exposure.

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Session I: 12:10 to 1 p.m.

UC Forums

## Shackled: How Mass Incarceration Affects African American Families

GRAHAM BENNETT and Kathryn Statler

"This project analyzes the War on Drugs, which has not only done more harm than good, but it has also targeted African Americans across the country. It was not a war against drugs as much as it was a war against the people who were thought to possess them. Mass incarceration skyrocketed in the 1990s, causing many household families left behind struggling to pick up the slack of the member who was behind bars. This struggle continues once released from prison, having to try and live in a society that is structured to work against the offender. A long history of exploitation dating back to the 3/5 clause in the Constitution, has plagued African Americans. African Americans have faced discrimination from the executive, legislative and judicial branches. More recently, a number of Congressional Acts and, court cases led to the current sorry state of affairs, and statistical evidence shows African Americans suffering at an alarming rate that is much higher than other racial groups.

This paper argues that the mass incarceration that resulted from the War on Drugs negatively affected African American families in a variety of ways. Incarceration results in a complete breakdown for family and community left behind, chances of becoming separated from one's significant other increases, and financial support for the family terminates and is linked to an increase in children's aggression. Once labeled a criminal, one can expect to face discrimination in all aspects of society, which can lead to homelessness and state custody of children. "

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Session I: 12:10 to 1 p.m.

UC Forums

## Role Of The Medial Entorhinal Cortex In Odor Sequence Learning In Rats

LINDSAY BENSTER, EDWARD FISHER, ALYSSA MORSE and Jena Hales

The hippocampus is critically involved in the formation and maintenance of spatial memory. Previous research established the role of the hippocampus in spatial navigation and the formation of a "cognitive map", starting with Edward Tolman (1948) and culminating with the Nobel Prize in 2014 for discovering place cells (O'Keefe and Dostrovsky, 1971). The adjacent cortical region, the medial entorhinal cortex (MEC), provides the major projections to the hippocampus and composes the principal gateway between the hippocampus and neocortex. The MEC is also involved in spatial memory (Steffenach et al., 2005; Hales et al., 2014) and possesses spatially selective cells known as grid cells (Hafting et al., 2005). Besides its role in encoding the spatial aspects of memory, the hippocampus also plays a role in encoding the temporal aspects of memory (Fortin et al., 2002) and contains time cells (McDonald, et al. 2011), which are similar to place cells. Although recent studies suggest that MEC inactivations disrupt hippocampal time cells, the role of the MEC in temporal aspects of memory is less known. Our study tests rats with and without MEC lesions on odor sequence learning. We hypothesize that the MEC plays a critical role in the formation of temporal memories, much like its role in spatial memories. This study will contribute to the discussion of the role of the MEC and hippocampus in episodic memory.

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Session I: 12:10 to 1 p.m.

UC Forums

## Changing the Common Misconception That Individuals Repress Memories of Traumatic Experiences

SIERRA BEQUETTE and Jennifer Zwolinski

This poster will summarize psychosocial research that debunks the common myth that individuals repress memories of traumatic experiences. Numerous studies question the myth of repressed memories (Loftus, 1993), showing that trauma actually enhances (rather than represses) memory unless there is partial amnesia as a result of deliberate forgetfulness (Rofé, 2008). Freud first proposed that individuals repress painful or unacceptable memories to protect their self-concept and to minimize anxiety (Myers & DeWall, 2015). Although over three quarters of therapists report using at least one memory recovery technique (Lilienfeld et al., 2010; Poole, 1995), many therapists cannot actually distinguish between accurate memories and false memories. If individuals falsely believe that they could repress trauma, this could lead to false accusations towards a perpetrator and diversionary paths away from any actual trauma (Ganaway, 1989, 1991). Clearly, this myth needs to be changed. Many of the studies summarized in this poster were first presented in the fall of 2015 as part of the Change LLC research symposium for Dr. Jen Zwolinski's Introduction to Psychology preceptorial course. The purpose of the symposium was to "change" members' of the Change LLC's beliefs about this myth. Using this format, I hope to increase awareness about this repression misconception to the larger USD community. I also plan to present new summarized research on this topic.



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UC Forums

## An Environmental Critique of Capitalism

MACAULEY BERG and Mark Woods

I will be addressing the broad set of impacts generally referred to as “the environmental crisis.” I argue that the environmental crisis is truly an “ecological” one, insofar as humans are its primary drivers as well as its primary victims. I then investigate the possibility of there being a structural cause (or structural causes) which produce this multitude of effects. In turn, this leads me to seek out and address the social underpinnings of this problem. I identify capitalism (specifically, its current form of global neoliberal economics) as a major driver of the ecological crisis and explore the relationship between capitalism and environmental practice. As such, capitalism must be broken down into its constituent parts and ideologies. The relevant aspects of this relationship I will address include: capitalism as a process (always in flux, always growing and accumulating, always transcending boundaries), capitalism as a mode of social organization (biopolitics: structuring the way we live in society; economism: structuring the way we talk about, think about, and understand relationships), and the resistance of nature to “commodity fetishism” (nature being broken down from a cohesive Whole and commodified). I will not only explicate the internal inconsistencies of capitalism in relation to environmental sustainability, but I will also explore neoliberal attempts at remediating the ecological crisis and how these are ultimately counterproductive. Lastly, I will explore “political ecology” as a proper and hopeful translation of environmental science into the political realm of policymaking.

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## Christianity vs. Buddhism

TANVI BHATNAGAR and Evelyn Kirkley

The topic that my poster is based on is animal testing through a Christian and a Buddhist point of view. I picked the religions Christianity and Buddhism because they are two religions that have different origins and different morals, which led me to believe that they would have different and fascinating stances on the subject. I picked animal testing as the main topic because it is a practice that is highly debated in society. Since each religion dates back quite a while ago, they both have a modern and a traditional outlook. Each religion consists of a traditional viewpoint that lays down guidelines that support their stance, however both religions also have a modern stance that somewhat contradicts the traditional guidelines. It was extremely interesting to see how exceptions were made as time past because people started to developed a more modern way of thinking. People started to consider indirect results that came from animal testing instead of solely looking at animal testing and not its results. Because this development, both religions say that they condone animal testing but also do not condone it. For Buddhism and Christianity, the traditional outlooks do not condone it but the more modern perspectives do. However, it is the reasons that they use to justify their change of perspective that differ so greatly between these two religions. In this way, these religions share similar views but also differ on specifics.

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## Racism in LGBTQ Community Spaces

NICHOLAS BIHR and Jesse Mills

As the American public celebrated the legalization of same-sex marriage during the summer of 2015, mainstream LGBT civil rights organizations questioned what issues they should tackle next. Simultaneously, these organizations were found to foster a culture rooted in white male-oriented experiences. Additionally, social movements like Black Lives Matter that center the experiences of queer Black women, point to the increased violence transgender women of color faced due to the intersections of racism and heteronormativity, among other institutionalized and interpersonal forms of domination. While consciousness about racism and homophobia are growing, how these dynamics play out microscopically at our current historical moment needs to be explored. Through qualitative participant interviews and autoethnographic accounts of the LGBTQ community and space, the intersections of racism, homophobia, and heteronormativity are explored in the context of everyday life. Ultimately, I conclude that racism, homophobia, and heteronormativity operate implicitly and explicitly in structured relationships and institutionalized organizations, thus needing further attention in LGBTQ organizations and spaces. Rather than simply criticizing organizations, alternative spaces and social connections must be taken into account and explored.

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## Changes in Synaptic Protein Content and Signaling Associated with Post-Synaptic Density Protein 95 in the FMR1 Knockout Mouse

KELLY BIRCH and Peter Vanderklish

Fragile X Syndrome--the most common inherited form of intellectual disability--is characterized by low IQ, impaired social interaction, hyperactivity and impulsivity, and abnormal physical traits including an elongated face and protruding ears. Nearly half of all children with Fragile X also meet diagnostic criteria for autism spectrum disorder. Fragile X is caused by a trinucleotide repeat expansion on the X chromosome, leading to silencing of the Fragile X mental retardation gene (FMR1) and thus lack of expression of Fragile X mental retardation protein (FMRP). As a key translational suppressor, FMRP is crucial for normal neural development and synaptic function. The current study investigated a group of synaptic proteins implicated in both autism and Fragile X that may be over-expressed in the Fragile X brain. Additionally, previous research has shown that these proteins likely participate in a common signaling cascade that functions abnormally in Fragile X. Using the FMR1 knockout (KO) mouse, I validated that these proteins were up-regulated in KO mice compared to wild-type (WT) and discovered that the downstream signaling molecules in this complex of proteins are modulated by the same neurotransmitter receptor systems that lead to exaggerated long-term depression in Fragile X. Finally, I am currently preparing to conduct functional assays of the final product of this protein complex using synaptoneuroosomes.

## Water War: The Hidden Benefits of Los Angeles' Acquisition of the Owens River

CONOR BRANDT and Iris Engstrand

While the Owens River Valley was known for its agriculture in the first half of the 20th Century, today, the valley's economy is primarily based on the numerous recreational opportunities that the area's natural resources provide. This recreational economy was only able to establish itself after Los Angeles began diverting water from the Owens River in 1913. In order to obtain water rights from the many small town farmers in the Owens Valley, Los Angeles had to undermine a federal irrigation project, in addition to purchasing valley properties. Los Angeles' negotiating tactics would create hostility that valley residents still share towards the city, which has produced numerous publicized protests against Los Angeles. Los Angeles would eventually outlast and put down valley resident protests in the 1930s, which allowed the city to expand and divert multiple watersheds in the Eastern Sierra without regard for the effects the water diversions had on the valley's agriculture or environment. Ironically, due to the media coverage, many people began visiting the valley. The combination of the establishment of a recreational economy and a new environmentally aware public resulted in extensive legal battles between Los Angeles, environmental groups, and valley residents to regulate Los Angeles' water diversions in the 1970s. Environmental groups and valley residents feared that continued unregulated water diversion by Los Angeles would lead to even worse environmental degradation. As a result of those legal battles, the Owens Valley is now thriving environmentally due to conservation measures put in place to help protect the regions recreational economy.

## Mother-Toddler Relationship Quality and Maternal Strategies Work Together to Predict Toddler Cooperation

ROBERT BREWSTER and Adriana Molitor

The present study examined relations between maternal behavior and mother-toddler relationship quality in predicting toddler compliance during a laboratory-structured control situation (toy clean-up). Past research shows that a mutually responsive, positive, and synchronous relationship promotes a genuine interest in compliance among young children. For toddlers with these high quality relationships with mothers, a situation such as toy clean-up may be viewed as a reciprocity task because children have a genuine interest in compliance due to histories of mutual accommodation. For many dyads, however, toy clean-up reflects a control task where goals conflict. In the latter situation, more immediate maternal behavioral strategies may be responsible than relationship history in promoting young children's cooperation. In the present study, we examined how maternal behavioral strategies work together with relationship quality in predicting cooperation levels in a sample of 106 30-month-old toddlers during toy clean-up. Mother-child relationship quality was assessed during two minimally controlled and non-goal-oriented situations: snack break and picnic play. During the clean-up task, we coded toddler cooperation levels and two types of maternal behaviors that reflected theoretically distinct features: autonomy support vs. control and structure vs. ambiguity. Findings revealed that greater maternal autonomy support and structure both predicted increased toddler cooperation. Interestingly, toddlers with lower quality relationships with their mothers seemed most sensitive to maternal behavioral strategies. That is, these toddlers were the least cooperative when their mothers were high in control and ambiguity yet they showed the highest levels of toddler cooperation when their mothers were autonomy supportive and/or structuring.

## A Summer in the U.S. Department of State's Bureau of Educational and Cultural Affairs

HAYLEY BRUDISH and Matt O'Rourke

During the summer of 2015, I interned at the United States Department of State in the Bureau of Educational and Cultural Affairs. My direct placement was in the Youth Programs Division of the Office of Citizen Exchanges. During the course of my internship, I was able to work on varied projects with over two dozen staff members throughout the Office of Citizen Exchanges, including professional, youth, cultural and sports exchange programs. In Youth Programs, the focus is on the next generation, targeting secondary schools to promote mutual understanding, leadership development, educational transformation and democratic ideals. I had the opportunity to somehow be involved with every youth program offered. My duties included drafting short articles highlighting program activities, analyzing student surveys and interviews, assisting program officers in preparing grant packages for review on Capitol Hill, editing documents and presentations, managing event logistics, and preparing briefing papers for high level officials, among others. I was also able to attend meetings and events on Capitol Hill and with private-sector partners. Interning in the summer was a huge advantage because many programs were coming to an end or just beginning, so I was able to personally interact with many of the participants. My supervisor encouraged me to work with other divisions that I was interested in, allowing me to prepare for and attend President Obama's Young African Leaders Initiative (YALI) Summit with the Mandela Washington Fellows, learn about the Fulbright Program, experience the SportsUnited initiative, and so much more.

## Fighting the Overuse of Antibiotics on Factory Farms

ELESSAR BRUGGER and Loren Whitaker

Working to stop the overuse of antibiotics on factory farms is no easy task to accomplish. My internship with the Fund for the Public Interest, a national nonprofit, advocates for making a real difference to stop the widespread misuse of our nation's antibiotics. Working with California's Public Interest Research Group, we go door to door in San Diego educating and mobilizing public support in order to raise awareness about this issue while simultaneously fundraising for the campaign efforts. Every year out of the 2 million Americans that get sick, 23,000 die from antibiotic-resistant infections. Up to 70% of antibiotics sold in the U.S. are given to livestock animals on a daily basis, usually when they aren't even sick. This is leading to the increased risk that antibiotic resistance is spreading through these animals and then into humans as we consume antibiotic raised meats. On this campaign, we are specifically targeting large fast food chains like KFC and In N Out to call for change and stop buying from these factory farms. Learning about the power of money in large agricultural companies and the politics of implementing change has been an enlightening experience. My passion for speaking with people about issues I care about is nurtured with this internship with the Fund, along with my desire to learn about the different ways grassroots efforts can create change.

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## Finding the Emerald City: Environmental Sustainability and the Growth of Urban Environments

CAROLINE BUYAK and Alyson Ma

The phenomenon of urban living has prompted inquiries from economists for years. The purpose of this paper is to explore the net migration rate of US cities, and the most important determinants for consumers when deciding to live in these urban environments. According to Glaser, Kolko and Saiz (2000), the key to the growth of dense, urban areas is to attract high human capital consumers. This type of consumer is attracted to an urban environment based on the amenities offered, and are weighted in contrast to the diseconomies that are associated with city living. One amenity in particular is the introduction of sustainable initiatives, as well as “green space” available in the metropolitan area. This paper will examine the relationship between green policies and the net migration rate of a city, using a regression model. County data gathered from the fifty largest cities in the US will be used to regress the net migration rate of these cities against an environmental index, as well as control variables such as per capita income, education level and urban rent prices in the corresponding city. Much research has been done the subject area of urban migration, but the impact of environmental initiatives on the growth rate of cities will serve as a new contribution to this topic. As it follows, policies that implement green initiatives should attract high human capital consumers, and spur the migration rate of cities.

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## The Digital Mediation of Female Cyborg Consciousness

VINCENT CABRAL and Maura Giles-Watson

In this project I explore the representation of the female cyborg in a Japanese anime, and theorize the influence of mass media on contemporary understandings of what I see as utilitarian female cyborg consciousness. Through Haraway’s “A Manifesto For Cyborgs” and a Marxist framework I theorize and critique technological progressivism’s notion of the female cyborg as an idealization of post-modern human experience and enhanced productivity. In so doing, I argue that “she” is the representation of abject social groups whose subjectivity has been displaced by threads of technological dominance in a new digitally mediated form of cultural oppression.

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## Analysis of Impact of Thermocline on Vertical Distribution of Barnacle Larvae

HALEY CAHILL and Nathalie Reyns

Barnacles are considered a model species in marine science, because their life cycle is representative of that of most marine organisms. However, information related to the interaction of larvae and their navigation of near shore waters is lacking, especially as most of what is known is only for a few select species. This study focuses on exploring the relationship between vertical thermal variation and the concentration of the nauplii (early) larval stage and the cyprid (late) larval stage of barnacles. Samples were collected at a 5m deep station near the rocky intertidal by Bird Rock, California using a plankton pump to obtain larvae from different depth intervals (0-1m, 1-2m, 2-3m, 3-4m, 4-5m). A CTD was used to measure the temperature at all of the depths where plankton were collected. Sampling was repeated during June 2015. In samples collected during which there was no well-defined thermocline, most of the nauplii (early) stage larvae were located at the shallower depths (0-2 m) and the cyprid (late) stage larvae were found in the deeper depths (3-5m). In samples with a well-defined thermocline, the nauplii (early) stage larvae, were mixed into the water column reaching slightly deeper depths (0-3m) and cyprid (late) stage larvae were more evenly mixed in the sample, but with the general distribution still deeper than the nauplii. Understanding the vertical distribution of larvae is important, as their depths can determine how they become transported in coastal areas.

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## Survey Design to Conduct a Validation Study on a Health Promotion Program

BRIANA CAPUCHINO and Stephen Pearlberg

Wellness and Health Promotion (WHP) programs are believed to provide many benefits to the workplace. While organizations seek to improve the health of their employees, many healthcare providers and insurers support these efforts by subsidizing program budgets in order to reduce their long-term costs. However, research suggests that WHP programs affect worker productivity, satisfaction, and presenteeism only modestly, at best. Current research was proposed as an assessment of a private university's recently introduced employee WHP program. After attending an informational seminar, employees' immediate perceptions were measured with a brief survey. However, in-depth analysis of employees' responses to these surveys indicated the need to construct a more diagnostic instrument. This new questionnaire was developed to identify the strongest and weakest aspects of each informational seminar and to assess the validity of the entire program.

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## Environmental Impact of Air Travel as Related to Major League Baseball

CORMAC CARDWELL, MARIAH BANKS, MARY CHIPMAN and Michael Catanzaro

One of the largest sources contributing to carbon emission is from air travel and transportation. Air travel emissions currently account for approximately 2.5% of carbon emissions and are expected to rise drastically in the next decade due to the increase in air travel demand and less rapid fuel efficiency improvements. Air travel is an inevitable part of operations, especially when the goal of an organization such as Major League Baseball (MLB) is contingent on competition across the nation. This study sets out to examine the average carbon emissions from air travel of a standard MLB team in a season. Acknowledging that such emissions are unavoidable in the organization's success, carbon emission impacts must be studied. Through this study, carbon emission mitigation efforts will be identified with the intent that potential implementation may improve Major League Baseball's carbon footprint.

## Spirituality and the Outdoors: A Heightened Experience

FRANCES CASEY, Emily Reimer-Barry and Lance Nelson

From the theological perspective, I plan to examine the works of the Church and religious figures, Christian mystic writings and the works of prominent nature writers to identify why the outdoors allows for a heightened spiritual experience. I will also examine how this heightened experience within nature charges Catholic Christians towards environmentalism within the modern context, now coined as the field of ecological theology. My approach will primarily consist of a literature review. I will read and identify relevant passages from Church teachings, including *Laudato Si* and the Bible. The majority of my religious writings will be drawn from the Catholic Christian perspective and draw upon notable figures, such as St. Francis of Assisi. The nature writings I will draw from include biographies and autobiographies of notable figures, such as John Muir. I aim to draw upon the commonalities between religious writings and nature writings to identify common language and perceptions on how being in the outdoors allows for a heightened spiritual encounter. Much of my research will emphasize the double effect of being surrounded by natural beauty as one level and opportunities for spiritual encounters as the second level. I will synthesize my findings across these different domains to formulate a collective approach that describes these commonalities and provides a deeper understanding of why the outdoors allows for a heightened experience. From here, I will expand outwards to address how this affects the actions of Catholic Christians today.

## Growing Up White- Stories of Mixed-Race People

CELINE CASTILLO and Jesse Mills

An often overlooked group within the racial experience in the United States, mixed-race people have struggled to find a place of community and acceptance in this severely divided society. Their place in this structure is impacted by many factors in our mono-racial society, like their ability to abide by cultural norms, traditions, and languages. People who are half white and half non-white experience a different set of norms than most of society because of their complex relationship to white privilege and racial marginalization. When mixed-race people grow up enmeshed within their white culture, they experience further displacement from their non-white identity and can struggle to feel accepted. Additionally, they may have a harder time recognizing the differential treatment and micro-aggressions that they experience as non-white. Using oral history and auto-ethnography, this study examines how growing up in the mono-racial, white-dominated culture of the U.S. as a mixed-race person of color impacts one's notions of and values pertaining to beauty, belonging, and self-worth. By gathering information from one-on-one interviews and by re-examining my own mixed-race story, I argue that mixed-race voices help us understand racial formations in the U.S. better, and thus must be un-silenced. Mixed-race stories can help us create a more inclusive society that deals with issues of racial inadequacy.

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## Rædende Iudithðe: The Heroic, Mythological and Christian Elements in the Old English Poem “Judith”

JUDE CAYWOOD and Joseph McGowan

This thesis is devoted to the Old English epic fragment “Judith,” which was composed in the 9th or 10th century. The poem is now contained within Cotton Vitellius A.xv, also called the “Beowulf manuscript,” and it follows that famous work. Based on the biblical “Book of Judith,” which tells the story of a Jewish heroine’s defeat of the fearsome Assyrian general Holofernes, this Anglo-Saxon adaptation reworks the tale to fit within its own literary and cultural traditions and historical situation. This project argues that the title character arises from the complex multicultural forces that shaped Anglo-Saxon society, positing that she exists between the mythological, the heroic and the Christian. Simultaneously Christian saint, Germanic warrior and pagan demi-goddess or supernatural figure, Judith arbitrates amongst the seemingly incompatible forces that shaped the poet’s world, allowing the poem to serve as an important site for the making of a new Anglo-Saxon identity, one which incorporates these disparate yet co-existing elements to form a new English national identity. Judith becomes a single figure who is able to reconcile these opposing forces within herself, doing important cultural and spiritual work for the world for which the poem was written. In addition, the project involved a full, original translation of the 350 line text of “Judith” from Old English to Modern English.

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## Synthesizing Synergy: Exploring the Relationship Between Economic Development and Environmental Degradation

MATHEW CERF and Alyson Ma

This paper will investigate factors affecting the relationship between economic development and environmental degradation developing countries. Variables introduced to this model will include factors of institutional quality, financial development, and international action around climate change. The framework for this research builds off of existing research on the topic and on the “environmental Kuznetz curve”, an inverted U-shaped curve showing the relationship between economic development and environmental degradation. Results will be of import for governments wishing to promote policies that allow for economic development that does not come at the expense of the environment and the state’s natural resources. In broader terms, this research will work towards explaining how to achieve sustainable development.



## The Expression of Polymeric Immunoglobulin Receptor in Larval and Adult Zebrafish

MARIA CHACON, ALAINA STUDDT and Valerie Hohman

Mucosal immunity helps maintain the integrity of epithelial linings, which are the most susceptible to infection. Antibodies in the mucosal layer bind to pathogens to prevent them from infecting the organism. Antibodies are not synthesized in mucosal secretions and require the polymeric immunoglobulin receptor (pIgR) to transport them to the mucous where they form the first line of defense against pathogens. Although pIgR is vital to the immune system, its expression in lower vertebrates has not been fully characterized. Our research focuses on characterizing pIgR in larval and adult zebrafish. Zebrafish are a model organism for immunological studies as their development and genome are well documented. The embryos and larvae of the zebrafish are also clear and develop quickly, which facilitates developmental research. To confirm the sequence previously identified by our lab codes for pIgR, in situ hybridizations of tissue sections from adult zebrafish are being performed to identify specific cells expressing this sequence. Based on pIgR function, we expect expression in the epithelium of the gill and intestine. In the larval zebrafish, whole mount in situ hybridizations are being performed to characterize the temporal and spatial expression of pIgR during early development. This research will provide insight into the evolution of mucosal immunity in lower vertebrates and could be beneficial for agricultural aquaculture. By understanding the development of mucosal immunity in fish, better vaccine strategies to protect fish in fisheries could be developed.

## Permanents Foreigners: The Effects of Exclusionary Policy on Chinese Migrants in Mexico

LUCERO CHAVEZ and Vidya Nadkarni

This research seeks to assess the effects of immigration policy in the formation of border identities and the racialization of the border, specifically the US-Mexico border. In analyzing the effects of migratory policy, I will be taking the experience of Chinese immigrants who settled in Mexico after being repelled from the United States through legislation like the National Origins Act of 1924. The case of the Chinese population in Mexico is particularly interesting since much of their settlement can be attributed to their failure to enter into the United States' system. The resulting marginalization of the Chinese migrant community in Mexico, who in many cases are continuously perceived as permanent foreigners despite their attempts to integrate, can be paralleled to the experiences of Mexican immigrants in the US, who also find themselves in the fringes of society. In addition to reviewing the intended and unintended consequences such legislation affecting border populations, the rationale of the United States for implementing such legislation in the first place will also be questioned. . Although this is a multi-national study, the focus will be mainly on legislation passed by the US and its effects within and across its borders. The hope of this study is to better understand the social consequences of migratory policy on affected minority groups in order to foster greater consideration of these consequences in future migratory policy actions, especially in the case that exclusionary policy is considered.

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## Web-Based Deegan-Packel Power Index Calculator

MINGYU CHEN, ANNAN WANG, Jane Friedman, Cameron Parker and Eric Jiang

Voting game is widely applied in political bodies, stock companies and economic organizations. For this project, we implement a web-based Deegan-Packel power index calculator. Deegan-Packel power index is one of ways of measuring power in weighted voting games which the preferences of some voters carry more weight than the preferences of other voters. Deegan-Packel power index focuses on the minimal winning coalitions, which has the property that removing a single player from such a coalition changes it from a winning coalition to a losing coalition. User can calculate the power of each voter by entering specific data. Besides, the calculator is able to generate data automatically based on user's requirements, in order to solve some mathematical problems.

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## Zooplankton Community Composition And Gut Content At Two Southern California Sites

MARY CHIPMAN and Jennifer Prairie

A critical element to understanding climate change is the marine carbon cycle, which is driven by carbon fixation by phytoplankton and ultimately the fate of this carbon after it enters the planktonic food web. Drawing from previous work, this study seeks to gain insight into the role of copepods in the marine carbon cycle. To gain such understanding this study focuses on relative abundance and gut content analysis of zooplankton at two Southern California locations. Our observations revealed that relative abundance varied between the two sites and that the larger of two species of copepods (*Calanus pacificus*) had a greater chlorophyll gut content. Relative abundance was studied in conjunction with physical parameters for each site; However, nitrate levels were only found in trace amounts and salinity, temperature, and density profiles were only observed at one sample site. Further research in this area should include greater replicates of the gut content analysis performed, consideration of more climatic variables, and more specific identification to better understand the connection between zooplankton and the marine carbon cycle.

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## Action Selection Processes in Courtship and Sleep Co-Regulation

VICTORIA COLEMAN, Shalin Shah and Divya Sitaraman

Basic behaviors such as reproduction, sleep, feeding, and aggression are critical to survival, and are conserved across species. However, these behaviors seem to be incompatible; that is, an organism typically cannot perform two of these actions simultaneously. The simplest of organisms are capable of prioritizing these behavioral options based on the environment and their internal motivational state. Studies further show that the human brain was not originally evolved to multi-task (1). Clearly, decision-making processes that allow an organism to select an action (e.g. eat or sleep) are integral to our functioning, though not well understood in any organism. This research aims to obtain a better understanding of the basis of control for key decision-making and action selection processes in the brain. In order to do so, we will focus on an experimental model system where we can not only observe this behavioral prioritization process, but also study the neurons involved in this selection. Specifically we will focus on how two incompatible behaviors, sleep and courtship, are controlled in the fruit fly, *Drosophila melanogaster*. By testing connectivity between the sleep and courtship neuron circuits, we hope to identify a simple switching model that might provide a new framework for understanding the neural basis of decision-making and action selection. The motivation to study these behaviors stems from the wealth of information available about the neurons involved and the ability to manipulate both neurons and genes in the fruit fly.

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## Where's the Money Going?

WILLIAM CONSIDINE and Alyson Ma

This research project will discuss the effects of school spending, among other variables, on student outcomes using the recent Common Core dataset to differentiate itself from previous research in the area. By using propensity score matching and a dummy variable for union power at the regional level, this research will also attempt to provide a compelling comparison between regions of the effects of union power on the efficiency of school funding.

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## Worth The Tax Breaks: The Economic Impact of an NFL Franchise

ANTHONY CONSTANTINO and Joey Gabaldon

The NFL often boasts that cities lucky enough to host teams will be rewarded with huge economic impacts, often in the hundreds of millions of dollars. Much of the economic research, however, currently shows that these cities should not jump to conclusions so quickly, since often tax payers are asked to foot a portion of the bill for new stadium building in the vicinity of \$10 million a year. The new push is to include business districts near the stadiums that lure people for 365 days a year and not just on game day. My project seeks to take a look at the increase in jobs and wages surrounding the area of these business districts enough to outweigh the influx of taxpayer money.

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## Teens Perceptions of Control Through Social Media Usage

OLIVIA COREA, Olivia Gonzalez, and Susannah Stern

This project aims to explore and understand how perceptions of control impact teens' identity and image through social media use. We know that in addition to the feedback that teens get through likes/comments on their posts on social media, the posts that others (friends, family, classmates, etc) create about them also contributes to a teen's identity. This contribution can feel positive or negative, depending on if the type of image and identity that is being created for them aligns with their existing identity standards. Teens exert control over who they befriend both offline and online. In this project the domains of control that social media usage can be understood through are explored. Teens can curate their profile on a social network site that offers friends/viewers the version of themselves that they want to broadcast, one they are proud of. Teens are aware that their actions can be immortalized on the Internet and they navigate life feeling responsible about what they do/who they do it with so that their social media image reflects that.

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## Book Reviews By a Guy

THOMAS COTTER and Scott Lungergan

I am starting a Youtube channel called "Book Reviews By a Guy". This project shows how I grew my business and subscriber base from scratch. I am investing my own money in this business and the data describes real world results. My goal is to get younger kids into reading.

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## Determining Shapley-Shubik Power Distributions for Proper Weighted Voting Games with No Veto Power

JASON CLAPP, TAYLOR COURY, KRISTIN DESPLINTER, ASHLEY DUNN , ROBERT FITZPATRICK, SAUL GARZA, MELINDA GRAD, LIA HERBERT, MAEVE MCCL ATC HEY , ERICK PEREZ, JORDAN READYHOUGH, KATHRYN REGAN, SHEA RICKETTS, MATTHEW SAIKI, BRYCE WIMBE RLY and Jane Friedman

"In voting, there are situations where there is a certain number of votes, a quota, required to pass a piece of legislation or bill, yet each voter may have a different number of votes. For example, think of a Board of Directors of a corporation voting on an initiative. How can power be measured between a board of directors based on the number of votes each individual has? To measure the power distribution in a weighted voting situation such as this, we use the Shapley-Shubik Power Index which measures the power based off the order each individual votes. Here we explore different possible power distributions for situations with small numbers of voters.

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## Fish Productivity in the Pacific Ocean Throughout the Miocene

JOSE CUEVAS, Elizabeth Sibert and Richard Norris

We used ichthyoliths (fossil fish teeth) as a means of reconstructing fish productivity in the Pacific Ocean throughout the Miocene Epoch (25-5 Ma). We observed higher degrees of variability throughout this Epoch in comparison to older records, and found that the North and Equatorial Pacific sites displayed comparable levels of fish productivity.

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## Familiarity of Engineering First-Year Students with Information Literacy Concepts

JULIAN CUOMO, KATHRYN FORSYTHE, MELANIE KLIEGEL, CHANDLER ROGERS, ALEX SPILDE and Frank Jacobitz

The purpose of our research project is to gage the familiarity that first-year college students in the engineering program at USD have with the concepts of information literacy. According to the United States National Forum on Information Literacy, information literacy is the ability to know when there is a need for information, and to be able to identify, locate, evaluate, and effectively use that information for the issue or problem at hand. In order to evaluate the students' understanding, we gave a lecture to the students enrolled in five sections of a first-year engineering course. Topics that were covered in the lectures included: the definition of information literacy, data smog, applications of information literacy, practice using websites and databases for research, and how to create citations. An important component of the lecture materials were pre and post lecture surveys that we used to collect data about an understanding of information literacy concepts and the ability of the presentations to teach basic principles of information literacy. Through the analysis of our surveys it became obvious that among first-year engineering students little to none of them understand concepts of information literacy or even know what information literacy is. However, using our post surveys, we noticed a significant increase in the understanding of the core concepts of information literacy. For example, the average student rating of their familiarity with information literacy concepts on a 7-point Likert scale increased from 2.268 on the pre-survey to 5.929 on the post-survey.

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## Effects of Tree Species Composition on Carbon Sequestration in Tropical Cattle Pastures

JULIE CURTIS and Achim Hagar

Agroforestry has a potential to reconcile agriculture and greenhouse gas emissions by carbon sequestration and storage. An important factor for carbon storage in cattle pastures using agroforestry is tree species composition. This research was conducted in an effort to understand the relationship between carbon storage and tree composition so that the best strategies for agroforestry can be taken. Research was conducted in November 2014 on three cattle pastures with trees in Atenas, Costa Rica. Trees with a diameter >5 cm were measured and identified using a clinometer on 1 hectare for each site. Allometric equations were used to estimate above ground carbon (AGC). AGC was estimated using allometric equations. Pairwise Bray-Curtis similarity indices and Principle Component Analysis (PCA) were used to analyze species composition on 10 0.25 hectare transects across all sites. Data was collected on the tree dimensions and the AGC using allometric equations in order to understand the effects of tree composition on carbon storage. The statistical analysis proved that there was a significant relationship. By understanding the effects of species composition on carbon sequestration, greenhouse gas mitigation and agriculture can have a more symbiotic relationship.

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## Using an Engineering Design Experience in the 6th Grade Curriculum to Promote Interest and Learning in Science, Technology, Engineering, Arts and Math

RISHIKA DARYANANI and Odesma Dalrymple

The engineering design process allows students to interconnect science, technology, engineering, arts, and math (STEAM) concepts to transform simple ideas into complex multi-disciplinary systems, such as Rube Goldberg machines. The STEAM Machines™ curriculum has been developed and refined over the past 6 years by scholars in the fields of engineering education and gifted education. It includes a series of instructional units that integrate science, technology, engineering, arts and math (STEAM) topics. In Spring 2014, a partnership between a southwestern university and a local elementary school district resulted in a customized model of the STEAM Machines™ curriculum designed for use with 6th graders from two elementary schools. The modified curriculum was implemented within the classroom over a week. A total of eight 6th grade classes participated in the experience. The 6th graders engaged in the curriculum for 3 hours per day for five days. The resulting STEAM Machines Project curriculum focused on the application of the engineering design process to the designing and building of chain reaction machines, with 30 - 60 minute instructional modules on the engineering design process, teaming, and testing for reliability. This poster describes the details of the implementation of the STEAM Machines Project. Evaluation results are also included based on pre/post-tests completed by students on STEM concepts such as simple machines, energy, electrical circuits, reliability, and engineering design process knowledge.

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## Machinery of Green: The Topography of Environmentalism and Deep Ecology

BRAD DAVID and Molly McClain

I begin by investigating the niche of mainstream environmentalism within the global capitalist system. Neo-liberal, late-capitalist environmentalist strategies may crusade against the exploitative, industrial machine, yet ultimately exist within a larger framework of socio-economic domination of nature. In other words, capitalism is antagonistic to truly effective environmental efforts. Furthermore, green consciousness has infiltrated the consumer market; now the individual can enjoy the union of sustainability and capitalism. Green consumerism constructs and sells the experience of nature and environmental redemption, while ultimately perpetuating an anthropocentric stance towards the Otherness of nature. Second, I explore the ontological, social, and political root systems of deep ecology. In addition to the work of impactful deep ecologists, I examine poetry, film, and literature that offer insight to the deep ecology landscape. From an ontological standing, where pure reductionism abandons language itself, how do ecologists try to illustrate monistic understanding between the human and nonhuman? On a more macro-level, I examine how deep ecologists think about the Space of Nature; how they succeed and fall short in destroying the proverbial dam--the binary--between nature and culture; and how radical environmental groups are symptomatic of Marxist threads within deep ecology. Lastly, I explore nature myself. To offer solutions to the antagonisms of environmentalism or the incongruities within deep ecology is not my intention, nor is it to present some personal manifesto. Here, rather, I scrutinize nature through the lens of studium and punctum as developed by Roland Barthes, and comment upon the growing sybaritism of environmentalism.

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UC Forums

## Income Elasticity of Insurance in the United States

BRANDON DE CAUSSIN and Alyson Ma

Increases in income do not uniformly relate to increases in insurance penetration and density. These are two leading indicators for the development of the insurance industry in a country. This project researches trends across the United States that influence income elasticity of insurance in each state. The effect income has on insurance penetration is an important relationship to research because understanding the shape and relationship at the state level can help determine the potential size of the insurance market in any given state. This research focuses on life insurance premiums, and reveals an s-curve affiliation between insurance penetration and per-capita income. This better understanding of income elasticity of life insurance can lead to more accurate risk profiles and forecasting of the insurance industry.

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UC Forums

## Reflections on the Immersion Process of the Medical and Public Health Brigade in Nicaragua

CHRISTY DENOVA and Kevin Guerrieri

This study details my observations and reflections about the immersion experience of the University of San Diego's Global Brigades trip to Nicaragua in January 2016. The student preparation consisted of a trip orientation, an onsite delivery of activities while in Nicaragua, and a post-trip reflection. The main objective was to reflect on the immersive experience of students and elucidate process improvements for the next trip. As part of my methodology, I collected information and observations in a fieldwork journal over three stages: First, during the trip preparation sessions; second, as I was in Nicaragua following the primary care medical and public health service; and third, after I returned from the trip to Nicaragua. My general observations and reflections suggest that the students were committed to participate, open to collaborations, and aware of the purpose of the trip. Students were eager to shadow medical providers with open-minds;

however, students over-estimated the impact of their own service. Some participants were focused on their own outcomes for career development while others more authentically developed. I noticed that students did not have strong Spanish-language skills, knowledge of medical practice methods, or enough understanding of the history and culture of Nicaragua. These skills would have allowed them to better engage in this brigade. This brigade experience allowed students to apply classroom concepts to real dynamic patients. My reflections led me to continue to question if students merely broadened their perspectives or if they will continue to embody the values they learned abroad.

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## Internship with the Climate Action Campaign

DENAE DEFOREST and Sarah Gray

The Climate Action Campaign works to adopt and follow a Climate Action Plan (CAP). These CAPs outline the kinds of pollution that are emitted by the city government as well as the city at large. It aims to put strategies and policies into place that can secure a brighter future for our climate by eliminating the harmful pollutants. I began my internship just as San Diego itself used its CAP to commit to running on 100% clean energy. In light of this recent success, the Climate Action Campaign is working with surrounding cities to create a unified county on clean energy. My role as an intern involves the compiling of any previous CAP or clean energy legislation to see where the surrounding cities currently stand with their policies.

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## Appetitive and Aversive Learning in *Drosophila* Larvae

ALLISON DEHART, Austin Pavin and Divya Sitaraman

Learning can be defined as the use of past experience to change or adjust a behavior. Learning is conserved across species and can therefore be studied in relatively simple experimental systems and applied to more complex organisms. While learning is observed in all species, the mechanisms underlying it are not well understood. Using *Drosophila melanogaster* (fruit fly) larvae as an experimental system, we conducted two-odor reciprocal training to study associative learning. This training involved exposing a group of larvae to an odor (A) paired with a rewarding food stimuli (fructose), and subsequently exposing them to a second odor (B) paired with no reinforcing stimuli. Separately, a second larvae group is reciprocally trained such that odor B is paired with the reward while odor A is not reinforced. After repeated training periods, the larvae are exposed to both odors and their preference index is observed and calculated. The broader goal of the assay is to observe and identify novel genes and pathways important for learning and memory formation.

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UC Forums

## The Economic Impact of the Mountain Pine Beetle Epidemic in Colorado

ADAM DEJONG and Alyson Ma

The mountain pine beetle is an invasive species that has caused an epidemic in the forest areas of the Western United States. The mountain pine beetle kills the tree but still making it usable for commercial production. There are 19.7 billion cubic feet of standing dead trees, which has caused concern for policy makers in the states effected because it has caused an increase danger to the population due to the increase danger from fire and falling trees. Many policy makers are pushing to increase the salvaging of trees and selling them to local mills. I want to look at the state of Colorado and how the salvaging the dead wood affected by the mountain pine beetle has impacted the economy during the epidemic. I will be looking at the change of employment, the revenues and expenses for salvaging and the mill growth.

## Economic Cost Minimization Due to Congestion Pricing Implementation on Public Roadways

CHRISTIAN DI SCALA and Alyson Ma

Traffic congestion in major arteries of national highway systems and city centers negatively impact the economic productivity of major municipalities throughout the country. Without a method to limit the demand via a price mechanism, traffic congestion will continue to be a problem. The economic consequences of a labor force unable to produce goods and services, transit unable to quickly move from origin to destination, and increased carbon emissions burned into the surrounding environment strain the economy. The national annual cost of traffic congestion in the United States is approximately \$216.6B. Though a significant negative externality, this expense can be minimized by the implementation of market-based approaches that have been in use in major international hubs for more than a decade. These mechanisms, such as the implementation of mandatory dynamically priced toll-ways on highways and urban centers to alleviate demand pressures and increase efficiency have the ability to decrease travel times, increase local production, and decrease carbon emissions. This presentation will be founded on an analysis of congestion pricing in London and Singapore and the economic viability of implementing similar approaches to urban centers in the United States. With a bivariate analysis of economic benefits derived dynamic highway pricing and static cordon pricing in American municipalities, it will be posited that congestion pricing on public roadways is a viable way through which local economic benefit can be increased.

## Exploring Mental Health Provider Characteristics and Organizational Climates

CHRISTOPHER DISHOP, Gregory Aarons and Amy Green

Limited funding, increased client demands, and frequent organizational change lead to increased organizational stress and burnout among mental health providers. In two studies, we examined the moderating effect of organizational climates on the relationship between provider characteristics and commitment to their organization, including turnover. Over 300 mental health providers from 49 community mental health programs completed surveys assessing individual and organizational characteristics. Study one examined the moderating role of stressful climates on the relationship between provider adaptability and organizational commitment. Stressful climates significantly moderated the relationship, with more adaptable providers less committed to their organization when stress was high compared to less adaptable providers. Study two examined relationships among emotional exhaustion, functional organizational climates, work attitudes, and turnover. Functional climate moderated the relationship between emotional exhaustion and work attitudes, and work attitudes marginally predicted turnover. Findings reveal the importance of assessing organizational climates and provide mechanisms for retaining favorable employees.



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## Internship at Atkinson, Haskins, Nellis, Brittingham, Gladd & Fiasco: Insight into the Legal Field

KATELYNSAM DIXON and Walter Haskins

This presentation contains the highlights of my internship experience at the law firm of Atkinson, Haskins, Nellis, Brittingham, Gladd & Fiasco. Located in Tulsa, Oklahoma, the firm specializes in a wide variety of areas in litigation, including insurance and corporate defense. Over the course of intersession, I was given the opportunity to intern at the corporation and gain experience in the legal field due to my possible career interest in law. While at the firm, I observed pre-trial conferences and depositions as well as performed other tasks around the office, such as writing medical narratives and reviewing documents. I also had the chance to interview several individuals in different positions at the firm and gain a greater understanding into their profession. This experience has opened my eyes to so many more career possibilities within the legal field, and has also provided me with greater insight into choosing what type of future career to pursue.

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## Suppressor of IKK epsilon (SIKE): the Intersection of the Cytoskeletal Network and the Innate Immune Response

EMERALD DOHLEMAN, HANNAH STEELE, HALIE SONNENSCHNEIN, FLOWREEN SHIKWANA, Jilan Knoblauch, Kenneth Lawrence and Jessica Bell

The innate immune system rapidly responds to challenges by pathogens via activation of an inflammatory response. As a convergence point for multiple inflammatory and anti-viral signaling pathways, TANK binding kinase 1 (TBK1) serves as a catalytic hub to initiate host defenses. Suppressor of IKK epsilon (SIKE) is a newly identified TBK1 substrate. The goal of this project was to identify the function of SIKE within the host's anti-viral response. Co-immunoprecipitation & tandem MS/MS analyses of the SIKE interaction network identified several interactions with cytoskeletal components. Immunofluorescence assays of endogenous SIKE with cytoskeletal markers and colocalization analyses indicated that SIKE colocalized with tubulin, actin, and alpha-actinin. Reciprocal immunoprecipitation (RcIPs) studies confirmed the SIKE:tubulin and SIKE:alpha-actinin interaction that appeared enhanced following dsRNA stimulation, a mimic of viral infection. The SIKE:actin interaction was not detected by RcIP. In vitro immunoprecipitation assays mapped direct interactions between SIKE:tubulin and SIKE: alpha-actinin and were used to further probe for a weak SIKE:actin interaction. Assays employed purified cytoskeletal proteins and full-length (residues 1-207), N-terminal (residues 1-112), C-terminal (residues 113-207) or a phosphomimetic (S6E) of a 6x-His-tagged SIKE construct. Together these studies establish an interaction between SIKE and cytoskeletal proteins that may provide a direct link between innate immune signaling and cytoskeletal components. This work was supported by NIH grant R21AI107447 and the University of San Diego SURE program.

## The Public Commonly Believes That Sexual Assault is a Crime of Passion and Lust

COREY DUNBAR and Jennifer Zwolinski

This poster will summarize psychological research that debunks the common myth that sexual assault is a crime of passion and lust. Sexual assault does not arise from passion or lust (Palmer, 1988). A rapist knows the victim does not want or enjoy the sexual contact yet he/she still wants to control and dominate the victim (Sexual Assault Prevention and Awareness Center, 2015). By making the issue about sexual desire and lust and not about dominance and violence, individuals may be more likely to perceive this crime as more acceptable. Now, the rapist is allowed to use the excuse that the victim desired sex, and the sexual assault “just happened” (Sexual Assault Prevention and Awareness Center, 2015). A target may also question the perpetrator’s intention especially if he/she believes the perpetrator has affection for him/her due to their existing relationship, as in the case of acquaintance rape (Burriss & Rempel, 2011). This myth that sexual assault is due to passion and lust may help to explain why over 90% of rapes are unreported on college campuses (Fisher, Cullen, & Turner, 2000). This poster is an extension of work completed as part of the fall 2015 Change LLC research symposium for Dr. Jennifer Zwolinski’s Introduction to Psychology preceptorial course in which students helped to debunk common misconceptions using psychological data. I hope to increase awareness about this rape misconception to the larger USD community especially given that Sexual Assault Awareness Week and Creative Collaborations are hosted during the same week.

## Distance-to-Empty Prediction Model

ANH V. DUONG, MINGYU CHEN, XUE GAN, Ani Velo and Lukasz Pruski

The amount of fuel remaining in the tank of a car is measured by a simple float system that most manufacturers use. The measurements obtained this way are not always accurate and are subject to errors resulting from, for example, the main plane of the car not being horizontal. Thus, the resulting distance-to-empty displayed on the dashboard is sometimes grossly inaccurate. The motivation of the project is to build and study two models that will predict the distance-to-empty more accurately. The first model is physics-based and estimates the available range based on velocity, acceleration, and the angle of inclination of a car trajectory. The second model uses the time-series approach, and predicts the distance-to-empty based on the data from the past driving history, and on identification of current driving patterns, such as city driving, freeway driving, mountain driving, etc. This model uses the simplest mechanisms of learning to estimate the distance-to-empty based on two sets of data points (time vs. distance): the large collection of data from the past driving and the small sample of current values. The second model, being non-engine-specific, may have more general applications. The results obtained from the two models will be compared in the conclusion of the project.

## The Formation of the Nation-State and Its Impact on People: A Case Study of Mexico and Somalia

D'JENNE EDWARDS, CARLEIGH FERNANDEZ, TAYLOR HICKERSON, ANDREW WINKLE, Greg Prieto, Antonieta Mercado and James Michael Williams

For centuries, hegemonic powers throughout the world have been vying for control over regions where they had no former ties or knowledge. Their primary motive for these conquests was expansion of their power and worldwide recognition through acquiring territory. This process is especially evident in the study of US and European influence over Mexico and throughout Africa respectively. From the early 1800s, the United States has been slowly infringing on Mexican territory, gradually claiming land to create what is today the US-Mexico border. This intrusion displaced thousands of natives, while spurring the migration of millions to the US today. The repercussions of this migration are not limited to US-Mexico relations, they have affected global migration patterns worldwide, which this poster will address. Similarly, European colonization in Africa throughout the 1800s disrupted African migration patterns as well. At the 1884 Berlin Conference, Europeans formalized the Scramble for Africa by dividing the continent into European controlled colonies. These lines were drawn without regard for the African population, creating unnecessary conflict and migration as well as unstable foundations for future governments. This is clearly seen in the case of Somalia, where due to ongoing conflict, Somalis have been unable to settle and are continually displaced in their own nation-state. In both Mexico and Somalia, dominating world powers created nation-states for their own benefit rather than for the benefit of natives. We argue that this fostered a detrimental disruption to migration patterns that negatively impacted both the Mexican and Somali populations.

## A Literature Review on Effective Remediation Techniques for Soil and Groundwater Contamination from Underground Storage Tanks

CONNOR ENGLAND and Sarah Gray

This project is a literature review of relevant and emerging remediation techniques for soil and groundwater contamination stemming primarily from leaching petroleum hydrocarbons at sites of in use and abandoned underground storage tanks. Methods were conducted in a variety of ways to observe the results of the established and emerging technologies, measure the cost effectiveness of each against the development status, contaminant, soil type, efficiency, and duration of remediation. It examined results from journal articles published on the subject ranging from the utilization of remote Geographic Information Systems modeling, to emerging technologies such as air sparging, as well as established remediation techniques like soil-vapor extraction. The primary conclusion found in the literature is that soil-vapor extraction (SVE) is becoming the most widely used remediation method for soil contamination by total petroleum hydrocarbons and polychlorinated biphenyls, for both it's positive results in the short term, as well as its cost effectiveness when compared to other technologies across the spectrum. In addition to this they also concluded that new and hybrid technologies such as air sparging seem infeasible at the moment, and are highly site specific based on soil quality. This literature review will be used to determine appropriate utilization and improvements of remediation technologies which can be narrowed down and implemented in the North Texas area.

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## Is a Green Fund the Answer?

ASHLEY ESCOBAR and Bethany O'Shea

"USD is committed to promoting sustainable lifestyles and expanding curricular and scholarship development on sustainability and climate change through facilities, operations, and business practices." Although as a campus we are committed to this. These programs take time and as students come to our university they often have many different programs that they want to put into effect in order to make our campus more sustainable. Making our campus a more sustainable campus takes time, money, and effort this case study looks at the possible solutions to making this process more easily accessible and the possibilities that a green fund holds.

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## The Role the Nation State has on the Movement of People

SEAN ESSEX, ALLY BELDA, LEXIE FAHEY, LUCERO CHAVEZ and James Michael Williams

The movement of people is one of the largest and most controversial issues facing the international community today. From the refugee crisis stemming in the Middle East to the immigration debate raging in the 2016 Presidential race, the issue of the rights and responsibilities of both the movers and the individual countries is widely contested. This project aims to discover the role that the nation state plays in facilitating or inhibiting the movement of people from one area to the next. By looking at this issue from the perspective of multiple disciplines we wanted to find connections and similarities that existed but were not obvious do to the different focuses of the topics. We looked at the topic of movement of people from the perspective of US African Relations, the role of the media and how it addresses conflict, and the position that gender and literature play. These diverse perspectives each address different aspects of this issue but all speak to similar themes that emerge. It was from these themes where we are able to come up with several ways in which the nation state has a very large influence on the movement of people.

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## Women in Victorian Literature: Their Strengths, Challenges, and How They Compare to Women in Contemporary Media

CAROLINE EVERSMAN and Mary Hotz

The purpose of this project is to observe and analyze the role of women in Victorian literature and its application to what life was really like for women socially and economically during the nineteenth century. This project includes character analyses primarily on the characters of Rachel Verinder from Wilkie Collins' *The Moonstone* and Mina Harker from Bram Stoker's *Dracula*. The project includes a brief discussion of the roles of women historically throughout the nineteenth century, along with a small comparison of nineteenth century female characters to women present in modern day literature/media in an effort to observe any differences in how women are portrayed in media today compared to their Victorian Era counterparts. The authors of Victorian novels depict their female characters as strong figures that are often not taken seriously due to their gender. These women are often juxtaposed with male characters who are in a sense "lost" without the female character(s), even though they have much more social power. In the end, these female characters often have to rely on the male characters in order to move forward, which is one way the authors of these novels point to the issue of gender inequality during this time period. Even though many people believe that women have made great progress in today's society, female characters in contemporary media still rely on men to accomplish their goals, suggesting that women still face similar issues today that they did in the Victorian Era.

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## Bigger the City, Better the Health: How do Economies of Scale in Cities Effect Health Outcomes?

JUSTIN FABIAN and Alyson Ma

Many firms move to cities in order to take advantage of economies of scale and agglomeration. As these firms move closer to others in the same industry, they utilize many shared resources, and these shared resources benefit all of those involved. The health industry in the United States is no exception. The largest cities often contain the greatest quantity and best quality of healthcare throughout the country. This creates an interesting tension in the United States. On one hand, having the best health concentrated to cities creates obvious health inequity. On the other hand, these industry centers are pushing the frontiers of creating the best new health innovations and care, which can be a benefit to all of society. I will be researching the effect of city size on the health of inhabitants. Using data from the 2014 National Health Interview Survey, I will compare a variety of health outcomes across individuals from different city sizes. I expect to find that large cities will have the best health care and better health outcomes. This research will further our understanding of the effect of health care concentration and create important inroads into adequately dealing with both the positive and negative effects of having the health industry concentration in the major cities in the United States.

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## Functional Analysis of Suppressor of IKK? (SIKE) in Migration and Phagocytosis

SEAN FAHEY, Frank A. Slykas, Nick D. Dichristofano, Mariam K. Dawood and Jessica Bell

Innate immunity is a critical, non-specific early defense system that allows the body to respond to pathogens prior to the recruitment of specific antibody defenses. This process involves the recruitment and subsequent migration of nearby immune cells to the site of infection, allowing the pathogen to be consumed via phagocytosis to prevent widespread infection. Migration and phagocytosis require the rapid disassembly, rearrangement, and assembly of a network of structural proteins known as the cytoskeleton. The link between cytoskeletal rearrangements in these processes and detection of pathogen, like viral patterns by Toll-like receptor 3, are not well defined. TLR3 initiates proinflammatory and type I interferon responses via the TANK binding kinase 1 (TBK1) pathway. SIKE was originally proposed as a TBK1 suppressor. However, more recent studies have indicated SIKE acts instead as a preferred substrate of TBK1. Mass spectrometry and confocal microscopy further indicate that SIKE interacts with the cytoskeletal proteins actin, tubulin, and alpha-actinin. This revised understanding of SIKE suggests that SIKE acts as a bridge between the viral stimulation of TBK1 activity and the resulting cytoskeletal rearrangements. To examine this role of SIKE, the functions in cellular migration and phagocytosis were assessed. A CRISPR/Cas 9 SIKE knockout was developed in the KMB7-derived HAP1 cells. The HAP1 SIKE knockout showed no detectable SIKE expression compared to the parental HAP1 cells. To determine the role of SIKE in migration, parental and knockout cells were used in cell migration assays. A lentiviral-mediated shRNA SIKE knockdown was completed in the mouse macrophage RAW264.7 cell line. Using SL1344 Salmonella typhimurium strain, gentamicin protection assays were completed to determine the role in phagocytosis. Introduction of SL1344 S. typhimurium at MOI = 100 into RAW 264.7 showed successful infection of cells by confocal microscopy and gentamicin protection assay.

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## Conversion of Aldehydes to Beta-hydroxyboronate Esters by Diboration/ Homologation Sequences

CARL FERBER, Cameron Moore, Casey Medina, Peter Cannamela and Timothy Clark

A reaction sequence has been developed for the conversion of aldehydes to beta-hydroxyboronate esters via a diboration reaction, followed by Matteson homologation. This diboration reaction uses the copper catalyst (ICy)CuOt-Bu reported by Sadighi by forming this catalyst in situ from (ICy)CuCl. The reaction sequence skips purification of the diborated intermediate, improving overall yields of the homologated product. The diborated intermediate has also been shown to be important to the mechanism for the Matteson homologation. Beta-hydroxyboronate esters have been provided from a variety of aldehydes in moderate to high yields. Aggarwal and co-workers have reported the homologation of boronate esters with epoxides. Initial progress on a new method that combines the enantioselective borylation and epoxide homologation into the previously described reaction sequence will be described.

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## Internship at the Office of State Senator Joel Anderson

KATHERINE FINNEGAN and Alexandria Adkins

How better than to partake in the political system than to serve the public sector? This internship was completed at the district office of State Senator Joel Anderson to explore the world of local politics. Work included, but was not limited to, research projects, legislative round tables, community outreach, case work, and writing articles to be published in local newspapers, putting my government knowledge to test and teaching me about the professional realm, while allowing me to experience politics from the inside.

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## Establishing Catalanian Identity: Insights into Catalonia Independence Movement

CARLOS FLORES and Kathryn Statler

This project examines to understand the rise and mobilization of the recent Catalan independence movement. I argue that the growing solidarity of Catalan identity and economic disparity between Catalonia and the central government led to the movement. Catalonia identity is understood to encompass the Catalan language and cultures. Catalans do not like to be identified as Spaniards, which is why they tend to promote their language and traditions. years of the Spanish government continuing to suppress this identity has led to the movement. As for the economy, many in the Catalan region believe that they would be richer if they didn't have to send money to the central government. The money often goes to poorer regions in Spain but not back towards improving Catalonia. This study will be conducted after analyzing primary accounts of Catalan identity suppression by the central government and the media and by looking at recent economic statistics that portray Catalonia as suffering domestically. Accounts of Catalan culture and sports such as football propaganda will also be provided to show the clear distinction between the regions, and how Catalan identity is integral to the independence movement.

## Existential Tension between Inspiration and Creation: Genesis of a Proper Metaphysical Basis for Einstein's Theory of Relativity and other Complex Mechanics Systems

JACOB FOBEAN and Tyler Hower

Science and Philosophy have often been seen as oppositional in a modern context and to some degree this opposition can be traced back to Interbellum Europe but the root cause of the divide runs much deeper. Certain metaphysical assumptions based primarily on Einstein's Theory of Relativity (TOR) had proliferated following its complete proposal in 1917 and although the science of the TOR remains logically coherent and scientifically sound this author believes it has yet to find a proper metaphysics to animate it. The nature of TOR and of Complex Mechanics in general is an operation at the limits of reality and the universe; these types of theories are looked at as the building blocks of a yet undiscovered Theory of Everything (TOE). Philosophers for their part are tasked with laying out a proper metaphysics for a proper TOE. The Rhizomes of Giles Deleuze and Feliz Guattari provide an excellent basis for proceeding with such a project. This conclusion is to be shown in two separate but simultaneous and conatal processes: 1) Genealogical: Tracing the origin of the Rhizomatic Method, and 2) Rhizomatic: Holistic yet individuated consideration of concepts via their origin. A tracing with dimension; Rhizomatics is at once evaluative and surmised, but also demonstrative and fluctuating. The process proceeds through the middle by stretching an essential relation such as a dichotomy or equivalence to its inspirational and creative limits until a novel univocal relation emerges.

## Spatial and Temporal Patterns of Barnacle Settlement within the Southern California Rocky Intertidal

DIANA FONTAINE, Catharine Hargenrader and Nathalie Reynolds

Barnacles act as model species for understanding how larval transport processes influence settlement and adult population dynamics. Settlement of barnacle larvae was quantified in the Southern California intertidal from April 2014 through January 2015 and from April through December 2015. Settlement plates (PVC, 1.9 cm<sup>2</sup>) were deployed daily at 12-14 locations within our study site in the Bird Rock, La Jolla, California intertidal. Time series of temperature and pressure (significant wave height) were also collected within the study site. We compared temporal patterns in settlement with changes in temperature and significant wave height. In general, settlement was higher in spring-summer months when compared to fall-winter periods during both years, but greater overall settlement occurred in 2014. In addition, settlement will be quantified spatially by ranking the plates according to the number of barnacle larvae present on each plate. Spatially analyzing barnacle settlement provides insight into how larval transport processes affect barnacle population dynamics within the rocky intertidal.

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## Home Automation: Does This Turn You On?

HEATH FONTAINE, MICHAEL LEVACK and Eric Jiang

Automation is the Mecca of technology; it reduces the effort needed to complete repetitive, menial tasks and enables developers to devote ample attention to complex tasks. Our objective, however, is to explore the idea of reaping the benefits of automation in day-to-day life with home automation. In particular, we focus on tracking motion to determine when a person enters or exits a room, using the results of motion tracking to automatically turn room lights on or off, and developing a mobile app to allow the user to manually interact with the lights. We hope to introduce consumers to the idea of automating their living space in order to make their living experience more efficient and more enjoyable. These ideas have been tested in a home environment but may be scaled up for commercial purposes.

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UC Forums

## 3D Model Encryption Using Conway's Game of Life and Rubik's Cube Rotations

KATIE FOTION and Jane Friedman

Conway's Game of Life, invented in the 1970's, is a virtual simulation of cellular life, combining characteristics of overpopulation, under-population, reproduction, and death on a two-dimensional grid. In 2012, an interesting application of the game was introduced, taking advantage of the unique cellular formations produced by the game and utilizing them to encrypt images. I have extended this encryption technique to three dimensions, by first redefining the game in a way that thrives in the 3D world, and then permuting different models using the results from the game and the rotations of a Rubik's cube. The applications of this encryption technique are endless. It is fairly simple to encrypt images, primarily made up of red, blue and green components. However, the encryption of a 3D model is one that has not yet been thoroughly explored, despite its massive implications for the future. With the growing popularity of 3D printing with military and spacecraft applications, and therefore highly classified models, there must be a method to encrypt such models. My 3D model encryption using Conway's Game of Life and Rubik's Cube Rotations offers a fascinating gateway into the possibilities ahead.

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UC Forums

## An Application of Discrete Dynamical Systems to Stress Propagation through Layered Media

AIDAN FOUHY, JAYNE TESTERMAN and Ani Velo

"As a semi-infinite flyer hits a finite layered medium, which is attached to a homogeneous half space (in a perpendicular direction to the layers), an initial impact occurs and a stress wave is created. The Goupillaud-type of the finite layered medium allows for the stress to be modeled discretely through a linear dynamical system. In this project, we evaluate the eigenvalues of the system/coefficient matrix and analyze the short and long term behavior of the stress as time goes to infinity.

The motivation of this project is built upon prior work on this subject, where it is shown that the steady state solution of stress does not depend on the material properties of the finite medium, but rather only on the properties of the flyer and half space. "



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UC Forums

## The Effect of the New Revenue Recognition Standard with a Focus on Software and Cloud Services

BRYAN FOX and Loren Margheim

This poster is a visual representation of my research paper on the new revenue recognition standard. The paper includes descriptions of both the old and new revenue recognition standards, including similarities and differences, an intensive focus on the principles of the new model, including a focus a detailed analysis on the five steps that must be applied, and finally an evaluation of the new standard in regards to software and cloud services. It is my prediction that many companies, specifically those that deal with software and cloud services, will have to make significant changes in revenue recognition. In order to deal with such changes, these companies must ensure that they have the proper processes and systems in place to complete the implementation. Such an implementation will undoubtedly add costs. It is also clear that the new standard is more principle-based, and as such, software entities will be required to exercise more judgment. This increase in judgment and interpretations may allow some entities to recognize revenue sooner than they do today. The goal of this project is to present a forward looking analysis on the effect of this new standard.

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UC Forums

## A Dynamic Website for a Local Jiu-jitsu Gym

MARK GAPASIN and Eric Jiang

“Competition comes in many forms and can be found everywhere and the Internet is no exception for small and growing businesses. The world of mixed martial arts is a growing market and The Stronghold, a local jiu-jitsu gym’s website had been developed to help aid their growth and be an asset. A small business needs to keep up with today’s technologies and providing a user-friendly, interactive and responsive website to help identify potential customers and promote their business is key to success. Services like e-commerce that is dependable and usage of multimedia were added as features to the website. This approach can be applied to other similar organizations like after school programs, clubs or other extra-curricular activities who what to stand out from the competition to showcase their business.”

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UC Forums

## Regime-Type Variation in the Post-Communist States

MOLLY GARTALND and Vidya Nadkarni

Due to the uniformity in regime type prior to transition and time of transition, the post-communist states of Central and Eastern Europe and Eurasia are a unique group to study. The term “post-communist state” refers to states that were part of the Warsaw Pact, republics that were once part of the Soviet Union, or republics that were part of Yugoslavia. This study will explore the scholarly literature that deals with the factors that could help explain regime type variation in the region and the research that follows will explore the determinacy of structural factors versus agency factors. My hypothesis is that in countries that became communist before 1917, structural factors constrain the role of agency to a greater degree than in countries that became communist after WWII.

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UC Forums

## Millennials as Consumers: How Businesses Must Adapt

ASHLEY GENOESE and Linda Barkacs

Each generation brings new challenges in which businesses must change their operations, marketing strategies, and other key factors of their company. With Millennials being the most unique generation, businesses will not only have to change all of these tactics, but might even run the risk of becoming irrelevant to this next generation. Also known as Generation Y, Millennials are classified as those born between the years 1981-2000, and in 2016 the current ages of Millennials are 16-35, but more typically identified as those ages 19-30 in the year 2016. Born and raised in the era of booming technology and rapid changes in society, Millennials have a mindset different than any other challenge business have faced before. The demands of Millennials are instantaneous, expecting results as quick as a mouse click and relies heavily on technology. Businesses without these capabilities are sure to fail if they do not quickly adapt to the expectations of this generation. In addition to these changes, Millennials seek more from a company than its product or service. A company must have ties to the community and support popular ideals that might not even relate to the business operations. Millennials choose to do business with companies that are socially responsible, adept with technology, and that can provide quick and instantaneous service: this puts many companies and even entire industries at risk.

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## Subjectivity and Authenticity: Puritan Influence on the Female Figure in 19th Century American Fiction

Danielle Gibson and Dennis Clausen

In this project, I explore the New England Puritan influence on the representation of the American female figure in two 19th-century novels, as well as a set of 19th century poems. Through a feminist theoretical lens, I analyze the authenticity of female subjectivity in *The Scarlet Letter*, *The Turn of the Screw*, and a selection of Emily Dickinson's poems. I define authenticity as the individual's ability to transcend stereotype, and subjectivity as the interaction between an individual's thoughts and her consequent actions. I argue that the position of the male author impacts female subjectivity differently in each novel: in Hawthorne's case infusing authenticity and individuality in Hester, and in James' case by impairing the governess' authenticity and voice. In contrast, I provide a potential counterargument in the form of Emily Dickinson's authentic female voice.

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## Preparation of Peptide-Based Polymers via Microwave-assisted RAFT Polymerization

ELLA GILES, ALISSON MAGSUMBOL and Joan Schellinger

Peptide-based polymers have various applications including drug delivery agents, biomaterials, and in the regeneration of cell tissue. There are several advantages to utilizing peptides because their sequences are easily manipulated, they are compatible with aqueous environments, and have distinct biological functions including cell targeting. Reversible addition-fragmentation chain transfer (RAFT) polymerization is a "green" living free radical technique that is able to withstand numerous reaction conditions. However, there are several issues involved in RAFT polymerization as monomers become more complex, including slow reaction time, poor control, and a need for multi-step reactions. One way to circumvent these shortcomings is by incorporating microwave technology into RAFT polymerization. This project aims to efficiently prepare peptide-based polymers by introducing microwave heating into the polymerization

of complex peptide monomers. Eight pentapeptide monomers with varying characteristics including hydrophilic, hydrophobic, and zwitterionic were synthesized via SPPS utilizing Fmoc/tBu methodology followed by purification and characterization through High performance liquid chromatography (HPLC) and mass spectrometry (MS). Preliminary polymerization was conducted with simple monomers such as methyl methacrylate (MMA) and dimethylaminopropyl methacrylamide (DMAPMA) to investigate optimum reaction conditions. Once reaction conditions are optimized for these simple monomers, peptide-based monomers will be utilized in the polymerization to compare conventional and microwave heating. Overall, microwave-assisted RAFT polymerization will allow for a more efficient and natural method of preparation of peptide-based polymers that will have the potential to be utilized for numerous applications, such as drug delivery agents and biomaterials.

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## General Atomics Direction Finding System

ZACH GILLAN, SARAH MIKOSZ, DAVID WHITE, EVAN WOODRUFF and Peter Hetzel

The goal of this project is to create an operational direction finding system that incorporates the newly developed antenna produced by General Atomics Aeronautical Systems Incorporated (GA-ASI). This system will utilize the Watson-Watt method and algorithm as a co-located antenna system. The system's accuracy will be within ten degrees and will operate in the FM frequency range (85 to 110 MHz). The system will consist of four main elements: the antenna, the radio frequency front end (RFFE), the logic and computation, and the user interface. The antenna will receive the signals being transmitted across the spectrum. The software defined radio (SDR) will act as our RFFE and will then filter these signals and output a digitized version of the target signal. This target signal will then run through the field programmable gate array (FPGA) located on the ZedBoard Zynq 7000c. The ZedBoard will then use digital signal processing (DSP) to examine the signal and determine its direction of arrival (DOA) or bearing. This bearing will then be graphically displayed on a monitor through the developed graphical user interface (GUI).

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## Electrophysiological Analysis of Neuronal Aging and Stress in *Drosophila melanogaster*

MADALYN GLIM and Adam Haberman

Neurons are some of the longest living cells in the body, and the study of their function is crucial to discovering novel ways of coping with loss of neuronal function. The purpose of this work is to investigate if age and stress together have detrimental effects on neuronal function. We hypothesize that neurons that are more active will show greater dysfunction with age. We will use electrophysiology, which is the study of electrical properties in biological cells and tissues, to measure action potentials of neurons. We will measure the electrical response of photoreceptors in the fly eye in response to short pulses of light with an Electroretinogram (ERG). The flies will be raised in both light and dark conditions and will either be three days or five weeks old. We predict that five week old flies raised in the light will have a greater loss of neuronal function than flies raised in the dark. This experiment will provide insight into the mechanisms of neuronal aging, which is relevant to age-associated neuronal diseases such as Alzheimer's, Parkinson's and Huntington's.

## The Limitations of NAGPRA for the Kumeyaay

David Gonzalez and Molly McClain

The Native American Graves Protection and Repatriation Act (NAGPRA) passed by Congress in 1990 addresses issues over Native American human remains and artifacts including the repatriation of such remains. Those familiar with the legislation have heard of the highly controversial Kennewick Man case in which an ownership conflict over ancient human remains discovered in Washington arose. They may not realize, however, that a similar type of case is unfolding in the San Diego area. My thesis focuses on the controversy between the University of California at San Diego researchers and the Kumeyaay tribe over human remains discovered at the UCSD's Chancellor's house in 1976. Some professors questioned the remains protection under NAGPRA because UCSD reported that the remains were "culturally unidentifiable." This inquiry led three professors to initiate a lawsuit in an effort to stop the repatriation of the human remains to the Kumeyaay nation. My work points out some of NAGPRA's limitations, including its ambiguous language and lack of effective enforcement, and suggests that the legislation's ineffectiveness is due to cultural differences between Western researchers and the Native American community. My project reveals the lack of understanding of Native American burial practices that exists in Western culture and proposes a better understanding of such practices as a preventative solution towards future controversy.

## Breadsticks: Food for Thought? The Value of Treating Memes as Media Production

OLIVIA GONZALEZ and Susannah Stern

In a world of rapidly developing forms of online communication, memes exemplify a vastly overlooked and misunderstood genre of media production. Teenagers dominate meme production and consumption; however, despite their overwhelming presence, teenage meme producers are underrepresented in scholarly literature, and lack a voice in defining their production. This study sought to explore teenage meme producers' motivations, benefits, challenges and opportunities, as well as the value of teenage meme production within an adult-driven media culture. This analysis is founded upon research conducted through Skype interviews with four teenage girls in Northern California. This study revealed that teenagers engage in the production of memes in order to enjoy and provide entertainment, to develop and sustain interpersonal relationships, and to reap the social benefits of participating in, and developing, community. Memes have also led to the development of a unique vernacular through which teens establish and affirm interpersonal relationships. A lack of audience understanding, and the "teenager" label introduce challenges in teens' meme production. However, meme production also allows teenagers to successfully participate in, and shape, popular culture. Ultimately, the genre of memes is a key component in the overall picture of emerging media. Through treating this genre as media production, scholars can fully explore its benefits and risks, gain insights into the ways memes influence relationships among teenagers, and explore the generation gap in the understanding of memes.

5th ANNUAL

VISUAL ART STUDENT EXHIBITION April 9-29, 2016

Student Life Pavilion Exhibit Hall

Monday through Friday, 8 a.m. to 11 p.m.

Saturday and Sunday, 9 a.m. to 11 p.m.

Free Admission

Opening Reception

Thursday, April 14 from 12 p.m. to 2:15 p.m.



Ivy Guild

Cecilia Mariscal

Meagan Merlino

Taylor Mortis

Julie Pham Vu

Paige Sellers

Samantha Stone

Maya Vanderschuit

Nicole Zens

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## Effects of Crowder Structure and Salt on DNA Mobility and Conformation in Crowded Environments

STEPHANIE GORCZYCA and Rae Anderson

Biological cells are crowded environments in which DNA must move through to perform specific functions. We study how the properties of crowded cell-like environments impact DNA dynamics by tracking individual 115 kbp ring and linear DNA in different crowded environments using single-molecule fluorescence microscopy. We determine the role of crowder structure and salt on DNA diffusion and conformation by measuring the mean-squared center-of-mass displacements, as well as the conformational shape, size, and fluctuations of each molecule. Previously, we used 10 and 500 kDa dextran as crowders and showed that mobility of both ring and linear DNA decreased exponentially with increased crowding, but rings compact while linear DNA elongate. These effects were dependent solely on the reduction in available volume for DNA rather than size or number of crowders. Here we use crowders of similar molecular weight, but different structure to dextran (10 kDa PEG and 400 kDa Ficoll). We find that DNA mobility reduction is independent of crowder structure and that ring and linear DNA undergo more significant compaction. Finally, we characterize the role of salt on DNA mobility and conformation to determine the relative roles of enthalpic versus entropic effects on crowding-induced DNA dynamics.

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## Feasibility and Incentives of Water Reuse at the University of San Diego

HAILEY GORDON and Michel Boudrias

Drought in the Southwestern United States has already begun to severely affect certain areas and is only predicted to worsen. Although the feasibility of transporting water reduces impacts from the current drought, water scarcity will lead to future economic and social impacts to the community and region. As an educational institution the University of San Diego has the opportunity and obligation to make sustainable changes. This extends greatly to the current drought San Diego is facing. Under NFPA 25 regulations, the Shiley Center for Science and Technology releases sanitary wastewater used in mandatory weekly fire protection tests. This study quantifies how much water is disposed each week to determine a yearly average. The fire pump supplies approximately 32,600 gallons of water a year. Although reusing wastewater may not have significant economic benefits now, it can be a necessary step to reduce economic, social and environmental costs in the future.

## Survey of Public Opinion of American Companies: Debunking the Underdog Myth

EMILY GRAN and Nadav Goldschmied

People tend to look more favorably upon entities that had to overcome obstacles to reach their goals (Kim et al., 2008). Previous research has shown that underdog branding positively impacts customers' attitudes towards products (McGinis & Gentry, 2009). The current study aimed to explore whether individuals like a company more if its founder was portrayed as an underdog compared to a company whose founder had fewer challenges to overcome. Therefore, it was hypothesized that participants would rate a company and its products more favorably if they were under the impression that the founder began as an underdog than they would if they were led to believe otherwise. Participants read that Steve Jobs was either forced out of college because he was struggling academically and then started his company Apple Inc., in his parents' garage (i.e., underdog condition), or that he found college too easy, opted out, and built the first computer in an air conditioned office (i.e., non-underdog condition). The results showed that underdog condition had no significant effect on participants' ratings of the company and its products. However, participants who had little familiarity with the company and were in the underdog condition rated the founder of the company, Steve Jobs, as a more inspirational figure compared to those who were in the non-underdog condition.

## Metabolic Intensity in Eared Grebes

CHYNA GRAY and Hugh Ellis

Eared Grebes are diving waterbirds that though migratory are flightless when on the water due to changes in their body composition; changes which are extreme among birds (Jehl 1997). Several authors (e.g., Daan et al. 1990) have argued that basal metabolic rate (BMR) should be affected by body composition. Specifically, that the size of metabolically active organs should drive BMR. Ellis and Jehl (unpublished), however, found no change in BMR in migrant vs. non-migrant Eared Grebes despite major body composition differences. Might metabolic activity of tissues be more important than size? The Ellis lab has found some such differences by looking at enzyme activities of several tissues. We have used two enzymes, citrate synthase and lactate dehydrogenase, by performing enzyme assays via spectrophotometric analysis. I am now looking at two other enzymes, 3-hydroxyacyl coenzyme A dehydrogenase (HOAD, a key enzyme in the breakdown of fatty acids) and pyruvate kinase (PK, an indicator of the glycolytic pathway). Changes in the activity of these enzymes in organs of different sizes will confirm the independence of BMR from body composition. I have established HOAD baselines in several tissues and now am doing comparisons.

## For the Sake of Science, the Sacred, or Just Plain Cruelty?: Animal Testing in Hinduism and Christianity

SARAH GRAY and Evelyn Kirkley

My poster for Creative Collaborations addresses the social issue of animal testing through the lens of two world-renowned religions: Christianity and Hinduism. Both Christianity and Hinduism have rich histories and great influence on the world today; which made data for this research abundant and accessible. I chose this topic because it is a social issue that I am passionate about, and I wanted to explore how two drastically different religions viewed the issue of animal testing. I chose the religion of Christianity to research because I was raised in a Protestant household, and it was easier for me to choose a religion I had the greatest personal connection to. I was also curious to see what I would find out in my research, as I had never thought about animal testing through the lens of Christianity prior to this project. I simply believed all Christians were friendly to animals, just like my family and the members of my church were, but this project gave me a chance to see beyond my religious illiteracy. I also chose to research animal testing through the lens of Hinduism. I chose Hinduism because out of many religions my class researched in THRS 112: Intro. To World Religions, Hinduism was the religion I knew the least about, acting as a great counterbalance to my familiarity with Christianity. Both religions provided a great foundation for this compare and contrast research project. Some conclusions I drew from this research were that both Christian and Hindu texts address the ethical treatment of animals, while traditional Hindu views on the treatment of animals are more animal-friendly in comparison to traditional Christian views.

## Academic Freedom, Public Art, and Private Universities: Examining the Expression of Communication at USD

IVY GUILD and Leeva Chung

Maintaining Academic Freedom in Public Art Processes at Private Academic Institutions: USD Case Study Examining the Roles of High & Low Context Communication The study combines Visual Arts, Art History, and Communication studies in a synthesis of two correlated research projects. The first part of the study involves research about adult student autonomy, the history academic freedom, legalities of academic freedom, Catholic higher education, public art on private university campuses, and utilizes the University of San Diego as a case study. Multiple universities are compared in the study, but the focus primarily remains on USD and the new public art policy formed as a result of a series of events that occurred during the spring of 2015. This part of the study seeks to determine when private academic institutions have the legal right to obstruct academic freedom of students in terms of their public artwork. The study focuses on USD as a Catholic higher education institution to examine how religious affiliation may impact academic freedom in public art policy for students at the university. The second half of the research draws on high and low context communication theory to examine the same case study from Spring 2015, but this time in terms of the miscommunication that led to the events. During the period of events, a series of messages exchanged between an administrative individual and a student led to problematic miscommunication. Their email correspondence combined with recent interviews from the subjects is analyzed in terms of their communication styles, particularly high and low context. The research investigates from a communication studies standpoint the miscommunication that occurred and how it could have been prevented.



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## Las Generaciones del Negocio: Immigrant Families in Small Businesses

BIANCA GUZMAN and Jesse Mills

The reasons that people immigrate to the US are vast and diverse, however one chief reason is for immigrants to give their children better lives than they had themselves. Small businesses operated and owned by immigrant families provide a glimpse into one path that many immigrant families take in an effort to achieve this goal. These businesses create a cultural context of their own. The stories of the people in the businesses vary from generation to generation, and reflect the generational differences within these businesses and families. This project focuses on this distinction by examining the experience of these different individuals through interviews in a Mexican-American community in the Bay Area. Interviews with intergenerational Mexican-American family business owners expose differences that reflect racial, social, economic, generational, and ethnic contexts which are constantly changing and impacting this community in an intersectional fashion.

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## Desbordando El Bordo Unpacking The Canal

JEFFREY HALLOCK, Greg Prieto and Maria Silva

This research project employed a qualitative and quantitative survey to better understand the deportation experience and daily life of migrants who have been deported or repatriated in Tijuana. Interviews were conducted at Desayunador Padre Chava in the Zona Centro of Tijuana. The questions were designed to look at a complex range of issues tied to demographics, deportation experience, health, substance abuse, living arrangements, family, and personal security. The changing nature of the political landscape in Tijuana, with specific regard to the treatment of the homeless, during the course of this research project had a great impact on the project and the ability to survey the project's indented population. The project's methodology had to be flexible to respond to these changes. The result was important insight into how to conduct a small scale academic research project in a foreign country with human subjects that are inherently transient in nature. The challenges faced during this process produced important findings and lessons of great value for the academic community. The end product of this project is a blend of primary data and an examination of methodology to aid future academic research in Tijuana.

## Operation Future Perfect: How the OSS Planned to Reconstruct Germany Before WWII was Over

MORGAN HANSEN and Kathryn Statler

During World War II there were many different tactics used on the battlefield. One of the most overlooked aspects of the war was psychological warfare. From the beginning of the war, the United States lagged behind its counterparts in the realm of intelligence. With the help of the British and the creation of the Office of Strategic Services, the United States would catch up with, and surpass the British intelligence services. While literature exists about the United States intelligence services during the war, and some of their hair-raising missions, historians have neglected the OSS's psychological warfare aimed towards German troops. One aspect of the war rarely mentioned is the close economic, cultural, and familial ties that existed between the United States and Germany, even during Nazi rule. This alignment thus begs the question, how did close American ties to Germany during WWII affect U.S. psychological warfare toward the Germans? Ultimately, this paper will examine the underlying sympathies towards the German people through the examination of United States propaganda directed towards German soldiers as well as German civilians. Due to these sympathies, the OSS and specific American leaders were priming the German people for a favorable reconstruction following the conclusion of the war.

## Factors Affecting Residential Energy Use in San Marcos and Escondido

JARETT HARTMAN, Nilmini Silva-Send and Zhi-Yong Yin

Issues related to energy consumption and energy conservation have perhaps never been as popular as they are now. An increasingly important topic in the global community, nations are advocating not just for cleaner energy, but for the more efficient use of energy. In order to gauge the effectiveness of current efficiency standards, an understanding of the factors which serve as main contributors to energy consumption is necessary. This study aims to investigate factors related to households, individuals within those households, and weather to determine the influences that these factors have on daily energy use. By focusing on the daily energy use of over 500 single-family households in San Marcos and Escondido for one year, this study aims to assess the extent to which residential energy use can be explained by residential household characteristics, socioeconomic status, and climatic variables in the San Diego region. Using hourly energy use data collected by San Diego Gas & Electric (SDG&E) for over 500 households over the course of one year, as well as information from Zillow and MesoWest weather stations, the influence of a number of household characteristics, socioeconomic status, and climatic variables on daily energy consumption (in kWh) was measured. Preliminary results indicate that climatic factors are strongly significant, and that weather patterns heavily influence daily energy use. The results also indicate that while household characteristics in general may not have large impacts on daily energy use, these factors may eventually lead to substantial increases in demand for energy over time.

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## Quantitative Analysis of NHE1 Agonist Activation

Daniel Hasle and Joseph Provost

The Sodium-Hydrogen Exchanger 1 (NHE1) is a transmembrane protein important for cell processes mainly including migration and homeostasis of intracellular pH (pHi). The activity of NHE1 is modulated upon phosphorylation via the protein kinases: ERK 1/2, protein kinase B (AKT), RhoA kinase (Rock) and ribosomal s6 kinase (RSK). Various agonists show different degrees of NHE1 stimulation, however we do not have an understanding of how these sites coordinate or if there is a hierarchical phosphorylation regulation of NHE1. The potential phosphorylation-dependent regulation of NHE1 on pHi will be determined by measuring the impact of these four kinases. To accomplish this, cells will be treated with three different agonists; lysophosphatidic acid (LPA), platelet-derived growth factor (PDGF), and phenylephrine (PE). Initially, we performed dose response assays for the mentioned agonists in fibroblasts deficient in NHE1 expression (PS120 cells) and in fibroblasts stably expressing human NHE1 in PS120 cells (PSN cells). To quantify the magnitude of stimulation each agonist has on NHE1 basal activity, cells were treated with each agonist and steady state pHi was determined 15-20 min after addition of agonist using the pH-dependent dual excitation, single emission dye BCECF and fluorescent microscopy. Increases in pHi of 0.25 to 0.28 (n=12) were observed for the agonists. To selectively analyze the extent each kinase has upon NHE1 activation, cells were introduced with specific cell permeable kinase inhibitors (10uM MK-2206, 10uM BI-D1870, 10uM Y27632 and 0.5uM SCH772984) prior to the agonist. To investigate the effect of direct phosphorylation for each agonist, mutant PSN cells expressing human NHE1 with Ser/Thr to Ala mutations for each kinase site will be subjected to the same assays. Our project will grant better understanding of the relative contributions each signaling cascade has upon NHE1 basal function.

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## Children's Advocacy Institute

ALYSON HAYDEN and Elisa Weichel

As an intern at the University of San Diego's Children's Advocacy Institute, I research issues related to juvenile detention, foster care, domestic minor sex trafficking, and child abuse. I am assigned projects by CAI staff attorneys and I present my findings to them at the completion of my research. CAI works to improve the lives of children through impact litigation, legislative and regulatory advocacy, research, and public education. My research is the preliminary work required to publish reports and initiate a legislative proposal or legal proceedings. A major project that I have researched was the excessive use of pepper spray in juvenile detention facilities in San Diego county. It has been reported that California has the highest rates of pepper spray use in the country. In researching issues, CAI uses a bill development template to determine if there is sufficient evidence to introduce bills. I applied to be an intern at CAI because I am interested in pursuing a career in law. As a lawyer, I want to work to improve the circumstances of children so that they may more lead productive lifestyles. This internship is an excellent learning opportunity as it provides me with a solid legal foundation through first hand experience. Law is a challenging profession and an internship such as this is certainly beneficial to my legal future.

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## Ius Lege: a Question of Law, Justice, and Land in America's Young California

DANIEL HEARST and Micheal Gonzalez

This project involves looking back at California's early years as a state and the process by which the vast majority of land grant claimants lost their land. When California became a state in 1850 there were over 800 Mexican land grant claimants. Although more than 600 of these claimants successfully defended their title in court, by the turn of the century almost none were still intact. Through court cases, court documents, and secondary sources, I will show that the law Congress passed on March 3, 1851, 9 Stat. 631, to ascertain and settle the private land claims in the State of California (referred to as the Land Law of 1850) was necessary to solve real issues that faced California in its early years. However, these same sources prove that this law was abused to strip the Spanish-speaking population of their land without violating the 1848 Treaty of Guadalupe-Hidalgo.

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## Investigations of a New Energy Source

WILLIAM HELMER, Troy Zawlacki and Daniel Sheehan

Epicatalysis is a recently identified form of catalysis that could have wide ranging applications for chemical manufacturing and energy production. Epicatalysis is the catalytic process in which gas-surface reactions cause a steady state non-equilibrium of gas phases. Until now all known experimental examples have occurred exclusively at high temperature (i.e.,  $T > 1500$  K), though theory indicates that a room-temperature version should be possible using either van der Waals dimers or hydrogen-bonded dimers interacting with polymeric substrates. During summer 2015 we explored room-temperature candidates by exposing test surfaces to low-pressure test gases using an original apparatus of our original design. Initial results with teflon and kapton surfaces and formic acid gas demonstrated the first examples of room-temperature epicatalysis.

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## TransformerMD

TAYLOR HENDERSON, Metaeb Alohal, Shawn Christie and Kathleen Kramer

The increasing awareness of global warming has encouraged the advancement and implementation of new, green technology throughout America. The increase in electric vehicles and home photovoltaic systems due to this heightened awareness has put a burden on the current electrical distribution system creating unexpected failures in many power distribution components. For this reason, San Diego Gas and Electric has requested a device capable of monitoring the health and reliability of the pad mount transformers they maintain. The monitor, known as TransformerMD, will utilize various sensors to measure current, voltage, top oil temperature and ambient air temperature of the transformer. Using these measurements, TransformerMD will be able to calculate the remaining lifetime of the pad mount transformer. This will help SDG&E maintain a reliable electrical grid because it will allow for the timely repair and/or replacement of a transformer before it's too late.

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## Prosthetic Arm

IRVIN HERNANDEZ, LAUREN HOFFMAN, YARA ALJARALLAH, MARIA ALKADHEM, AIMEE SLAVENSKY, ALVARO GONZALEZ, CRISTINA GONZALEZ and Kathleen Kramer

The high demand for prosthetics in the United States resulted in the development of very expensive sophisticated prosthetics. The goal of this project is to develop an inexpensive and 3D printable prosthetic that will perform daily functions. The design incorporates four fingers, an opposable thumb, a wrist, and a forearm. The hand will be driven by three DC brushed, and two servo motors. The system will be powered by a rechargeable battery and controlled by the microcontroller. The system will be activated by a signal from Electromyography sensors, which will sense the muscle movements and send signals accordingly. The system will also include a feedback system consisting of force-sensitive-resistors, which will notify the user of grip force using LEDs.

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UC Forums

## More People, More Trash, More Gas?

MITHSY HERNANDEZ, Eric Cathcart and Beth O'Shea

Landfill gas emissions are one the largest anthropogenic sources of methane in the atmosphere and as population increases so will waste generation and methane production. Although there is little to be done about maintaining population growth and the increasing need for landfills, the production of methane can be a positive, sustainable alternative to the increasing trash problem. There are various methods and ways that the methane can be harvested and used that can negate the soon-to-be high methane production from more people and more trash.

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UC Forums

## Investigating the Relationship Between Physiological Properties of Exotic Plant Species and their Impacts on the Hydrological Cycle in Tecolote Canyon

CAMERON HEYVAERT, Paul Kemp and Zhi-Yong Yin

Understanding the spatial distribution of vegetation among a watershed is an important component of efficient watershed management. With varying physiological requirements, plant composition can greatly alter components of the hydrological cycle including surface runoff, infiltration, evaporation, and transpiration rates. Alterations in these components can be particularly important in regions like Southern California where local water supply is extremely limited. While it is well supported that exotic plant species can transform native ecosystems, their cumulative effect on natural hydrologic processes is poorly understood. This study seeks to explore the hydrological impacts of exotic plant species with consideration to their physiological characteristics. Specifically, we will be investigating the physical components of soil moisture content in correlation with photosynthetic activity, transpiration rates, and available radiant energy of exotic species on a north facing slope in Tecolote Canyon. Based on this study, grander implications can hopefully be applied toward more efficient and informed watershed management decisions.

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UC Forums

## The Ghost of the Ghost Particle

KJELL HINIKER and Chad Kishimoto

The neutrino has often been called the “ghost” particle because of how hard it is to detect. The sterile neutrino, a theoretical quantum mechanical counterpart and possible candidate for dark matter, is even harder to detect thus making current expectations of measuring one nearly impossible. Another method by which we can learn information about proposed sterile neutrinos is by creating physical models via parametrized computer code using known thermodynamics, basic particle physics, and theoretical creation of sterile neutrinos during early epochs of the universe. We then varied these parameters to fit observed data, thus creating upper and lower bounds through which our model of the sterile neutrino must be contained.

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UC Forums

## Implementing Low-Cost Energy Solution to Water Heating in Rural Dominican Republic

LAUREN HOFFMAN and Truc Ngo

Energy in rural Dominican Republic is often a limited and expensive commodity. When electricity is available, people use it mainly for lighting and operating household appliances. Propane gas and firewood are other common energy sources in rural areas, however with increasingly high cost. As a result, heating water for personal bathing and showering becomes a luxury that average rural Dominicans simply cannot afford. Cold showers are the normal way of living. Consequently, people take showers infrequently, personal hygiene is compromised, and risk of illnesses, especially pneumonia, is increased. This work aims to develop a low-cost, passive solar thermal powered water heater, which connects directly to a showerhead inside a bathroom facility. Two different designs, including batch and thermosiphon models, are considered, evaluated and compared. Several system parameters, such as insulation, heat trap, reflective surface and stirring, are varied and system performance is characterized based on maximum water temperature and stability. The thermosiphon model is found to be most optimal, considering its performance, cost, ease of maintenance, manufacturability, and adaptability. The selected design is then implemented at several communities in El Cercado, a rural town located in the southwestern Dominican Republic.

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UC Forums

## Hybridity and Black Masculinity in The Hunger Games

RAYNE IBARRA-BROWN and Carlton Floyd

Historically, mainstream representations of black men have been deeply problematic, as they are informed by racial ideologies born from the institution of slavery. This project examines how these ideologies continue to pervade contemporary culture by analyzing the cinematic and textual treatment of black masculinity in The Hunger Games franchise. I focus specifically on the character Thresh, an archetypal hybrid of the “black brute” and the “runaway slave,” whose state-sanctioned abuse and death are simultaneously neutralized by rhetorical de-racialization and justified by white supremacist constructions of black masculinity. Racial representation has incredible discursive power when negotiating the meaning of black demise, a dynamic evident in modern popular culture, mass media, and American history.

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UC Forums

## **R&D Investment and Firm Value: A Software Industry Evaluation**

**DIAMOND INNABI and Audrey Cole**

Studies by Branch (1974), Nord (2011), Johansson & Loof (2008), and Crepon (1998) found a positive relationship between investing in research and development and future profitability and growth of a company. Although there has been much research on the impact of research and development expenditures on firm value, current literature severely lacks investigating this relationship in software companies. This paper aims to identify the effect research and development expenditures on the market value of public software companies.

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UC Forums

## **The Acoustic Analysis of Bowhead Whales in the Chukchi Sea throughout July 2012-2013**

**ELLEN JAMESON, Joshua Jones and Michel Boudrias**

The Bering-Chukchi-Beaufort stock of bowhead whales pass through the Chukchi Sea when undergoing their annual migration from summering to wintering waters in the Arctic and subarctic. In this paper, the acoustic presence of bowhead whales in the Chukchi Sea was described using recordings collected by a High Frequency Recording Package (HARP) during July 2012-2013. The hourly occurrence of calls was analyzed in relation to seasonal variation and sea ice concentration throughout the recording year. Bowhead calls were detected with intermittent peaks of high occurrence throughout the relatively ice-free mid-summer to fall months. A higher than expected acoustic presence was observed during the late spring to early summer months at times when there was a recorded mean sea ice concentration of 90-100%. The unanticipated prevalence of calls throughout these ice-covered months is likely due to the heightened ability of bowhead whales to maneuver through unstable or small ice cracks and the incomplete nature of sea ice satellite imaging. In addition to sea ice cover, the temporal and spatial variation of bowhead whales in the Chukchi Sea is presumably driven by various seawater parameters and zooplankton advection patterns, all of which can be altered by the recent Arctic warming due to climate change.

## United In Our Diversity: Education, Peacebuilding, and Reconciliation After Ethnic Conflict

WILLIAM JERNIGAN and James Michael Williams

Since the end of the Cold War, the world has seen a decrease in interstate conflict be matched by a sharp increase in intrastate conflicts, often spurred by ethnic inter-group disputes. After the dust of such ethnic conflicts has settled, how can a nation overcome the lasting reverberations to create a peaceful society? Is reconciliation between historically divided groups possible? How do youth affected by these conflicts perceive them? Can education systems be effectively designed to reshape their values towards acceptance and inclusion of the “other”? This study seeks to determine which factors within education drive higher levels of peace and reconciliation within countries that have recently endured civil ethnic conflict. The related bodies of literature, though widely populated with case studies, lack a comprehensive examination of the connections between educational processes, peacebuilding and reconciliation. A thorough examination of that literature has revealed five particularly common elements that appear effective: Ethnic Integration in the Education Sector, Linguistic Tolerance, the Presence of Peacebuilding Education, the Presence of Citizenship Education, and the Holistic and Objective Presentation of Historical Narratives. There is nothing inherently special about these five, but they recur throughout the literature, and are therefore compelling and worthwhile to examine. This study examines their variance across 4 nations as related to variance in 4 concepts highlighted by South Africa’s Reconciliation Barometer: Interracial Reconciliation, Political Tolerance, Support for the Principles of Human Rights, and Perceived Legitimacy, in an attempt to unveil the most effective educational tools to create peace after ethnic conflicts.

## Characterizing Brown Carbon Aerosol Formation through Lab Studies

NATALIE G. JIMENEZ and David De Haan

Brown carbon (BrC) aerosol has a significant impact on climate due to its atmospheric abundance and strong absorbance. Although all the formation pathways and products have not been fully elucidated, certain reactions between atmospherically abundant organic compounds and ammonium sulfate (AS) have produced BrC. Additionally, the phase of these products in atmospheric droplets changes the rate of formation of BrC. This research focuses on photochemical and dark reactions between carbonyls, amines, and AS to determine the rates of browning in order to better understand the formation of BrC. Varying concentrations of hydrogen peroxide (HOOH) were added to explore BrC formation through aqueous, radical reactions. The reaction progress was monitored by UV-Visible spectroscopy. In hydroxyacetone-methylamine reactions, the formation of BrC at 300-400nm was delayed by the addition of HOOH. Reactions containing hydroxyacetone-glycine formed BrC faster with the addition of HOOH under light conditions. Furthermore, BrC formation in evaporating droplets in response to the addition of methylamine was explored through humidity-controlled experiments. The droplets were composed of the semi-solid organic-AS reaction products and methylamine gas was added to the reaction in order to observe if browning occurred. The formation of light absorbing products was monitored using cavity attenuated phase shift spectroscopy. At low humidity, the addition of methylamine gas did not cause particles to brown. However, light absorbing products were observed at a higher humidity upon the addition of methylamine gas.



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UC Forums

## An Explanation for Rising College Tuitions

DYLAN JONES and Alyson Ma

In this research project I will be extending existing literature on the issue of what has caused university tuition costs to rise so drastically over the past 25 years. This is a pertinent issue facing the United States currently and affects hundreds of thousands of students across the country. I will be looking at panel data of university sticker tuition prices across states, across time and using this data to assess what allows universities to essentially defy normal laws of demand with constant price increases. Primarily I want to look at the effect of federal student subsidies and their availability on sticker tuition price, which is known as the Bennett Hypothesis. I believe my findings will confirm the Bennett Hypothesis, that federal student aid increases have only cushioned tuition increases and lead to something called a tuition aid trap. My research will be combing the works of several scholarly articles that have approached this issue from different angles. Some of these angles include theories that factors such as Baumol's cost disease and greater increases in earnings of college graduates relative to non-graduates have led to the increase in demand for degrees which allow tuition to constantly rise without seeing a marginal decrease in the applicant pool. My research will attempt to find that federal student aid increases have been the most significant factor in the increases of college tuition over the past 25 years.

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UC Forums

## Characterization of Na<sup>+</sup> Transport in Characids Nonnative to the Rio Negro

STEPHANIE JONES and Richard Gonzalez

The Rio Negro is a tributary of the Amazon River with waters of unusually low ion concentrations ( $[Na^+]$  and  $[Cl^-] \leq 50 \mu M$ ) and high acidity ( $pH \leq 4.5$ ). For typical North American freshwater fish, these conditions inhibit Na<sup>+</sup> uptake and stimulate efflux, resulting in a net loss of salts and death if not corrected. Studies have shown that the fish of the Rio Negro avoid these disturbances until exposed to very low pHs, indicating a high degree of specialization. We examined the ionoregulatory capabilities of two non-Rio Negro characids, congo tetras (*Phenacogrammus interruptus*; CT) and black neon tetras (*Hyphessobrycon herbertaxelrodi*; BNT), to determine whether they exhibit the same pH tolerance and mechanisms of ion regulation as Rio Negro species. Upon exposure to pH 3.5, we found only a mild stimulation of efflux, and no inhibition of uptake. Examination of transport kinetics revealed a high transport capacity ( $J_{max} CT = 1406 \pm 55.0$  nM/g/h;  $J_{max} BNT = 888.9 \pm 52.1$  nM/g/h) and a high affinity ( $K_m CT = 23.8 \pm 3.4 \mu M$ ;  $K_m BNT = 13.0 \pm 3.7 \mu M$ ). These results indicate these characids have ion transport capabilities and pH tolerances very similar to Rio Negro characids, suggesting these capacities may be characteristic to the family Characidae, rather than adaptations to the Rio Negro.

## County-Level SNAP Participation Rates Across the United States

TAYLOR JORDAN and Andrew Narwold

In recent years, the prevalence of food insecurity in the United States has increased to bring the problem to the forefront of American public health analysts, policy makers, and food assistance program administrators. The federal government's most widespread hunger initiative, the Supplemental Nutrition Assistance Program (SNAP), aims to alleviate food insecurity by providing supplemental income to those who lack consistent access to enough food for an active, healthy life. Though a large body of research has emerged to consider the determinants of SNAP participation at the state level, county-level SNAP participation rates remain largely unexamined. The author feels that analyzing increasingly localized spatial diversities will be vital to improving SNAP's efficacy. A holistic consideration of the various factors affecting reliance on SNAP benefits is likewise needed. With these ideas in mind, this paper implements a regression analysis of demographic, health and wellbeing, and food choice factors likely to predict high SNAP participation rates in counties across the United States. After taking into account several regression models and econometric issues, fifteen independent variables are determined to be statistically significant predictors of SNAP participation. The Unemployment, Poverty, Single Mother, and Diabetes variables show the most pronounced predicting power and provide the most compelling support of the paper's theoretical and economic arguments. Subsequent researchers are invited to examine what this evidence might imply for each diverse county in the United States, and policy makers are urged to continually and efficiently target SNAP benefits to those most in need.

## Internship at the Center for Island Sustainability Under the Ecofeed Project: Green Restaurants

HANNA JUGO and Mari Marutani

The Center for Island Sustainability (CIS) at the University of Guam aims to develop island-based models for sustainability through designing and adaptation of technologies in the areas of environment, economy, society, and education. During my time as an intern, I worked under the Ecofeed Project, which researched food recycling technology that created closed loop systems that turned restaurant food waste to animal feed. My duties under the Ecofeed Project included food waste monitoring, data collection and entry, preliminary testing at the research farm site, and survey work. My specific project question centers on the concept of green restaurants, which are establishments that meet certain criteria of sustainable practices in the areas of food waste, energy efficiency, water use, pollution, and use of materials. The goal of my research was to define and evaluate the kind of sustainable practices restaurants in Guam are implementing for their food waste. I surveyed around thirty restaurants to assess any sustainable practices that may or may not be set in place for food waste production and disposal. Results showed that majority of restaurants not only separated their food waste, but also utilized relationships with local pig farmers who used the food waste for animal feed. The data I collected can aid in further developing standards and procedures for restaurants specifically in Guam to promote greener practices among the restaurant industry.

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UC Forums

## Comparing the Beliefs of Islam and Judaism on Nuclear Power

CYRO KAMOGAWA and Evelyn Kirkley

My poster compares the positions that the religions of Islam and Judaism have on the topic of nuclear power. I will explain that each religion believes that nuclear power is acceptable because these resources were given by God. Each faith has historical documents that advise fully utilizing these resources, and so this practice is permissible. On the other hand, the topic of nuclear weapons is far more controversial. The only Jewish nation, Israel, has nuclear weapons. There are also Muslim nations that possess nuclear weapons. Each religion is amid heavy internal controversy, since each one has historical texts that condemn mass destruction. Finally, I will discuss the modern world implications of these beliefs, with particular focus on the Iran Nuclear Deal of 2015.

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UC Forums

## Geologic Map of the Northeast Portion of Black Mountain Open Space Park, San Diego, California

AYA H KARADSHEH, Bethany O'Shea and Eric Cathcart

Black Mountain Open Space Park, located in northern San Diego, California, is popular with visitors who are drawn to its various trails for recreational activities. Additionally, in the northeast portion of the park, abandoned arsenic mines are common. In 1975, the USGS published a 1:24000 geologic map (Poway Quadrangle) that is not sufficient for studies requiring a deeper understanding of the canyons geologic composition. In addition, the Poway Quadrangle map depicts the area as a Jurassic volcanic unit labeled as the Santiago Peak Volcanics (SP). However, recent studies have shown SP is actually Cretaceous in age. In addition, formerly identified SP outcrops in and around Penasquitos Canyon (to the south of Black Mountain) are also Jurassic in age and have been renamed as the Penasquitos Formation. This study has resulted in the creation of a 1:1000 scale geologic map of the area (from N320 59'12.48' to N320 59'38.4' and longitude W1170 06'35.49' to W1170 06'50.85'). Field reconnaissance in the Black Mountain Area has identified meta-volcaniclastic andesites (KspVCA), fine-grained meta-volcanic andesites (KspA), and meta-basaltic andesites (KspBA). An accurate, detailed map of the SP is crucial to future and ongoing studies relating to the composition and distribution of the volcanics and the presence of arsenic in the area.

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UC Forums

## Strategic Alliances in Venture Capital

VIKTORIA-TETIANA KARHINA and Alyson Ma

The topic for my research is "Strategic Alliances in Venture Capital" and study is an empirical examination using data for over 30 years. The paper will contribute to the current research by examining how did alliances help portfolio companies to create a greater value at the time of IPO, how it diversifies the risk, and decreases capital infusion among venture capital firms. These high-risk takers are significantly benefiting the economy since they are the ones promoting innovations and uncovering new markets. On the other hand engaging in strategic alliances can be quite expensive and carry a high level of uncertainty. Researching current trends, will give me an opportunity to discover what is going on in the market and how can the riskiest investments become safe by engaging in strategic alliances. Due to the lack of the research, this study will be very beneficial and help people to understand how does the risky investment market is operating. Venture Capital is playing an important role in the economy by contributing to research, development of the new technology and uncovering new markets. Since this is one of the investing opportunities, it's important to know how can risk be diversified. Since strategic alliances tend to be more positively related to the capital infusion, researching this topic in the more detailed way will be beneficial for many of us.

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UC Forums

## Why Go Global?: Transitioning from Domestic to Transnational Terrorism

MADELINE KASIK, Casey Dominguez and Avi Spiegel

Since the September 11th terrorist attacks on the World Trade Center, the United States has engaged in what is called the global “War on Terror.” As a hegemonic power, this US-led “War on Terror” has become a worldwide phenomenon and, terrorism, particularly transnational terrorism, has received increased global attention. However, even before 9/11, terrorist attacks were an important political strategy. While the majority of terrorist attacks remain concentrated in their state of origin, global attacks are steadily rising. In particular, the actions of ISIS, or the Islamic State in Iraq and Syria, have thrown the world into a state of turmoil. ISIS, however, started out as Al-Qaeda in Iraq, a domestic organization focused on punishing infidels and nonbelievers while promoting an Islamist state. Thus far, there is no agreed upon reason as to why a domestic terrorist organization transitions from a local and regional group to a transnational actor. The purpose of this paper, therefore, is to examine the literature surrounding three Islamist terrorist organizations from different regions that have each started as domestic organizations and then transitioned globally. For comparative purposes, these organizations will be juxtaposed with a domestic Islamist terrorist group in order to examine the rationale of going global. By analyzing possible theories surrounding these motivations, it is the objective of this research to gain a better understanding of why groups engage in transnational terrorism and how foreign policy officials can better combat it.

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UC Forums

## Mexican-American Border Acculturation

KELLY KENNEDY and Vidya Nadkarni

Acculturation can be loosely defined as the process through which an individual from one culture/society is exposed to another culture/society through immigration and the cross-cultural transfer that occurs from such migration. Mexican-American acculturation was originally assumed to be “straight line”? Meaning that the change from a completely Mexican identity smoothly and methodically transformed into theme melting pot? Mentality of Anglo-nationalism. Now, acculturation is seen as a multidimensional process of “segmented” change, which occurs over time and generations. There is a relationship between proximity to borderlands and the process of acculturation that immigrants and their families go through. If a Mexican-American lives in close proximity to the Mexican-American border within a community that prioritizes maintaining traditional cultural identity, than their process of acculturation will significantly differ and may even be slower or distorted in comparison to a Mexican-American that does not live in close proximity to the Mexican-American border or does not live in a community that prioritizes maintaining a strong traditional identity.

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UC Forums

## Understanding Differences

ISIAH KING, Daniel Kurzweil, Pat Moschetti, Martin Cazarez, Alex Michail and Alberto Pulido

Our group will be focusing on how school organizations incorporate and include people of different cultures and backgrounds. The group that will be getting our information from will be the Center for Inclusion and Diversity. We feel that if any group will be pushing change on this campus it would be this particular organization which seems to cover everyone. From our talks with the Center for Inclusion and Diversity we will analyze the steps they are making to truly create an accepting environment at USD but also what improvements can be done from student’s perspective.

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UC Forums

## How Much Is Too Much: The Effects of Private Credit on Growth

THOMAS KLEIN and Alyson Ma

Much of the research on the effects of the financial system on economic growth volatility shows that more available private credit is, the less volatile the growth of that country. However, one paper by Easterly, Islam, and Stiglitz (2001) demonstrates that this relationship is not linear. This is an important distinction because it shows that, not only are the effects of a deeper financial system diminishing, but also there is a potential turning point in which an even deeper financial system causes more volatility than it prevents. This paper will look into the relationship between the financial system and growth volatility exposed by Easterly et al. (2001). This paper will see if the relationship holds in the U.S. from 1952-2014. This paper intends to show that the non-linear relationship between private credit and growth volatility does hold.

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UC Forums

## Ab Etruria Ad Romae: Etruscan Origins for the Roman Practice of Human Sacrifice

KATHERINE E. KOLTHOFF and Ryan Abrecht

“Evidence from both literary and archaeological sources indicate that the Romans practiced various forms of human sacrifice or ritual murder until it fell out of favor in the first century BCE. Recent excavations and ancient accounts have likewise provided examples of similar acts that can be attributed to Rome’s neighbors, the Etruscans, whose territory had included much of Central and Northern Italy from the 7th century BCE through the 4th century BCE, and to whom the Romans themselves attributed many aspects of their religion and culture. Through the analysis of ancient Roman writings, modern archaeological discoveries from excavations on the peninsula, and circumstantial evidence, this paper endeavors to demonstrate that Roman practices of human sacrifice and ritual murder can largely be attributed to Etruscan influence. “

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UC Forums

## Promoting Civil Civic Discourse

AMANDA KRASULICK and Karen Shelby

In this project, I focused on researching methods to get the community involved in a civil civic debate over tough issues. In doing so, I looked up syllabi for college courses and community guidebooks that worked towards discussing these tough issues in a productive way. I also helped strengthen the social media accounts for the organization (Institute for Civil Civic Engagement) and thereby broadened the reach of this initiative.

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UC Forums

## A Story Reclaimed: Holocaust Memoir and Shattering the “Single Story”

NANCY KUELBS and Tobie TondiAs Chimamanda

Adichie asserts, “Power is the ability not just to tell the story of another person but to make it the definitive story of that person.” The Nazis exploited propaganda and the “blood libel” tradition to create a “single story” about the Jews; this single story allowed the Nazis to perpetrate the Holocaust from a position of power, claimed by violence and unrestrained by conscience. The Nazis sought to erase the Jew as an individual and to obliterate European Jewish culture. In the aftermath of the Shoah, the Holocaust memoir emerged as a heteroglossic narrative of testimony I propose that this genre represents the imperative to bear witness, seeks to expose the lie, and replaces the perpetrator’s single story with the survivors’ multiple stories.

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UC Forums

## Amazonian Migration Patterns: Causes and Consequences of Andean Settlement in the Community of Pillcopata, Peru

RANI KUMAR and Lisa DePaoli

Since the 1960s the Peruvian government has promoted agricultural expansion and colonization in the Amazon. While policy has begun to shift, the Amazonian frontier remains a place of dynamic social change of great environmental concern. Through 24 semi-structured field interviews with both community members and government agencies in the upper-Amazonian town of Pillcopata, this study constructs a historical timeline of Andean settlement in the community and chronicles the migratory experience of the colonizers. This timeline places the foundation of the town in 1961 and demonstrates that migration patterns appear to correlate with social and economic macro policy changes. Common themes which surfaced during research include overarching positive transitional experiences to the Amazon, pluricultural identities, frustration with the town’s socioeconomic situation, and expressed hopes and fears for the future of Pillcopata. Unexpectedly, the findings of this study indicate that Andean colonizers, whose livelihoods such as logging and agriculture often directly contribute to deforestation, have developed a strong affinity for their new environment and are concerned with the rapid degradation of the Amazon. This receptiveness to environmental concerns suggests that future conservation efforts could have increased success in the colonized Amazon regions if community engagement and participation are made central components of environmental protection goals.

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UC Forums

## Boarder Brutality

BRIANNA LAROSILIERE, Rita De Cassia De Sousa Moreira, Conner C. Fitzgerald, Nicholas J. Cosenza, Michael Fitzpatrick and Alberto Pulido

The discrimination among Mexican immigrants in the United States has created a huge problem that needs to be solved. Seeking citizenship in the United States as a Mexican immigrant is not an easy battle. Having documentation is one thing, but getting past border control is another one. Border control has been abusive towards immigrants trying to reach the United States. This kind of brutality led us to do more extensive research into the case of Anastacio Rojas. Anastacio was a man from Mexico who died in the hand of immigration officials. We will review this case and examine it within an ethnic studies framework and seek out expert opinion on both sides of the issue. We will focus on broader border issues and seek out solutions.

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UC Forums

## Spatial Distribution of Zooplankton in Bahia Magdalena, Baja California, Mexico

KAITLIN LATHROP and Michel Boudrias

Spatial distribution of zooplankton were analyzed in four different locations in Magdalena Bay, Baja California, Mexico. The sampling locations in the bay were chosen to provide a comprehensive analysis of planktonic community structure. Zooplankton samples were collected with a five minute plankton tow using a 300 micrometer net. Shannon-Weiner indices were calculated to analyze the community structure and determine the dominant species for each sampling site. Preliminary data results suggest that copepods dominated at the Los Dunas site, dominance was distributed between copepods, chaetognaths, mollusk larvae, polychetes, and nauplii at the A1/B1 and A5/B5 site. High numbers of individual diatoms were found at Los Dunas, and high numbers of diatom chains were found at A5/B5, suggesting different stages of phytoplankton bloom conditions.

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UC Forums

## Does Changing Uniform's Color Makes NBA/WNBA Teams Perform Better?

AMANDA LAUDERDALE, Nergis Akkaya, Zaki Alabdullah, and Nadav Goldschmied

Past research identified an association between the color of sport teams uniforms and performance. For example, the association between black color with aggression (Webster, Urland & Correll, 2012) and red color with dominance (Feltman & Elliot, 2011). In addition, experimental research found that red color influence performance (Elliot, Maier, Moller, Friedman, & Meinhardt, 2007). The current investigation attempted to find if changes in away uniform colors in American basketball yielded changes in performance. We explored NBA and WNBA teams (2003-2015 seasons) for home and away games. All in all, we recorded 14 jersey changes in both leagues. We found that especially bad teams tended to opt for a uniform change. Also, we found that that NBA teams (n=5) which changed into red uniform improved their away performance (relative to home) in the season after the change (relative to the one before) while not improving overall. In conclusion, we discuss the possible reasons for the observed effects.

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UC Forums

## Extracting Rare Earth Elements: The First Link in a Critical Supply Chain

MARY ANN LEE and Lawrence Chisesi

Rare earth elements (REE) are a series of chemical elements found in the Earth's crust that are vital to many modern technologies, primarily consumer electronics and national defense. The United States, once reliant on domestically produced REE's, has become completely dependent on its supply for REEs on other countries, particularly China, for the last fifteen years. With China's monopoly on the market and its recent history in limiting rare earth exports to countries in the past, industry analysts have expressed a rising concern over the growing scarcity of REE metals and the dependence on foreign sources to supply the demand for REEs. This investigational study identifies economic and geo-political issues facing technology companies and governments around the world that rely on the constricted supply of REE. It examines economic theories centered on scarcity that predict that for any raw material growing in scarcity, there will always be a search for new supply, search for alternatives, and development of a broader supply chain through all phases of production, from mining to final product.

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UC Forums

## Justice in Mexico Rule of Law and Drug Related Homicide

ELIZABETH LEFAVOUR and David Shirk

The Justice in Mexico Project works to increase rule of law in Mexico and identify drug related homicides. Personally, I help to track and monitor relevant stories in Mexico, to produce well-written, comprehensive, articles for publishing in Justice in Mexico blog. I also work on crime victimization documentation and contribute to the project Memoria by documenting cases of homicides with presumed links to organized crime. Finally, I contribute to social media outreach by producing weekly posts for social media with relevant information about Mexico in research areas.

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UC Forums

## Mothers of India Street: Exploring Gender Roles in San Diego's Little Italy 1918-1941

CARL LEHMAN and Kathryn Statler

San Diego's Little Italy was an ethnic community that developed in the early 20th century. It was a community of fisherman and their families that resided in the neighborhood around India Street. This research project seeks to explore the social role of women in Little Italy in the interwar period between 1918-1941. Women played an important social role in the community centered on their roles as mothers. It will also explore women's position as the enforcers of traditional Italian family values. It will give sufficient background on the traditional position in Italian culture and its effect on San Diego's community. The project also seeks to analyze the portrayal of women in film depictions of Italian-American culture and to contrast these depictions with the lives of women in San Diego's Little Italy. Finally, the project traces the evolution of the role of Italian-American women in popular culture.



## Posters Presentations, Session II

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Session II: 1:10 to 2 p.m.

UC Forums

### Policy Recommendations for Building Sports Stadiums and Arenas that are Economically Successful in the Long Term

JORDAN LEMOINE and Casey Dominguez

Each year, massive investments are made in sports arenas and stadiums in many different countries. The overwhelming majority of research on the subject supports the conclusion that these investments rarely, if ever, provide the massive benefits to local economies that Economic Impact Reports predict. However, it is clear that exceptions to this bleak prediction exist. The purpose of my project is to identify the factors that allow sports infrastructure to be as economically successful as possible in the long term. The first of these factors is the reusability of the stadium, or the frequency with which events are held there. Next, the factor of location denotes how close a stadium or arena is to the central business district of a city. This is important because a close proximity facilitates the consumption by the wealthy corporate sector of services or goods that are produced by the infrastructure. Finally, the factor of whether or not the stadium or arena was built with the purpose of urban revitalization in mind can provide a boost to the growth of an underperforming district by attracting new business. After ascertaining the degree to which these variables contribute to the economic success of sports infrastructure, my conclusions will be framed as policy recommendations to local or national governments in advanced industrialized nations that are considering investments in sports infrastructure designed either to house a domestic sports team or to hold a mega-sporting event such as the FIFA World Cup or the Summer Olympics.

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Session II: 1:10 to 2 p.m.

UC Forums

### Inside The Chaos: Interning for Majority Leader Kevin McCarthy

OWEN LEWIS and Gary Gray

Stepping off the red line D.C metro I was a sweaty, nervous wreck approaching the Capitol building. 435 congressman and hundreds of their staff raced through the underground tunnels connecting the five major buildings in the capitol. As I walked through the Capitol Paul Ryan passed me as he mulled over the latest legislation that would be voted on the floor that day. I witnessed John Kerry pleading to the foreign relations committee to pass the presidents Iran nuclear deal. In my first few hours I saw that D.C moved with lightning speed and had a certain enigmatic energy to it: Everything you were doing had a purpose that surpassed any individual. Each day the future of our society was being shaped by these very people at this very place. I was hooked. But the most important takeaway from my Washington experience was that I met one of the most impressive and polished politicians of our time: Majority Leader Kevin McCarthy. He is described as a genius of people skills; after greeting everyone he meets with a firm handshake and big amiable grin, he memorizes your name, your family's name, your dogs name and anything else you told him. But more than being a personable gentleman, this man is a wise and sturdy anchor for the Republican Party. He surrounds himself with staff members who can only be described as geniuses. This is a man who overcame the temptation to seize the speakership because he was thinking about the long term. Congressman McCarthy, his impressive staff, and Washington itself has exposed me to the thrilling rollercoaster of politics, the backbone of our country, and I know that one day I will be following in the footsteps of the people who work so tirelessly to make America the most wonderful country in the world.

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Session II: 1:10 to 2 p.m.

UC Forums

## San Diego Housing Prices Forecast

MENG LI and Alyson Ma

I want to answer the question how housing prices in San Diego would behave in five to ten years and in particular if fundamental economic factors such as GDP offers a base for long run housing price trends. I will use a vector auto regression model to forecast housing prices. For housing prices data I will be using the S&P/Case-Shiller CA-San Diego Home Price Index from FRED. This index contains seasonally adjusted monthly data from 1987 to 2015. I will also include the growth rate of GDP, LA housing prices, the rate of inflation, the real short term interest rate, the term spread and the growth rate of inflation adjusted bank credit as dependent variables in my regression

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Session II: 1:10 to 2 p.m.

UC Forums

## Identifying Birds Through Machine Learning

ERIK LOCKE and Eric Jiang

This study is to show that machine learning algorithms have the ability to identify a species of bird based on unique aspects of how that species sounds. The study incorporates the use of Artificial Neural Networks to analyze sound file data and associate that data with a bird species. Artificial Neural Networks are machine learning algorithms that are based on discoveries in neuroscience. The main result is a software program that can be easily setup to learn what specific bird species sound like and identify different recordings of them. With the working software this shows that machine learning can have a use in aiding research in different fields other than Computer Science.

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Session II: 1:10 to 2 p.m.

UC Forums

## Counter-Narrative in Latina Business Women's Stories

ALEJANDRA LOPEZ-CUELLAR and Jesse Mills

Storytelling has always been a major part of any society. It allows for recounting of experiences of people and places. More importantly it allows us to honor those who came before us. An important thing to note is that for every dominant master narrative, there is always an alternative counter story/narrative. That will be the focus of this project: to explore the lived experiences of Latinas/Chicanas in small business, as they often face multiple obstacles to entering the business industry. It is concluded that in an industry not allowing or accepting cultural understanding and representation through storytelling, creates a major divide to the detriment of both companies and consumers.

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Session II: 1:10 to 2 p.m.

UC Forums

## Making Landfall: A Study of Hurricane Strength and Crime

CHRISTOPHER LUND and Alyson Ma

As media coverage of disasters becomes more prolific and widespread, images of crime: looting, stealing, and vandalizing seem to become commonplace in the wake of tragedy. The more powerful the storm, the more pervasive crime seems to become after the storm subsides. The question that this paper attempts to answer is if this is really the case. That is, do natural disasters, specifically hurricanes affect crime rates in a significant way. This project's primary focus has an emphasis on people's behavior as rational actors respond to changing circumstances in their own lives in the wake of these tragedies. I will measure crime rates across several different coastal counties that were not equally affected by hurricanes over the course of several years, and compare them against each other to see if the hurricanes are statistically significant in explaining the difference in crime rates. Natural disasters as a result of warming waters have become more commonplace and stronger than they have been historically and I hope that implications of the result of my project help local and federal authorities and policy makers understand how best to address natural disasters as they happen.

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Session II: 1:10 to 2 p.m.

UC Forums

## Working With the People of the 80th District

ASHLEY MAJANO and Gary Gray

Under the supervision of my faculty mentor Dr. Gary Gray, I am interning at the office of the Assemblywoman Lorena Gonzalez of the 80th District. Some months we host big events that aim to help clothe, feed, and assist our constituents but all year long the office is working to address all of their needs. I speak Spanish which helps direct and inform people at these events, because a majority of the community predominantly speaks Spanish. I write out thank you letters and certificates of appreciation to those that come to our events or have stood out in the community. It's a very humbling, rewarding, and inspiring job working for Lorena Gonzalez. I hope to gain more focus on my career and learn from her methods of reaching out and communicating with her constituents. She makes real changes happen for those that have needed help for years, and that is what I want to do as well. Her determination and well as the charisma from the office has inspired me to remove my own limits and understand one's power can become real with support and enough effort.

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Session II: 1:10 to 2 p.m.

UC Forums

## Selective Formation of Biaryl by the Copper-Catalyzed Etherification of Benzylamine Boronate Esters

JUSTIN MARCUM, Carl Ferber, Kathryn McGarry, and Timothy Clark

Biaryl ethers are a reoccurring motif in a number of biologically relevant compounds. Access to these compounds has been hindered due to the nature of aromatic compounds, since traditional methods of synthesizing ethers are ineffective on these types of substrates. Access to such biaryl ethers has been shown to be possible through copper-catalyzed coupling between aryl boronate esters and phenols. This ether synthesis is possible because of the versatile nature of the C-B bond that allows for facile transformation to C-O, C-N, or C-C bonds. Previous research in the Clark lab developed an effective means of synthesizing aryl boronate esters through directed C-H borylation of benzylic amines, in which a normally unreactive C-H bond is transformed into a reactive C-B bond. These aryl boronate esters are of particular synthetic and biological interest for etherification because of the presence of the benzylic amine. Preliminary etherification reactions showed the reaction was sensitive to base and copper catalyst choice. The reaction was optimized using copper (II) trifluoroacetate catalyst and potassium fluoride as the base. The etherification reaction is shown to

be tolerant of several varieties of substituents on the phenol providing moderate to good yields. Similarly, the reaction appears tolerant of a variety of substituents on the boronate ester, providing moderate yields.

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Session II: 1:10 to 2 p.m.

UC Forums

## Modeling Metalloenzyme Active Sites: Nitrile hydratase (NHase) Structural Analogues

RAQUEL MARKHAM, WESLEY CHOW and Christopher Daley

Amidato bonding (metal bound to backbone N atom of peptide) is rarely found in nature as most metals are found bonded to the side chains of peptides rather than the nitrogens of the backbone; however, over the years, various significant systems involving these types of bonds have been discovered. To better understand the properties of these metal-amidato bonds our group has worked on making small molecular complexes that are structurally similar to the active site found in NHase, through a series of reactions involving the protection and deprotection of certain highly reactive functional groups. The native NHase active site (the form found naturally in nature) structure is chiral; meaning it is asymmetric in such a way that the structure and its mirror image would not be superimposable. As such, our goal was to make our model analogue system chiral as well, making it the most accurate model reported in the literature. Previous work in our group found that on completion of the synthesis of the desired complex, somehow the product had been converted from its original pure chiral form to a 50:50 mixture of both forms (enantiomers). In this research, we worked to circumvent the problem where the compound turns into a mixture of both enantiomers, so as to form a model analogue compound containing only the desired chiral form (enantiomer) to better characterize and understand NHase and the rare metal-amidato bonds.

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Session II: 1:10 to 2 p.m.

UC Forums

## Specific Binding Determinants Between Calcineurin Homologous Protein Isoforms 1 and 2 with Sodium Hydrogen Exchanger 1

CHELSEA MARSHALL, Daniella Silva, Mark Wallert and Joseph Provost

The Sodium Hydrogen Exchanger (NHE1) is a ubiquitously expressed protein, which regulates cell volume, intracellular pH, and motility. This antiporter exchanges an intracellular proton for an extracellular sodium and is regulated by a range of protein or lipid interactions and phosphorylations. Calcineurin Homologous Protein isoform 1 (CHP1) and isoform 2 (CHP2) both bind to essentially the same site on the carboxyl terminus of NHE1. However, while CHP1 and CHP2 share a 61% amino residue homology, they have different binding affinities for NHE1. Understanding how one isoform can bind NHE with greater affinity than another is of interest because CHP1 is required for basic NHE1 function and a physiological role of CHP2 has not been identified. To study the interaction of each CHP isoform with NHE1, we have generated a GST-NHE1 fusion protein (aa 803-846) and His tagged CHP1 and 2. After expression and reconstitution of a thrombin cleaved NHE1 peptide with CHP we determined the interaction using pull-down and thermal melt. To identify possible binding determinants on NHE1 for the each CHP isoforms we mutated eight residues of NHE1 thought to play a role binding CHP. These key residues, include: Asn519Ala, Asn519Asp, Ile518Gln/Ile522Gln, Ile534Lys, Ile537Lys, His523Gly, His523Ile, and Asp536Gly. Protein interactions with recombinant CHP1 or CHP2 with each mutant NHE1 peptide was determined using thermal denaturation, circular dichroism and other biophysical methods. This work will illuminate potential interaction sites on NHE1 for CHP, and demonstrate sites common and unique for both CHP isoforms.

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Session II: 1:10 to 2 p.m.

UC Forums

## Neuroplasticity Through Visual Learning and Serotonin Modulation

AMARIS MARTINEZ and Rachel Blaser

Learning is thought to be associated with brain plasticity. Several factors, such as increased levels of serotonin, are correlated to an increase in learning and brain plasticity. The hormone serotonin is known to be present in increased levels in salmon during early learning developmental stages. The increase of serotonin levels and an increase in brain plasticity seen in salmon provide the opportunity to explore the relationship between serotonin's role in learning and neuroplasticity. In this experiment, we analyze the effects of serotonin on visuo-motor learning in zebrafish. We administered fluoxetine in order to manipulate serotonin levels, and then observed the effects on the learning of predatory behavior in zebrafish. Zebrafish were trained for 5 consecutive days to hunt for live prey, then tested for learning. We hope the findings lead to future studies investigating the relationship between serotonin levels and neuroplasticity in patients with neurocognitive motor movement disorders.

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Session II: 1:10 to 2 p.m.

UC Forums

## Water Bottle Consumption

SOPHIA MAZIS and Alyson Ma

Water is one of the most important parts of our lives. Our bodies are made up of 75% water and we are advised to drink at least 2 liters of water a day. We need water to survive. In this day and age, we are able to get water in a variety of ways. For example, we can get water through the tap or we can buy bottled water. I am interested in exploring why purchasing bottled water has become so popular, especially since bottled water is almost 10,000 times more expensive than tap water. The annual consumption of bottled water has practically tripled in the past ten years. It is now an \$11.8 billion industry. Today, American consumers are spending a colossal amount on commercial bottled water, even though we have some of the best municipal tap systems in the world. The purpose of my research is to prove that even with adequate resources in the U.S., we still continue to spend money on something that is not necessary to buy.

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Session II: 1:10 to 2 p.m.

UC Forums

## Rethinking the Way We Teach: Why Mentoring Matters

AARON MCCARTHY and Ilana Lopez

My project will be focused on creating a business model that explains how I plan on transforming Young Dreamers United, a middle school program I co-founded, into a fully functioning business operating across the United States. YDU is a middle school mentorship program designed to equip students with basic goal setting and time management skills that will help them achieve success in their future. When we first created the program, we wanted to provide students with information and tools that would help them succeed in life, all while providing a fun and interactive environment for them to learn. We felt that by utilizing a mentorship relationship with these students and incorporating weekly sessions of games, videos and group discussions led by these mentors, the students would be more engaged and motivated to explore their dreams, hobbies and interests. We have seen physical changes within these students where students have gone from being too shy to share their name in the first session to confidently speaking about their dreams of becoming a roller coaster engineer. Our mission is to continue building the program and inspire more students to reach outside their comfort zones and begin pursuing their dreams today.

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Session II: 1:10 to 2 p.m.

UC Forums

## Experimental Prototype Community of Tomorrow

ANNWHITNEY MCCOMBS and Molly McClain

“There’s so much that we share that it’s time we’re aware, It’s a small world after all.” The lyrics, familiar to many Americans, were featured in a now-outdated Disneyland attraction, “It’s a Small World,” that first debuted in 1964 at the New York World’s Fair. The theme of this fair, “Peace through Understanding,” inspired Walt Disney to imagine and begin to build an “Experimental Prototype Community Of Tomorrow,” or EPCOT for short. This utopian society would feature a large geodesic dome in which 20,000 of the brightest people would live, invent, prosper, and teach the rest of the world how to live in peace and prosperity. Disney himself planned to organize and lead this experimental world. In 1966, however, Walt Disney passed away leaving behind a project that his colleagues never understood. EPCOT is now one of four theme parks in Florida. My thesis examines the utopian origins of this project in the nineteenth and early twentieth centuries, with particular attention to World’s Fairs. It also explores the ways in which EPCOT was intended to highlight the technology, innovation, and consumerism in the context of the Cold War.

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Session II: 1:10 to 2 p.m.

UC Forums

## Race in the Response: Reader Response to Racial Ambiguity in the Hunger Games

CHELSEA MCLIN and Carlton Floyd

What do readers presume to know about a character’s race in texts in which such signifiers are not explicitly marked, and what do those presumptions mean for reading? This line of inquiry first took shape from my reading of responses to *The Hunger Games*, published in 2008, and subsequently adapted to film. I was struck by online commentary concerning the filmic depiction of one character, Rue, as Black. One commenter, republished on Jezebel.com, noted that when they “found out Rue was Black her death wasn’t as sad.” This reader, then, ignored the racial cues in the text, reading Rue as white, largely because to see her otherwise gave them less reason to identify with her. Given recent claims that we exist in a post-racial society, the racial comments expressed above suggest race, if not racism, informs how we read. My hypothesis is that this reader’s comments privilege whiteness as a desirable characteristic particularly if one wants to sympathize with the character. I propose to study, then, whether and to what extent the default identifier for characters, particularly characters that elicit sympathy or empathy, is white, even potentially, among non-white readers.

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Session II: 1:10 to 2 p.m.

UC Forums

## Myoglobin in Diving Eared Grebes

MICHELLE MCSKANE, JONINA CAPINO, LYNN LEE and Hugh Ellis

The Eared Grebe (*Podiceps nigricollis*) is a leg-propelled diving water bird. It is found primarily in North America and is most closely associated with highly saline habitats. Oxygen storage is an important mechanism for diving and is achieved through respiratory volume, hemoglobin, and myoglobin. This research focuses on myoglobin concentrations in four tissues of the Eared Grebe: the gizzard (a grinding stomach), pectoralis (flight) muscle, gastrocnemius (diving leg) muscle, and the left ventricle of the heart. Myoglobin (Mb) is a protein that stores oxygen in the muscles by binding one oxygen molecule to its single heme group. It has a higher affinity for oxygen than hemoglobin so that diffusion of oxygen from the blood to muscles is assured. In order to determine Mb concentrations, assays have been performed on each of these tissues. Data have shown that the Eared Grebe pectoralis muscle, while not used for diving, has Mb within range of some of the strongest wing-propelled divers, such as penguins. Additionally, the gastrocnemius concentrations are the highest of all divers, both leg-propelled and wing-propelled. While little data exist on heart Mb concentration in aquatic divers, it has been shown that this concentration in the Eared Grebe is within range of the Pigeon, a terrestrial continuous flyer. Lastly, the Eared Grebe gizzard Mb concentrations are within range of birds with diets that require a high degree of activity in order to break down their food. Overall, Mb concentration is a valuable indicator to assess the oxygen storage capacity of the Eared Grebe and to explain a mechanism by which sustained diving can occur.

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Session II: 1:10 to 2 p.m.

UC Forums

## The Oxidative Stress Response in *Drosophila melanogaster*

DESIRAE MELLOR and Adam Haberman

As individuals age, old and damaged cells are removed and replaced. However, unlike most somatic cells in the body, neurons are not capable of regeneration. Therefore, neurons are specialized to stay healthy longer than other cells. A group of genes have been identified whose expression in neurons increases with age. We propose that some of these genes are essential to neuronal longevity, although which genes and in what capacity is still unclear. One of the ways cells are damaged as they age is through oxidative stress. Our study investigated whether these genes have an impact on neuronal longevity by protecting against the damage of oxidative stress in *Drosophila melanogaster*. The functions of the genes of interest were knocked down with RNA interference, and some of the flies were fed food made with paraquat. Paraquat causes the formation of superoxides, which cause oxidative stress. The flies were aged for seven days under these conditions. The eyes were then collected, stained and imaged on a confocal microscope. The results showed no significant difference in degeneration between the control group and the paraquat group. This result indicates that, while the genes may have an impact of neuronal longevity, they either do not protect against oxidative stress or the loss of one gene is not enough to impair the cells' response to oxidative stress. Future research could continue to investigate the capacity that these genes contribute to neuronal longevity.

## The Sorting Hat Comes To USD

ASHLEY MENDES, KATIE FOTION, JORDAN READYHOUGH, WENXIN QIU, Jane Friedman, Lynn McGrath and Amanda Ruiz

“National studies have shown that students in Living Learning Communities demonstrate stronger academic achievement, and are more invested in and connected to the campus community” (USD LLC website). As students at USD, we would like to support and help improve the placement of students into LLCs in line with their interests. The USD faculty and staff currently place incoming freshmen into first year preceptorial classes and Living Learning Communities (LLC's) by hand. The many constraints inherent in the placement process make placement by hand challenging and inefficient. We would like to improve placement, making it more efficient and optimizing the number of students in one of their top three choices of preceptorial classes. Our approach to this problem implements Integer Linear Programming. Our algorithm is based on an analysis of a similar problem at Macalester College in Minnesota, which Andrew Beveridge and Stan Wagon discuss in their paper “The Sorting Hat Goes to College.” Here, we report on the first step of our implementation of the algorithm, placing USD Honors LLC students into preceptorial classes.”

## British Petroleum Oil Spill: Post-Disaster Crisis Communication

ALLYSON MEYER and Julia Miller Cantzler

In April 2010, a Gulf of Mexico oil platform went up in flames after an explosion onboard. For the parent company, British Petroleum (BP), the following months were spent plugging a leak that flooded the Gulf with millions of gallons of oil. BP resorted to crisis communication to preserve its image and to assure the public that cleanup efforts were underway. The purpose of this study is to look at the ways BP presented itself and the spill to understand how the messages may have perpetuated injustices. Research was conducted through a qualitative discourse analysis of the press releases. Through this, it is clear that BP's communication furthered injustices, e.g. the promotion of business interests at the cost of the environment, and presented post-spill communication in such a way as to limit the disaster discussion. BP was operating within an institutional norm of business interests over environmental or human concerns, perpetuating environmental injustices in its response. BP is not the only company to further injustices through its communications, but the incident presented BP with a platform from which it continued to espouse social inequities. Going forward, it is essential to understand the institutional norms that promote inequality to better meet the needs of those harmed by disasters. BP is neither the first nor the last company to focus on its own interests, but it is important to evaluate post-disaster communication because, at its core, company-created messages are crafted in a way to protect the corporation and its future.



## Asylum: A Multifaceted Analysis of the Implications of Cultural Norms on Adjudication of Central American Cases

KAITLIN MEYER and Everard Meade

The research this proposal outlines will focus on looking at precedent cases, asylum grant rates, and migrant apprehensions from Guatemala, El Salvador, and Honduras in order to understand how U.S. cultural norms have influenced the adjudication of asylum claims. The three countries are located within the “Northern Triangle” region, an area plagued by gang and gender-based violence. Many who have fled this area have cited the conditions of their country as the reason for their departure. In order to address the impact of cultural norms on asylum adjudication for Central American migrants fleeing gangs and domestic violence, this research will follow a methodology that includes both qualitative and quantitative evidence. The quantitative aspect will include the statistics on the apprehension of undocumented Central American migrants, statistics on asylum grant rates for Central American migrants, the amount of national legislation dealing with domestic violence and gangs in the U.S. (in order to determine the weight of societal recognition of the problem in the U.S.), and the homicide and femicide/gender-based violence statistics for these Central American countries. The qualitative approach will focus on two case studies of precedent setting cases in order to determine the judicial interpretation of the specific persecution faced by the applicant. Overall, this research hopes to show that the disparity in adjudication of asylum cases results from unequal emphasis placed on domestic violence and gang persecution in the U.S.

## The Concept of Consent and Unwanted Sex

DANIELLE MEYERS and Lori Watson

The purpose of this study is to explore the ways in which the socialization of gender roles shape conceptualizations of consent among female adolescents and to indicate how this leads to instances of unwanted sex in college. In this study, unwanted sex involves a woman consenting to sexual behavior even though she does not want it; her motives, therefore, are something other than sexual pleasure. The research will look at socialization through formal and informal sex education including school, media, and the Christian religion. Additionally, it will look at the concepts of consent, sexual violence, and unwanted sex through the lenses of college women and legislation. By achieving a more complete understanding the concept of unwanted sex, a transformation in education and policies could make them better equipped to prevent and deal with instances of unwanted sex in college.

## Leadership Identity Development: How a Social Innovation Workshop Develops Relational Leadership in First-Year Students

AUSTIN MICHEL and Cheryl Getz

As a Changemaker campus, the University of San Diego is committed to developing students into leaders and social innovators prepared to take on issues of social justice. One program that has been developed at USD to do this is the Emerging Leaders course offered to first-year students. During the course, students learn the Social Change Model of leadership, which culminates with a Social Innovation Workshop. Within the workshop, the goal is for students to develop leadership competency, awareness around social justice issues, and the skills to affect social change. The purpose of this research was to see the results of a Workshop done in the Fall of 2015, to see if students not only developed their leadership competencies and awareness around social justice issues, but continued that development months later. To measure this, students were given two structured interviews, one at the completion of their workshop and one two months later. In addition, the student's final papers from the course were collected and coded. To measure the students' growth around leadership competence, particularly relational leadership, students were placed within stages of the Leadership Identity Development model; a grounded theory of leadership that tracks the progression of college students as they develop relational leadership. In addition, students were asked questions around their awareness and perceived ability to affect change on social justice issues. The hope is that as data is collected and analyzed, the success of the program can be measured, as well as ways in which the course can improve.

## Population Dynamics of an Invasive Species of Bryozoan within Mission Bay, San Diego, CA

CHARITY MILLAN and Nathalie Reys

*Zoobotryon verticillatum* is an invasive species of bryozoan that can be found throughout the world due to its high resilience to varying physical conditions. The objective of this study was to measure the population dynamics of this species and examine how its density varies with time. This study was done at the South Shores docks in Mission Bay, San Diego, CA from October through December 2013 and 2015. A 25cm x 25cm quadrat was randomly placed alongside the two different docks in order to measure the quantity of *Zoobotryon* present. In addition, the physical conditions of temperature, salinity, and light were measured using a thermometer, refractometer, and light meter, respectively. The average density of *Zoobotryon* was slightly higher in 2013 than 2015 and the density sharply decreased in the fall/winter months in both 2013 and 2015. Lastly, density decreased with decreasing temperatures in 2015. The presence of *Z. verticillatum* needs to be monitored, especially as sea surface temperatures are expected to increase with global warming. The warmer the water, the less native species will be able to tolerate their environment. In this case, invasive species could take over the local marine fouling community in Mission Bay, which could create problems for local boating enthusiasts as well as altering marine community dynamics.

## Breaking Down the Chains: An Analysis of Human Rights and International Law Violations in *Red Rising* by Pierce Brown

MADISON MOE and Necla Tschirgi

“I will be focusing upon the concept of Conflict Resolution for my project and how that can be applicable to our lives today. I will be analyzing these types of themes in relation to the fictional novel, *Red Rising* by Pierce Brown. For my project, I will be researching the way that international law and human rights laws function. I will then analyze the violence portrayed in the novel weighing whether or not any international violations or human rights violations have occurred and then judge culpability from there. I will primarily rely upon the International Criminal Court’s Rome Statute of 1998 and the Universal Declaration of Human Rights. I may supplement with documents such as The Geneva Convention for the Rights of the Child. The novel successfully illustrates a real-world projection of what a society would look like that was committing atrocities beyond those of which are currently operating on modern day Earth. Additionally, it contains the reactions to such violence and possible aftermath due to the perpetuation of it.

In my analysis, I will not only explicate how this futuristic, dystopic society can be applied as a model for a potential future for a modern society, but I will also pose questions about the culpability of those who are committing certain atrocities (human rights violations and violations pertaining to the Rome Statue) within the novel. I will not only explain the international laws, conventions and treaties that I have aforementioned, but I will then apply them to specific members and groups within the novel to explain why they would be found guilty or found not guilty for those particular crimes and why. “

## Islam and Roman Catholicism Views on Suicide (Moderate vs. Extremism)

ROXANNE MOGHADAM and Evelyn Kirkley

I studied Islam and Roman Catholicism’s moderate and extremist groups and their views on suicide. Research showed that Islam was strictly against suicide, explicitly detailing the grave sin of committing suicide in the Quran and Hadiths. While Roman Catholics are against suicide, lenience for the victims and their families is prevalent as burial rights and mass is provided. In one study depicting suicide rates among various religions, Muslims suicide rates were close to zero, while Roman Catholics had a rate of 11.5 per 100,000 individuals. This contradicted a popular western belief that Muslims, allow or in some cases, encourage suicide. In addition, I wanted to discuss the extremist groups from which most stereotypes about Muslims come from. It is important to separate the moderate religion with the extremist group(s) of that religion. Muslim beliefs on suicide differ greatly with Wahhabi views on suicide. Roman Catholics differ with Opus Dei in their views on suicide.

## Different Conversation Types Influence the Attention and Memory of Bystanders

Matthea Monroe, Kelly Birch, Lauren Fisher, Audrey Olchondra, Jazz Tinsley, Claire Faulkner, Shannon Hall, Zoie Hayes-Handy, Ashley Joshi and Veronica Galvan

Cell phones are becoming an integral part of individual's lives. People report feeling personally connected towards their cell phone, and research has demonstrated how chatting on cell phones help individuals to relax, socialize, enforce parental safety, and guide social relationships. However, cell phones also have detrimental outcomes. For instance, people have reported annoyance, distraction, and insufficient memory functioning in response to public cell phone use. Therefore, as the prevalence and use of cell phones increases, their effects may negatively influence bystanders in any setting. Previous work in our lab has shown that, when compared to two-sided conversations, bystanders who hear one-sided cell phone conversations report higher levels of distraction and perform worse on a memory recognition task. In this experimental study, we again examine the influence of one-sided and two-sided conversations, but with interesting and boring conversations. We hypothesized that participants overhearing the one-sided and interesting conversations would be more distracted, make more errors on an anagram task, but perform better on a memory task. Introductory psychology students ( $n=$ ) believed they were taking part in a study concerning anagrams and their association with reading comprehension. After the researcher left the room due to a false cover, participants overheard one of four conversation types while completing an anagram task. These included (1) an interesting one-sided conversation, (2) a boring one-sided conversation, (3) an interesting two-sided conversation, or (4) a boring two-sided conversation. The volume of the conversation was also recorded to ensure consistent speech levels. Following the conversation and the return of the researcher, participants completed surveys assessing their distraction and memory of words from the conversation. Data is currently being analyzed.

## Effects of Phytoplankton Growth Phase on the Formation and Properties of Marine Snow

QUINN MONTGOMERY, Kyle Proctor and Jennifer Prairie

Marine snow aggregates often dominate carbon export from the upper mixed layer to the deep ocean. Thus, understanding the formation and the properties of these aggregates is essential to the study of the biological pump. Aggregate formation is determined by both the encounter rate and the stickiness of the particles that they are composed of. Stickiness of phytoplankton has been linked to production of transparent exopolymer particles (TEP), which has been previously shown to vary in concentration throughout different parts of the phytoplankton growth cycle. The objective of this study is to determine the effects of the growth phase of the diatom *Thalassiosira weissflogii* to both TEP production and the properties of the resulting aggregates produced. Cultures of *T. weissflogii* were stopped at separate phases of the phytoplankton growth curve and incubated in rotating cylindrical tanks to form aggregates. Aggregate properties such as size, density, and porosity were measured at the end of each period of roller incubation. Preliminary results describe little variation in the size of the aggregates formed from different parts of the growth phase, but show a significant effect of growth phase on aggregate density. Density is an important factor in the settling of marine aggregates. Therefore, variations in aggregate density during different growth phases may have large implications for the efficiency of the biological pump during different stages of a phytoplankton bloom. Further examination will be performed on the potential effects of TEP abundance on the properties of the aggregates formed at separate growth phases and the resulting implications for carbon flux.

## Alcohol Consumption in the 21st Century

DIEGO MORALES and Alyson Ma

One of the biggest industries in the world is the alcohol industry. That's why we see many commercials about alcohol in almost all of the channels we see on television, social media and radio stations. What I want to accomplish in my paper is to see the impact of alcohol advertising in adolescents, college students and those who are under the age of 30. We have seen studies in the past that told us that advertising was a huge part of their sales to adolescents and it was a major cause of underage consumption. Research by Henry Safer and Dhaval Dave analyzed the effect of alcohol advertising on underage drinking from teenagers in 1996-1998. A comparison of their research is going to be studied in this paper to see what variables have changed throughout time and if advertising has increased or decreased the consumption of a specific age group. I also want to look at the the difference in consumption amongst gender, age groups, and race. The results will help to limit advertising if adolescent consumption has increased throughout the years and can help alcohol advertising companies look at the older age groups to see where they should advertise.

## Women's Veterans' Research Assessment Clinic

IORELLA MORALES and Niloofar Afari

Women veterans are one of the quickly growing underrepresented groups in the VA healthcare system. This study investigates women veterans' health in several areas such as treatment preference, barriers to care, mental and physical health issues, and pre and post-deployment experiences. The findings from this study will aid in the development of treatments to improve post-deployment outcomes in women veterans. Participants completed an electronic questionnaire after a complete informed consent at the La Jolla VA Medical Center. A social worker then contacted the veteran to follow-up on any health issues that needed to be addressed. While this study alone will not directly benefit the participants, the data and information gathered from the study may lead to future benefits. Since this study is comprehensive, participants may be identified and referred for treatment earlier than if they had not participated in the study. These findings may inform the development of new interventions, which may target quality of life outcomes in women veterans. There are minimal risks to the participants, and the findings are expected to help improve access to appropriate medical services for women veterans.

## The Scorched Earth: Case Studies of the Tactical Bombing of Germany and Japan in WWII

PATRICK MOSCHETTI, SHAWN SIEGFRIED and Kathryn Statler

“This project will examine the value and importance of American airpower in both the European and Pacific theaters of conflict throughout World War II. Highly unique to both the wars in Europe and the Pacific, the American capability to control air superiority during these engagements allowed for the destruction of Axis forces in ways not yet seen in modern warfare. American advancements in technology produced some of the most recognizable aircraft in the history of aviation, which drastically contributed to the success of the air war in regards to the United States against both Germany and Japan.

With respect to Germany, the paper will examine certain themes and technological advancements of the bombers themselves is, shifting from the air and to the selection of targets on the ground that were targeted and the effect on German forces, third taking a look at the development of superior escort planes and tactics, lastly examining the morality of the bombings and was this tactic the most successful and the effect it had on the German people itself.

As for the American military fighting against Japan in the Pacific, strategies such as the pivotal island hopping campaign to retake Japanese held bases across the region proved to be the most effective way of weakening Japanese military assets and morale. The plan to retake these territories allowed for superior American technology in aircraft to further attack the mainland of Japan and its citizens in an attempt to bring the war to a swifter end, proving that American air superiority was both effective and decisive in regards to the fall of both Germany and Japan. Both presenters respectfully request to have a presentation space for their own boards due to the high volume of information that the project will display. We therefore respectfully request that our boards be located next to one another in order to share and present shared research and findings. “

## Corporate Tax Inversions: A Brief Overview

HANNAH MUELLER and Thomas Dalton

The purpose of this report is to give a brief overview of corporate tax inversions and how policymakers are attempting to curb these efforts. The U.S. Treasury is starting to feel the effects of these inversions through decreased tax revenue as they have become more common for U.S. corporations. It is important for businesspersons to analyze this argument from both sides in order to better serve their clients. Corporations feel that an inversion is necessary in order to save money in taxes and maintain competitiveness in the global market. The government insists that corporations are taking advantage of business resources in the U.S. without paying a fair share of taxes. The data in this report was obtained through online tax research platforms, such as CCH Intelliconnect and Thomson Reuters Checkpoint. Much of the information comes from the U.S. Department of the Treasury, in the form of Internal Revenue Code and Internal Revenue Bulletins. This information has been analyzed to help corporations better prepare for new laws and regulations that expect to be released soon. Based on the data gathered, the results indicate that it will take time for the U.S. to be able to stop these inversions completely. The United States has one of the highest corporate tax rates in the world, and inversions will not stop happening until this is changed. The implications of this research shows that the government still has a long way to go in revising the corporate tax code.

## Oviposition as a Decision Making Process

LUKE MUSKETT, Mary Beth Putz and Divya Sitaraman

The long-term goal of our project involves finding evolutionarily conserved neurotransmitter systems and circuits that underlie decision-making processes. Decision-making is a complex behavior that depends on organisms, environment, internal state (e.g. hunger, sleep etc.) and motivation. Layers of cognitive and emotional processes make it difficult to narrow down what factors cause organisms to make the decisions that they do. In order to find true cause and effect relationships, it's necessary to study simple organisms that have simple decision-making behaviors and fewer neurons. To this end we chose *Drosophila melanogaster*, fruit fly, a widely used genetic model organism because of its experimental manipulability, ease of rearing, short life cycle and ability to make simple decisions in light of competing choices. Of the many decision-making processes we chose to study egg-laying preference of the female fly. The decision to lay eggs in specific locations depends on texture, temperature, humidity and nutrient value of the substrates to ensure the success of the progeny. For example, female flies show a strong preference for food containing ethanol. The fly integrates multiple sensory stimuli (vision, smell, touch and taste) and lays eggs in highly specialized locations but it is unclear how internal behavioral states like hunger and sleep affect this decision. As part of the SURE program (delete) I will use an interdisciplinary approach and (delete) develop a novel egg-laying assay paradigm to quantify the egg-laying behavior. Automation of this behavioral test will pave way for understanding how conserved systems like dopamine and serotonin influence decision-making.

## Examining the Impact of Current Demographics on U.S. Smoking Trends

PETER NELSON and Alyson Ma

The more than 45 million Americans that smoke cigarettes represent a preventable source of detriment to society, where the average pack at \$6.36 to the consumer translates to \$35 in health related costs to society. From 2000 to 2012, this negative externality equated to 133 billion dollars in the United States that could have been spent on more socially beneficial programs and services such as education or infrastructure. In an effort to further reduce the number of smokers in the United States, along with the money that society spends on them, this research will examine the relationship between current demographic trends and the propensity to smoke. I will empirically analyze the 2014 data from the National Health Insurance Survey to determine how current demographic factors affect the probability that someone is a smoker. These findings will provide a clearer understanding of the factors affecting smoking rates so that anti-tobacco campaigns, federal institutions and other anti-tobacco interest groups can better cater and market themselves to the people across the United States that smoke and achieve greater reception.

## Ion Regulatory Capabilities of Non-Rio Negro Cichlids

NGOC-TRAM NGUYEN and Richard Gonzalez

The Rio Negro, a tributary of the Amazon River, has waters that are extremely ion poor ( $[Na^+]$  and  $[Cl^-] \leq 50\mu M$ ) and highly acidic ( $pH \leq 4.5$ ). For a typical North American fish, exposure to such waters inhibit  $Na^+$  uptake and stimulate efflux, resulting in a net loss of salts and death if not corrected. Studies have shown that fish of the Rio Negro avoid these disturbances until very low pHs, indicating a high degree of specialization. We examined the ion regulatory capabilities of two non-Rio Negro cichlids, convict cichlids (*Amatitlania nigrofasciata*; CC) and the honduran red-points (*Archocentrus* sp.; RPC), to determine if these non-Rio Negro species show similar mechanism of ion regulation as Rio-Negro species. When exposed to low pH, both species show a 300-400% stimulation of efflux upon exposure to pH 3.5, while influx fell to zero, producing a net loss of salt. Examination of transport kinetics revealed a low transport capacity ( $J_{max}$  574.8 $\pm$ 34.0 nM/h,  $J_{max}$  RPC=332.4 $\pm$ 26.9 nM/h) but a high affinity (for CC  $K_m$  =22.4 $\pm$ 5.0 $\mu M$ ; for RPC  $K_m$ =39.0 $\pm$ 12.5 $\mu M$ ). These results indicate that both species may have mechanisms that allow them to cope with low pH waters. A similar degree of pH tolerance and a similar uptake capacity were observed in these cichlids, however, they also show higher affinity than that of Rio Negro species.

## Mobile Ticket Vending Machine

MITCHELL NICHOLS, SAM BUCK, THOMAS BRUNO and Michael Hilton

A ticket vending machine is a device that gives a consumer an automated way to purchase tickets. For transportation, these machines exist only at the platforms because they are large and require constant maintenance. They are expensive to produce and only large-scale transportation agencies can fund the purchase of them for use at their stations. We are designing a device that will be significantly smaller so that it can be placed on a bus and thus eliminate wait times at platform machines. The smaller device will cost less to produce so that middle to small range transportation agencies have the opportunity to utilize ticket vending machines in their buses too. The device will utilize radio frequency identification technology, 4G data transmission, and a touch screen user interface to allow users to check the balance of and add value to their contactless smart card while in transit.



## Ecosystem Effects of Wolves: Is There Sufficient Evidence in the Scientific Literature to Support Labeling the Gray Wolf (*Canis lupus*) as a Keystone Species?

TOBIAS NICKEL, Erin Hunt and Sarah Gray

Wolves are some of the world's most charismatic and controversial animals. Historically, wolves were native to virtually all parts of North America, but human-wildlife conflict led to systematic hunting and near extirpation of wolves from the lower 48 states. Thanks to the federal Endangered Species Act, changing human attitudes and efforts to reintroduce wolves to suitable habitats, wolves have been able to slowly recover. As wolf populations have rebounded, scientific studies of them have also flourished. The historical presence, then absence, and now presence again of wolves represents a natural experiment through time and a unique opportunity for ecologists to study wolves and their effects on ecosystems. Numerous studies suggest that wolves, through trophic cascades, have caused ecosystems to change in ways many people consider positive. Wolves have now been credited with everything from increasing populations of bears and songbirds to replenishing ground water. As a result, conservationists have labeled wolves as a keystone species, which has been critical in engaging emotions and obtaining support for wolf recovery. However, whether or not wolves qualify as a keystone species is subject to debate among ecologists. While some studies provide evidence that wolves are engineers of biodiversity, other research questions their vital ecological role. The purpose of this project is to synthesize and critically examine the most recent and relevant scientific literature that is available on this topic and evaluate whether or not we have good scientific grounds to label wolves as a keystone species.

## Changing the Common Misconception That it is Impossible to Rape a Significant Other

KELLY NORTH and Jennifer Zwolinski

This poster will summarize psychological research to debunk the common myth that individuals cannot be raped by a spouse or significant other. A person must provide consent every time before they have sex, even if someone has consented sex with a spouse or partner in the past (USD's Campus Assault Resources and Education/C.A.R.E., 2015). Prior to 1993, the Marital Exemption Law protected spouses from being charged with rape (McMahon-Howard, 2009). However, 84% of reported rapes are committed by an acquaintance or intimate partner (Ferro, Cermele, & Saltzman, 2008). This shows how spousal rape does occur due to a lack of consent so this misconception that intimate partner rape cannot occur must be changed. If the misconception was true, individuals would be allowed to force sex upon their significant others. Clearly, this myth is false and the public must be aware of the facts behind spousal and significant other rape. Many of the studies summarized in this poster were first presented in the fall of 2015 as part of the Change LLC research symposium for Dr. Jen Zwolinski's Introduction to Psychology preceptorial course. The purpose of the symposium was to "change" members' of the Change LLC's beliefs about this myth. Now, I hope to increase awareness about this rape misconception to the larger USD community. I also plan to expand and present new summarized research on this topic. This poster is timely given that Sexual Assault Awareness Week and Creative Collaborations are hosted during the same week this spring.

## Econometric Analysis of Customers at a Cloud Computing Company

KRISTEN OBANA and Stephanie Comardelle

This study examines the factors affecting the number of user accounts a customer will purchase at a cloud-based software company, ServiceNow Inc. Because ServiceNow uses an internet-based software-as-a-service (SaaS) model to provide enterprise service management (ESM) software, the number of users is used to classify customers. Customer accounts are described as Large Enterprise, Enterprise, Commercial, Mid-Market, or Small Business based on the number of users. Using the actual number of users, and later these five categorical “segment ranks” for account size, this study uses multiple linear regression with ordinary least squares (OLS) estimations and an ordered logistic regression model to estimate the effects of eight key factors in determining the number of user accounts and segment rank. This analysis is relevant in examining the efficacy of current practices and the usefulness of the data collected on customers. Accurate customer metrics are important, as they affect expectations of deal sizes, how teams are paired with customers, and in turn play into how employee performance is evaluated and compensated. By looking at the measures used to evaluate customers, and investigating their effects in determining account size, we are able to both support the significance of several of these variables as contributing factors in determining account size, as well as state there is opportunity to seek further explanatory variables that may also prove significant in determining the number of user accounts a customer purchases.

## Social Justice in a Nation-State: Immigrant, Refugee, and Diasporic Populations

CASSIE ORTEGA, CONCHITA WAITE, TOM ROBINSON, HALEY AZEVEDO and Daisy Alonso

In this collaboration our group has come together to examine the ways in which immigrant, refugee, and diasporic populations advance social justice in a given state of the nation. Each member in this collaboration comes from a different research course ranging from English, Communications, Political Science, and Sociology. In the context of our class, we will research and gather findings that contribute to our overall study in regards to how different members migrating to a nation-state promote the idea of social justice. This involves forming an approach that looks at the historical, cultural, and social interactions that have taken place in the past and has perpetuated in the present. It is our aim to develop a deep understanding of the immigrant, refugee, and diasporic communities in looking at their connection to their history, politics, communication styles, economy, values and beliefs. The overall awareness of these topics will contribute to understanding the holistic aspects of social issues in regards to equity and parity.

## The Role of Nitrogen Fixation by *Ceanothus palmeri* in Post-Fire Soil Recovery at Cuyamaca Rancho State Park

MARIEM ORTIZ CAZAUBON, Lisa Baird and Paul Kemp

In 2003, the Cedar Fire severely burned most of the forest vegetation of Cuyamaca Rancho State Park (CRSP) in San Diego County. Following this fire, one shrub species, *Ceanothus palmeri*, became particularly abundant, especially in severely burned areas. Since some species of *Ceanothus* have the capacity for nitrogen(N)-fixation, we hypothesized that this capacity is important to *C. palmeri*'s success in areas where litter and surface humus had been burned off. In order to assess the capacity for N-fixation by this species, and its potential contribution to soil N, we measured abundances of soil Frankia (the N-fixing symbiont associated with *Ceanothus*), as well as N14 / N15 isotopes in leaf, litter, and soil samples at six different study sites in CRSP that varied in burn-severity and abundance of *C. palmeri*. The presence of Frankia in soils and root nodules of *C. palmeri* confirmed that this species is capable of N-fixation. The N-isotope signatures of its leaves and litter indicated that it obtains a significant proportion of its N via N-fixation. We conclude that its capacity for high levels of N-fixation explains its overwhelming dominance in severely burned sites. Furthermore, analysis of total soil N indicated that there was little difference between the severely burned sites and moderately burned or unburned sites. Thus, we conclude that N-fixation by *C. palmeri* has played an important role in recovery of soil nitrogen in these severely burned sites.

## Dopamine Modulation of Sleep and Feeding in *Drosophila*

AUSTIN PAVIN, MARGARET DRISCOLL and Divya Sitaraman

Neuromodulators such as dopamine (DA) and serotonin have long been implicated in innate and learned behaviors. Widespread dopaminergic system manipulations depleting DA levels result in sleep regulation deficits in *Drosophila melanogaster* (the fruit fly). Further evidence suggests that regulation of feeding is also adversely affected when DA levels are diminished. Activation of specific DA neuron clusters projecting into an associative memory network important for olfactory learning in *Drosophila*, the Mushroom Body, reduces sleep. It remains unclear whether the observed sleep deficits are a cause of dopaminergic regulation of arousal, or of a motivational behavior like feeding. Using *Drosophila* as an experimental system, a comprehensive screen of all Mushroom Body DA neuron clusters was initiated. We analyzed specific subsets of these DA neurons in order to elucidate dopamine's role in the regulation of feeding and motivational behaviors. These data will be presented to establish a clear link between dopamine regulation and motivational behaviors and their implications for sleep regulation.

## Torero Racing: Steering and Front Suspension Design

DAVID PENNINGTON and David Malicky

“Torero Racing is a team of engineers designing and building an off-road vehicle for the Baja Collegiate Design Series hosted by the Society of Automotive Engineers (SAE). This competition is designed to test all aspects of a vehicle’s performance through acceleration, hill climb, maneuverability, and endurance events. The competition has a strict set of rules about all aspects of the design of the vehicle to ensure the safety of everyone involved in the competition. Torero Racing consists of thirteen mechanical engineers, and three electrical engineers, and I was personally tasked with the design of the front suspension, and steering systems. The suspension system is comprised of the design of the suspension arms, and their placement on the vehicle, and the shock placement. The steering system is mainly an analysis of the positioning of the components, and the effect that has on the vehicle’s performance. The parameters and goals for the design of these systems were developed through research into vehicles built in previous years by other universities, and industry standards. The main constraints that must be controlled are camber, and bump steer. Camber is the angle of the wheel toward or away from the body of the car, and is determined by the placement of the suspension joints. Bump steer is the change of the angle of the tire in the direction controlled by the steering system, but it is an unwanted movement caused by the suspension links, and steering links being different lengths. “

## An Analysis of Collegiate Factors that Influence a Recent College Graduate’s Starting Salary

NICOLE PETERSON, SYEFIRA SHOFA and Jane Friedman

Starting salary can be one of the most influential factors in a recent college graduate’s decision to accept a job offer. However, not every candidate will receive the same starting salary offer due to his or her varying qualifications. The question remains: what factors have influence on a starting salary and what factors do not? Factors such as college major, college minor, GPA, involvement in undergraduate research, the number of math courses taken, study abroad experience, and participation in an internship may all influence a new graduate’s starting salary. By using methods such as survey collection and randomization, this project has been collecting as much data as possible to base conclusions on. This project will implement regression models as well as t-tests and permutation tests to analyze the data to determine which factors have the most relevance and correlation. This study will highlight the differences found and compare the results. The data was collected online by surveying recent alumni to suggest which factors most influence graduate starting salaries. The study will develop a model to predict a starting salary and thus help current and future students in planning their undergraduate careers.

## Mi Historia: Where the Journey Begins

SARA PIELSTICKER, DALIA MARTIN DEL CAMPO, ELIZABETH CREECH, MAGALI GARCIA, JOCELYNE OLJUIIN, ANTONIO IRASTORZA and Maria Silva

A significant portion of immigrants in our community come from Latin American countries south of Mexico such as Guatemala, bringing with them a unique identity and experience. Our research aims to bring awareness of this to USD and create closer ties between our communities. Numbers and statistics are too often the preferred language in telling our country's immigration story, but our research approach included many interviews and conversations to bring forward the stories that are behind these statistics. Immigration is a complex issue with layered push and pull factors affecting migration patterns. There are the social, political and economic realities of the countries people emigrate from as well as the misconceptions of what the U.S. has to offer for those who make it across the border. Immigration does not begin or end in the border region. Therefore, the current reality of our border community is not disconnected from the reality of Guatemala and other countries of origin. Our Guatemala Immersion offered a more comprehensive understanding of immigration from one of its places of origin. This immersion experience took place in and with community, specifically a local Linda Vista resident and friend, Irma, and Irma's family members in Guatemala. Our research culminated in a photography and film projected presented to the USD community that brings to life the different stories of this family that we spent time with. Engaging with Irma's family in Guatemala has helped our community here better understand what our border community looks like at home.

## A Grand Tour for the Modern Student

ANDREA MAYELA PIZANA and Molly McClain

As early as the 1600s, it was common in European society for young students to take time off from studies to experience the roots and culture of Western civilization. Known as the Grand Tour, a privileged few benefited from an unsurpassed year of exploration and deep personal growth. Today, students are pressured to attend college soon after their high school graduation with the result that many find themselves confused and unprepared for the challenges they face. They often jump from school to school or drop out altogether, leaving colleges with high transfer and withdrawal rates. I argue that 21st-century students would benefit from a new kind of "grand tour" that would allow them to mature and prepare for the college experience. My thesis brings together research on higher education, including university statistics and sociological observation and analysis, in order to examine the areas in which college students struggle. It looks at current research on the "Bridge Year" and its impact on students entering elite institutions. It also examines how travel, volunteer work, and other enriching experiences can contribute to personal development and provide the basis for a successful college career.

## Designing the Natural World: The Influence of the Mid-Victorian Fascination with Botanical Arts on Wallpaper and Fabric Designs of William Morris

KASEY PLASKETT and Molly McClain

Natural design motifs are everywhere: from the vine-like molding on the Camino/Founders Bridge to the floral patterns gracing prominent fashion labels like Tory Burch. But do they accurately depict nature? William Morris, a late-nineteenth century textile and decorative arts designer believed that design could be not only decorative, but also educational. A lover of medieval craftsmanship and art, Morris encouraged artists to draw from nature as earlier generations had done. In so doing, he tapped into the mid-Victorian fascination with botanical art, gardening, and the science of botany. His designs and aesthetic ideals appealed to a growing middle class that sought a simpler life in the wake of the Industrial Revolution. It also appealed to those who saw in botanical illustrations clear delineations between gender roles. Morris gave the Victorians the natural, simpler designs that they sought. He championed a new aesthetic to counteract the dark, dizzying interiors popular during the Victorian period and influenced future designers for years to come.

## Crosscurrents: Gender, Religion, and Peacebuilding in Southeast Asia

ROSALIE PLOFCHAN and Karma Lekshe Tsomo

This research was conducted to understand the roles women and religion play in the peacebuilding efforts in Indonesia, Cambodia, Myanmar, and Vietnam. Through interviews with international nongovernmental peace organization workers, Christian, Muslim, and Buddhist leaders, activists, and university professors and students, we gained perspective on the challenges and opportunities for peacebuilding in these rapidly changing countries at international and grassroots levels. These interviews shed light on the ways political activism influence social transformation and how decision-making is influenced by ethics, communal harmony, and interpretation of religious values. Additional information was gathered by attending religious ceremonies and conferences on the state of the Muslim family, the role of women in Buddhist countries, and sustainable development. The findings of this research are a testament to the diversity of the region's history and traditions and the complexity of traditional roles for women and family.

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Session II: 1:10 to 2 p.m.

UC Forums

## Investigating the Binding of Calcineurin Homologous Protein Isoforms 1 and 2 to the Sodium Hydrogen Exchanger Isoform 1 in Lung Fibroblasts

THOMAS M POLVERONI-EDWARDS and Joseph Provost

The Sodium-Hydrogen Exchanger 1 (NHE1) is a transmembrane protein that plays a crucial role in maintaining stable intracellular pH. Furthermore, the protein is regulated by interaction between the C-terminus of NHE1 and several intracellular proteins, including Calcineurin Homologous Protein Isoform 1 (CHP1) and 2 (CHP2). NHE1's role and importance are easily observable in metastatic lung cancer cells as the exchanger displays higher than normal activity in order to compensate for the increased metabolism and proton production found in the metabolically active cells. Expression of CHP1 to NHE1 is ubiquitous and CHP1-NHE1 interaction is necessary for proper function of the exchanger, whereas the expression of CHP2 to NHE1 has so far only been found in gut cells and metastatic cancer cells. To investigate the differences between CHP1 and CHP2, and their binding to NHE1, we prepared CHP1-RFP and CHP2-GFP and observed their expression in Chinese Hamster Lung Fibroblasts with NHE1 null expressors (PS120 cells) and in Chinese Hamster Lung Fibroblasts stably expressing human NHE1 (PSN cells). Substantial translocation of CHP1 and CHP2 to the cellular membrane was observed in the PSN cells whereas no translocation was observed in the PS120 cells. We also generated several single amino acid alterations of NHE1 to determine the importance of these residues on binding. Furthermore expression and translocation levels were also measured in fed, serum deprived and stimulated conditions.

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Session II: 1:10 to 2 p.m.

UC Forums

## Measuring the Economic Unification of the European Union

MATT POPE and Alyson Ma

The European Union has long been a source of debate among world leaders. Some countries, such as Turkey, have been trying to join the EU for decades while others, such as England, have had spirited discussions about leaving the EU. A lot of these debates revolve around the economic ramifications that EU membership entails. My research attempts to analyze this issue in an empirical manner. To do this, I examine the economic performance of EU countries over the past 15 years as measured by GDP growth per capita. I regress this data against key indicators that are influenced by EU membership, such as inflation and migration.

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Session II: 1:10 to 2 p.m.

UC Forums

## Traction Force Microscopy of Arabidopsis Germination

CHRISTIAN POTTER and Ryan McGorty

In this experiment, traction force microscopy is used to analyze the germination of the Arabidopsis plant. Traction force microscopy utilizes elastic gel and fluorescent beads to track the forces exerted by a living sample in a growth medium. In particular, the movement of fluorescent beads in the elastic medium can be used to create a vector field displaying the forces applied by the germination of the plant sample. To analyze the sample, a SPIM microscope will be used with water based objectives to create a three dimensional image with minimal aberrations. Typically, this type of microscopy is conducted at the cellular level, however at the macro level of this experiment we hope to gain more knowledge in the biophysical mechanisms of plant germination.

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Session II: 1:10 to 2 p.m.

UC Forums

## Experimental Plasma Physics: Emissive Probe

QUINN PRATT and Greg Severn

This project serves to investigate using the emissive probe, an experimental plasma physics instrument, to diagnose the position of the plasma sheath within a confined plasma. We show the theory of the probe's operation and the goal for our experiment. We develop a computer program for automated data acquisition and explore fully integrating the probe into the plasma chamber. Furthermore, we show the complexity in data handling for the probe and the future work for analyzing the sheath structure for complex plasmas.

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Session II: 1:10 to 2 p.m.

UC Forums

## Effects of Phytoplankton Growth Phase on Delayed Settling Behavior of Marine Snow Aggregates at Sharp Density Transitions

KYLE PROCTOR, Quinn W. Montgomery and Jennifer Prairie

Marine snow aggregates play a fundamental role in the marine carbon cycle. Since marine snow aggregates are larger and thus sink faster than individual phytoplankton, aggregates often dominate carbon flux. Previous studies have shown that marine snow aggregates will significantly decrease their settling velocity when passing through sharp density transitions within the ocean, a phenomenon defined as delayed settling. Given the importance of aggregate settling to carbon export, these small-scale changes in aggregate settling dynamics may have significant impacts on the efficiency of the biological pump. However, there is still a lack of knowledge about how different physical properties of aggregates can affect this delayed settling. In this study, we investigated the effect of phytoplankton growth phase on delayed settling behavior. Using phytoplankton cultures stopped at four different growth phases, we formed marine snow aggregates in the laboratory in rotating cylindrical tanks. We then observed individual aggregates as they settled through a stratified tank. We will present data which illustrates that aggregates experience greatly reduced settling rates when passing through sharp density gradients and that the growth phase of the phytoplankton used to form these aggregates has a significant effect on this delayed settling behavior. A thorough understanding of the impact of phytoplankton growth phase on the delayed settling behavior of marine snow will offer insight into the way phytoplankton growth phase may influence the efficiency of the biological pump, carbon flux, and the carbon cycle as a whole.

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Session II: 1:10 to 2 p.m.

UC Forums

## Exposure to Trauma and False Memories

CARLOS RAMIREZ and Rebekah Wanic

“The aim of the present study is to explore false memory in individuals with differential levels of exposure to past traumatic events. Previous research has demonstrated an increased tendency for false memory recall among military veterans who suffer with Post Traumatic Stress Disorder (Zoellner, Foa, Brigidi, & Przeworski, 2000). The current project relies on the DRM procedure to assess the connection between military veteran status (with or without previous traumatic exposure) on false memory recall in a college student population. Participants were asked to self-report prior military service and completed a trauma questionnaire to assess past experience of trauma. They were then exposed to four different DRM lists, two related to neutral lures and two related to trauma lures, and their recall responses were evaluated. Data analysis will evaluate whether veteran status (yes or no), exposure to trauma (yes or no), and/or lure-type (neutral or trauma-related) are related individually or in combination to greater false recall.”



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Session II: 1:10 to 2 p.m.

UC Forums

## Octopamine Regulation of Sleep

VERONICA RAMIREZ and Divya Sitaraman

Sleep is necessary for survival across species, but its mechanisms and specific functions are not well understood. Several characteristics in the sleep behavior of the Fruit Fly, *Drosophila melanogaster*, are shared with mammals, like >5 minutes of immobility, increased arousal threshold, homeostatic regulation, and a light/dark circadian rhythm. Thus, *Drosophila* is an optimal animal model to study the neuromechanisms underlying sleep. Octopamine, a biogenic amine homologous to norepinephrine in humans, is an important wake-promoting signal in the fruit fly. Also, Gamma Main (GM) cells, a subset of Kenyon cells in the Mushroom Bodies, seem to be postsynaptic to octopamine cells and are also important for sleep. Here, we investigate if a wake-promotion signal is transmitted from octopamine cells to GM cells. We use genetic manipulations, such as GAL4 (UAS-dTrpA1) system for thermal neuronal activation, and GAL4-UAS RNA interference (RNAi) to inhibit octopamine production by Tyrosine decarboxylase 2 and Tyramine Beta Hydroxylase, and to explore the role of octopamine receptors located on the GM cells (i.e., OAMB, Oct-TyrR, Oct-B1R, Oct-B2R, Oct-B3R). We combined this with sleep analysis through a video-based acquisition system and a single-beam (SB) infrared (IR)-based detection in *Drosophila* Activity Monitoring (DAM). This behavioral genetic investigation will provide further insight into the neuromechanisms of sleep. Keywords: Kenyon cells, gamma main cells, mushroom bodies, octopamine, sleep, DAM.

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Session II: 1:10 to 2 p.m.

UC Forums

## Sweet Street iPhone Application

TJ REED and Eric Jiang

Sweet Street is a fun, interactive, family-owned candy and gelato store located in Danville, California. Sweet Street has a customer base that ranges from young children to older adults that live in the Danville area. In order to extend this customer base, the business has decided to create a mobile application for iPhone users. The scope of this project is to create this mobile application with four main uses: a rewards program, a map to the store, a virtual gift card, and the ability to stay connected with the store (via social networks and the store's "Wall of Fame"). This application allows Sweet Street to grow its customer base and encourages guests to visit the store more often. This application may be extended, with a few modifications, to incorporate a wider variety of small businesses and not be limited solely to Sweet Street.

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Session II: 1:10 to 2 p.m.

UC Forums

## Internship at I Love A Clean San Diego: An Environmental Non-Profit First Hand Experience

MOLLY REEVES and Sarah Gray

During this semester I have had the great pleasure of working at I Love A Clean San Diego as a Community Program Intern. I Love A Clean San Diego is one of San Diego's most distinguished proponents of environmental sustainability. This company has been tremendously successful for the last 60 years through their education, recycling and community programs. I have been lucky enough to gain experience working with the Community Programs Department; the branch where beach, river and canyon cleanups become reality, and adopting a beach is within reach. With my internship position, I have been able to learn the ropes of community outreach: coordinating events with 300+ people and maintaining strong relationships with previous organizations, businesses and volunteers. Some of the most rewarding experiences that I had have were when I was working with I Love A Clean San Diego's storm water outreach and education program, clean beach coalition and watershed urban runoff management program. With the experience of attending multiple cleanups and booth presentations, I will be able to organize my own Zero-Waste Beach Cleanup in my

hometown of Carlsbad, at one of I Love A Clean San Diego's adopt-a-beach locations. I will give a presentation to a group of my peers, family and total strangers about what it truly means to work towards a zero-waste life and community. In conclusion, because of all of these wonderful skills and experiences, I know this internship will have a lasting effect on my career and life path.

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Session II: 1:10 to 2 p.m.

UC Forums

## **Elegiac Aesthetics: The Shared Legacy of Robert Frost and Edward Thomas**

**BRANDON REITER and Malachi Black**

In my research paper I examine the poetic aesthetics of Robert Frost and his closest creative companion, Edward Thomas. I argue that in his mourning for Thomas, Frost emerges as a modern elegist in his "Mountain Interval" and "New Hampshire" poetry collections. Toward this end I explore the nature of their relationship and how each served to imbue the other's work with elements of art and artifice. I define as art those works which constitute an expressive response to the radical mystery of existence, and as artifice those which privilege the author's convictions over the work's artistic content, and argue that artifice ultimately impairs the author's expression of his personal ideals.

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Session II: 1:10 to 2 p.m.

UC Forums

## **Involvement of Multiple Memory Systems on the Continuous Alternation T-Maze Task in Rats**

**NICOLE REITZ, JON VINCZE, ANGELA CAMACHO, PETER BRESLIN and Jena Hales**

The ability to form, store, and recall memories greatly contributes to our quality of life. Multiple memory systems work in the brain to successfully form long-term memories and each utilize a different area of the brain. Due to its plasticity and speed, the hippocampus is the principle structure involved in declarative memory formation; however, previous studies have shown that other structures can compensate when the hippocampus is not functional (Morris & Frey, 1997), which supports the theory of multiple memory systems. (Ainge et al., 2007). Retrograde lesions, which occur after a task was learned, produce more detrimental effects to learning than anterograde lesions, which occur before learning a task. Such differences occur because hippocampal lesions require the use of non-hippocampal systems as a mechanism for learning. This finding raises a fundamental question: how are hippocampal lesioned rats learning these tasks? Our study uses an anterograde lesion model featuring hippocampal- and sham-lesioned rats and the continuous alternation T-maze task, which is a hippocampus-dependent task. By creating hippocampal lesions and varying training time durations in sham-lesioned rats, we hypothesize that rats will express neural activity in different areas of the brain in response to memory formation. After training is completed, we will measure the expression of immediate early gene, c-Fos, from different brain areas in rats with and without hippocampal lesions. Immunohistochemistry will allow us to visualize and quantify gene expression in areas that were active in memory formation during the T-maze task.

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Session II: 1:10 to 2 p.m.

UC Forums

## Kant's Critical Philosophy and the Opus Postumum

WILLIAM RICE and Michelle Grier

Kant's desire to establish a basis for physics occupied him until his death in 1804, but his last major work, the *Opus Postumum*, was intended to be the cornerstone of his critical philosophy, indeed completing the doctrine of Transcendental Idealism. This self-proclaimed "chef d'oeuvre" was Kant's final attempt to resolve what he believed to be a "gap" in his critical philosophy, by which a "transition," namely from the metaphysical foundations of natural science to physics, had become necessary. There must be a transition from the metaphysical foundations of natural science to physics if the science of nature is to become a science of reason" there exists a gulf between the two, over which philosophy must build a bridge in order to reach the opposite bank" (21:474, OP. 39). My research followed Kant's prevailing interest throughout the course of his life to explain how we, as human beings, can and even must uncover and comprehend all of nature in the *Opus Postumum* and *Critique of Pure Reason*. The *Critique of Pure Reason* represents Kant's initiation of his critical philosophy, where traditional issues of dogmatism, indifference, and skepticism are vehemently disputed via his radical doctrine of Transcendental Idealism, which can be broadly understood as a unique epistemological theory, imposing necessary, subjective strictures on what we can know.

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Session II: 1:10 to 2 p.m.

UC Forums

## Characterization of the Polymeric Immunoglobulin Receptor in *Leucoraja erinacea*

JAMES RICKETTS and Valerie Hohman

The first line of defense against many types of pathogens (such as viruses, bacteria, or toxins) is the mucosal immune system, which protects mucosal membranes lining the respiratory, gastrointestinal, and urogenital tracts. One common characteristic of all vertebrate species is the presence of molecules that participate in adaptive immune response, such as antibodies, which bind to pathogens to prevent infection. The function of the polymeric immunoglobulin receptor is to transfer these antibodies through the epithelial cells, and then release them as a secretory antibodies in the mucosa. Cartilaginous fish have evidence of antibodies in intestinal secretions, but not specifically the protein pIgR. We hypothesize pIgR is present in *Leucoraja erinacea*, or the little skate, a cartilaginous fish. My project is to identify the DNA sequence coding for the pIgR gene in the little skate. In order to obtain the sequence, I am using a technique called reverse transcription-polymerase chain reaction, which synthesizes a complementary DNA strand from messenger RNA. Through previous work in the Hohman lab, we have determined the full length sequence to be 3.0 kilobases, while our putative sequence is only 1.5 kilobases. The information gained from this project will provide essential information on the origins of mucosal immunity and may lead to improvements in the creation of vaccines for fish, which could benefit fisheries and aquaculture whose aim is to raise and protect various fish species.

## Carmel Valley : The Global World Next Door

JOSEPH ROCHA and Juliana Maxim

Suburbia has long been the object of extensive sociological and historical analysis with several sources describing it as a uniquely American phenomenon. This research focuses on the particular environment that is Carmel Valley and aims to produce a monographic study of its social, economic, and architectural character. One of the fictions on which suburbia is built is that it emerged on virgin land, on a site without history. In our research, we take issue with the abolition of history that suburbia seems to require. Through archival research in the County of San Diego's records, as well as through interviews with long-time residents who remember Carmel Valley "before Carmel Valley," we reconstitute a history of the site before its transformation into one of the county's most desirable neighborhoods. In addition, the research explores the relationship between architectural development and recent immigration patterns, for instance the Chinese community steadily establishing itself in some of the most recent planned communities, transforming what at first sight looks like a conventional suburb into the Chinatown of the 21st century.

## Determinants of Median Income in the United States

DANIEL ROSE and Alyson Ma

The fact that the middle class in our nation is shrinking is cause for concern, as the success of our entire society is correlated to this issue. The term "middle class" has no clear definition but the issue can be viewed as a shifting in income towards one end of the income distribution and away from the center. The issue is approached in the current literature by examining determinants of how income has become more concentrated at the top end of the income distribution. However, a disproportionate amount of income going to this upper end of the distribution is not an issue per se, but rather a necessary element of a capitalist society. The goal here is to find a set of variables that are highly correlated to the movements in middle class income, or more specifically median household income in the United States. Determinants of rising income at the upper end of the distribution presented in existing literature include population dynamics, various forms of taxation, and factors relating to entrepreneurship and creative destruction. This research will contribute to this general research area by examining if the factors that have been shown to contribute to rising income at the top of the income distribution hold their influence on the median of the distribution. Understanding the determinants of median income so we may work towards guaranteeing the success of our middle class is crucial to the goal of achieving long-term success for our nation and society.

## Estimating the Effects of Pet Spending on Social Capital

WILLIAM ROUTT and Alyson Ma

As pet population continues to grow in the United States, even though human population growth has been on the decline, more emphasis is being placed on the benefits that are associated with being a pet owner. Individual advantages, such as therapeutic, psychological/mental, physical, and psychosocial benefits, have all been directly correlated with pet ownership, with dogs being the most beneficial pets. A survey was administered to three suburbs in Australia with similar socio-economic status, to determine the impact of pet ownership on the community, with social capital as the dependent factor. Results showed that using networks, norms, and social trust, as a construct of social capital, showed people within a community interacted with each other more often due to owning a pet. The purpose of this thesis is to test the determinants of pet ownership in context to pet spending, seeking a result that will be relative to social capital benefits. That is, estimating the degree of each determinant relative to pet ownership, and comparing the overall happiness of each state, with total pet spending.

## Investing Aside Terror - Terrorism on Foreign Direct Investment

SCHYLER RUHLAND and Alyson Ma

This paper uses panel data to analyze a larger macroeconomic relationship between terrorism or transnational terrorism on foreign direct investment (FDI) for a nation. A country's economic stability is open to many influences and after panel data analysis I should find a ranged correlation between my variables. The data for such framework is pulled from a scope of developed and less developed countries over the course of 44 years, 1970-2014. Current research suggests a consistent and significant negative relationship between the two regressors. The outcome of this model will focus on the results from a panel data regression to either support or update existing models. My research is necessary because there are little findings based off panel data, only time series; and the suggested findings from current panel data models imply little significance between the variables. There is a need for more inquiry because the topic has an area of emptiness. As a result of my research it is my hope to construct a defensive plan to avoid any significant drops in FDI in any but namely terrorism prone countries.

## Doing Gender: The Construction of Hypermasculinity in Juvenile Hall

GABRIELLA RUSSO and Greg Prieto

In American culture, authority, control, independence, heterosexuality, and a capacity for violence characterize hegemonic masculinity. Mosher (1991) defines “hypermasculinity,” by referring to its primary dimensions of dangerousness, acceptance of violence, and dominance, particularly over women. As constructions of masculinity develop within what’s recognized as “total institutions,” according to Goffman (1961), prisons are indeed “total institutions” because all aspects of inmate life are conducted in the same place and under the same authority; and organized with deference to the aims of the institution rather than varied by the particular needs of individual members. While multiple masculinities are present in prison, the dominant construction intensifies several elements of hegemonic masculinity. Inmates believe it is necessary to present a hypermasculine public façade that may conflict with a more nuanced private self-identity. The public persona that individuals present when interacting with others inside prison may be a familiar guise, constructed and refined through a long process of socialization into male-dominated subcultures as a child, adolescent and adult. Various metaphors are used, such as mask or armor, to emphasize a distinction between a public and private identity. While recent scholarship has drawn attention to the relationship between gender and crime, this study concludes that cultural constructions of masculinity are correlated with crime and that male prison culture reifies hypermasculinity. Findings are based on an exploratory, qualitative study including participant observations and interviews with prisoners between two juvenile detention centers in southern California.

## Sexual Minority Imagery In Mainstream Magazine Advertising Influences On the Intent to Purchase Among Heterosexual and Lesbian, Gay, and Bisexual Consumers

SAIGET TRENT, Justine Rapp and Bradley Bond

Current marketing trends suggest large companies are reluctant to feature lesbian, gay, or bisexual individuals in their advertisements because they fear public backlash that could drive away heterosexual consumers who would feel alienated by LGB imagery. At the same time, companies have realized that LGB consumers are more likely to have disposable income than the typical American adult and they are extremely brand loyal to companies that support LGB rights. Thus, marketers have been interested to tap into the LGB market. This leaves advertisers attempting to figure out how to enter into the desirable LGB market without threatening heterosexual audiences. Previous research suggests LGB imagery in ads can cause a negative reaction among heterosexuals. Though these studies are insightful, they only examined attitudes toward the ads themselves, not the products. The study we propose will move beyond perceptions of the ad and measure heterosexual and LGB individuals’ perceptions of the products to further our understanding of LGB imagery in advertisements and how they might influence more long-term purchasing intentions.

## Demonizing Yoko Ono: A Story of Racism and Sexism in American-Japanese Relations

SIERRA SCHIPPER and Kathryn Statler

“Many Americans know Japanese born, avant-garde artist Yoko Ono as “the woman who broke up the Beatles.” In 1969, Ono’s marriage to iconic Beatle John Lennon spurred a whirlwind of public controversy that lasted well beyond his tragic death in 1981. The spectrum of public opinion ranged from mild criticism of the couple’s art, to all-out racist and sexist attacks on Ono. When tell-all accounts of the Beatles turned into bestsellers in the mid 1980’s, authors inscribed salacious images of Ono onto public memory of the band. While claims about Ono “breaking up the band” seem an obvious explanation for offensive portrayals of the artist, my research complicates that narrative. Yoko Ono’s story is deeply interwoven with the evolution of ethnic relations, foreign relations, gender, and peace activism in the United States. As Japan and a diverse group of Americans challenged the status quo, the media and individuals alike savagely attacked Ono’s ethnicity, gender and politics by drawing on America’s rich history of racial hatred against the Japanese. Using the lens of imperial rivalry, I suggest that the backlash against Yoko Ono is inseparable from a history of racism and sexism in American-Japanese relations.”

## On Structure Orientation in Turbulent Shear Flows

HARRISON S. SCHMACHTENBERGER, Adam Moreau, Anthony Shao and Frank Jacobitz

Homogeneous turbulent shear flows have been investigated as a prototypical example of turbulence due to the effect of shear with applications ranging from engineering to geophysical flows. The turbulent fluctuations in such flows form structures and many previous studies pointed out an inclination of these structures relative to the downstream direction. In order to study the turbulent structures, an existing simulation code was modified to generate a series of images of the flow evolution. These images contained information about the evolution of velocity, vorticity, or scalar concentration fields. The images were analyzed using two methods: First, the inclination angles of flow structures were determined from a visual examination of the images. Those results were then compared to inclination angles determined from a correlation of images with images of waves at different angles. It was found that the flow structures assume an angle of approximately 18-20 degrees from the downstream direction. We also found that there is a relationship between the structure inclination angle and the growth rate of the turbulence. In addition, movies of the turbulence evolution were created from the images in order to obtain a better understanding of the flows’ dynamics.

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UC Forums

## Using DNA Sequencing to Determine Evolutionary Relationships Among Wildflowers of Northwest California

EMILY SCHUMACHER and Michael Mayer

*Silene* is a genus of flowering plants with an elusive evolutionary history. After studies considering the evolution of sexual dimorphism within the genus, it became clear there were huge gaps in understanding the evolutionary relationships among the species of Northwestern California. My study focuses on revealing the family tree of this genus, termed a phylogeny, by utilizing genome sequencing of rapidly evolving DNA sequences in seven different species of *Silene* and one hybrid of two of the species. By determining the pattern of differences between these species' DNA, the distance of relationship between them can be elucidated. After performing these experiments, there was evidence of one species, *Silene hookeri*, possibly giving rise to the others, and as its geographic range encompasses the ranges of all of the other species sampled, it is possible these species evolved in response to isolation from the ancestral species. *Silene nelsonii*, one of the species analyzed, showed marked DNA sequence differences from the other members of the genus and likely did not evolve from *Silene hookeri*, instead being a distinct species. Although there is more work to be done in analyzing this group of plants, this study proved to be an excellent model of utilization of genome sequencing to describe evolutionary relationships between species and making inferences about how these species evolved.

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## "I Trust Thee Not": Male Mistrust and Female Confidantes in the Shakespearean Canon

KEVIN SEARLE and Maura Giles-Watson

In Shakespeare's plays, markedly worse outcomes befall women when they are isolated from other women. From a feminist perspective and through close textual examinations, I examine how and why isolated women are disproportionately dehumanized and harmed when they are surrounded by male characters, and contrast this failure of Shakespearean men with the much more positive outcomes that transpire for women when they are supported by women friends. In the process, I posit three categories: men isolating and mistrusting women, men defeminizing strong women, and women helping women. For my talk, *The Winter's Tale* is the cornerstone text, as it has relationships that fit each category, and I offer examples from other Shakespeare plays and genres that also figure in my larger project.



## Is the Consistency of BMR in Eared Grebes Due to the Metabolic Intensity of Critical Tissues?

LEIGH SEWALL, NICOLE POTTS, KATHERINE VILLEGAS, STEPHANIE LOW and Hugh Ellis

The Eared Grebe (*Podiceps nigricollis*), is a waterfowl found throughout Western North America. Eared Grebes spend about 9-10 months of the year flightless, due to long staging periods punctuated with long distance migration. At each staging site Eared Grebes undergo a change in body composition involving both atrophy and hypertrophy of specific tissues and organs, yet their basal metabolic rate (BMR) remains constant throughout these cycles. BMR is therefore not affected by body composition as predicted in the literature. We suspect that it is the metabolic intensity of their organs, rather than size, that affects BMR. Our research specifically examined the enzyme activity of citrate synthase, CS, and pyruvate kinase, PK. CS is a rate-limiting enzyme in the Krebs Cycle, and is important in aerobic metabolism and an indicator of a tissue's maximal oxidative capacity. PK catalyzes the final step of the glycolytic pathway, and can be used as an indicator of anaerobic glycolysis. We measured enzyme activity with a spectrophotometer using homogenized tissues in solution with enzyme substrates, and quantitatively analyzed the results. CS appears to be upregulated in pectoral and heart tissues prior to departure for migration. PK data demonstrates a pattern of decrease in digestive viscera and an increase in muscles from Fat to Late birds. Further research will continue to focus on the trends presented by CS and PK, as well as examining the activity trends observed in other critical enzymes such as LDH and HOAD.

## An Analysis of the Diversification of Armored Scale Insects (Hemiptera: Diaspididae) in Two Panamanian Rainforests

HANNAH SHAPIRO, DANIEL PETERSON, BENJAMIN NORMARK and Geoffrey Morse

Armored scale insects (Hemiptera: Diaspididae) are cryptic plant parasites found throughout the world. However, despite the magnitude of their diversity and range, little is known about armored scale life histories beyond those of the taxa most commonly associated with agricultural crops. In fact, the least is known about the taxa found in tropical rain forest canopies, which preliminary findings suggest could boast the most undescribed diversity. In this study, I surveyed two tropical rainforest canopy sites in Panama, utilizing the canopy cranes in Parque Natural Metropolitano and Parque Nacional San Lorenzo. I am interested in assessing the alpha diversity of armored scales at each of these sites, and the beta diversity between them, as Parque Natural Metropolitano is a seasonally dry forest, and Parque Nacional San Lorenzo is seasonally moist, to see if this has an effect on the abundance or representation of armored scales found there. Distinguishing between taxa can be notoriously difficult, especially when based off of morphological characters alone. This is because armored scales have extremely reduced morphology in their adult stage and these characters can be highly variable within taxa depending upon the substrate the individual developed on. For this reason I will be utilizing molecular phylogenetic techniques in association with morphological vouchers in order to better delineate cryptic species complexes and describe deeper phyletic diversity.

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UC Forums

## California Innocence Project

SAMANTHA SHAPIRO and Nadav Goldschmied

Innocence organizations around the world provide pro bono services to those that have been wrongfully convicted. Founded in 1999, at the California Western School of Law, the California Innocence Project provides interns with an invaluable opportunity to gain insight into criminal or post-conviction law. Attorneys, clinic students, and interns within the program assist in investigation and litigation by locating and re-interviewing witnesses, examining new evidence, filing motions, and securing experts. Interns gain insights into the criteria that is used to screen letters of innocence, create legal memos, and learn how to appropriately answer phone calls from attorneys, inmates, witnesses, and victims. The goal of this internship is to familiarize students and volunteers with innocence issues, legal documents, and cases. Since its foundation, the California Innocence Project has exonerated more than nineteen individuals that were wrongly convicted.

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UC Forums

## Determining the Disulfide Bond Linkage Between J Chain and Pentameric IgM in Nurse Shark

JASMIN SHORES, Steven Morrison and Valerie Hohman

Antibodies are a vital aspect of mucosal immunity in vertebrate animals. The small J chain protein binds to polymeric antibodies such as pentameric IgM and allows these complexes to be present in an organism's mucosal secretions. This permits an organism to protect itself against foreign pathogens trying to enter its body through the inner linings of the respiratory or digestive system. Past studies have shown that there are structural differences between the J chains in cartilaginous fish and mammals, including the number and position of the highly conserved cysteine residues that make up the J chain's structure. With this in mind, my project aims to determine J chain's disulfide bonding pattern between cysteine residues in nurse shark, a representative of cartilaginous fish. This is being done to better understand the structure of J chain in cartilaginous fish and how J chain may have evolved among vertebrates as a function of mucosal immunity. I am isolating pentameric IgM from nurse shark and performing protein digestion and peptide analysis using LC-MS. By comparing the protein fragments from LC-MS to a database of known shark IgM protein sequences, the bonding pattern between J chain and pentameric IgM can be determined.

## Frustrational Analysis of Na<sup>+</sup>/H<sup>+</sup> Exchanger 1 (NHE1) and Calcineurin B Homologous Protein 1 & 2

DANIELA SILVA, Mark A Wallert, Joseph Provost and Joachim Lätzer

The sodium hydrogen exchanger isoform 1 (NHE1) is involved in tumor cell proliferation, metastasis, invasion and morbidity in several cancers including non-small cell lung cancer. While several proteins, lipids and kinases are responsible for regulating NHE, two proteins, calcineurin homologous protein isoform 1 (CHP1) and 2 (CHP2) are of particular interest in lung cancer cells. While CHP1 binds NHE1 and is responsible for basal activation of NHE1, CHP2 expression is nearly limited to cancer cells and has been reported to replace CHP1-NHE1 interactions with unknown consequences. Thus an important target for anti-lung cancer drug design is the binding of a drug which would block CHP2 but not CHP1 from NHE1 activation. To determine unique and common binding sites for CHP isoforms with NHE, we performed molecular dynamics simulations with a coarse-grained funneled energy function that provided an atomic level picture of the association (and hence activation) of NHE1 with CHP1 and CHP2. In these simulations NHE1 collaboratively folds and binds correctly to both CHP proteins lowering the overall binding free energy. The molecular detail of the simulations helped identify “hot-spot” residues involved in the encounter complex and in the binding interface that can guide the design of non-binding mutants. To understand the association of NHE1 on a residue level, frustrated (residues unlikely to bind) and minimally frustrated (residues that bind strongly) contacts of NHE1 residues were computed for bound structures and also the encounter complexes. Based on circular dichroism studies and computational analysis the binding energies were determined for the bound complexes of NHE1 and CHP1/CHP2. The nature of the interactions probed served to understand, in molecular detail, the activation of NHE1 and could serve as input for pharmacomodeling to design a therapeutic drugs that fights lung cancer growth.

## Understanding the Preferences of Hummingbird Visitation: Feeders vs. Flowers

ALAN SIMS and Gerardo Avalos

Flower pollination is decreasing rapidly due to the presence of feeders. The burden has been placed on different pollinators, such as bees, to take on the job hummingbirds used to do. For this study, the data was collected at La Georgina Restaurante in Cerro de La Muerte, Costa Rica using 2 mist nets to capture hummingbirds to identify morphologies as well as observe hummingbird visitation and interactions at feeders. This study was conducted to determine if the presence of feeders had an effect on visitation to flowers. Uniformly, all hummingbirds studied visited feeders more frequently than flowers. The volcano female had the greatest visitations between both feeders and flowers with flower visitation totaling 433 visits (45%) and 2,294 feeder visits (49%). The overall visits to feeders totaled 4,642 compared to 952 flower visits, indicating a preference for feeders over flowers. This study sheds light on hummingbird preference for feeders over flowers. A multitude of factors can be taken into consideration for their preferences. One specifically is sugar content. However, there is a decline in floral visitation with a high, readily available sugar content available at feeders. In order to conserve the visitation while still amplifying visitation to the local flora, a reduction in the amount of feeders present are restaurant or homes can alleviate some problems as well as allow for the chance to observe hummingbirds when they must rely on nature. However, additional studies are needed to determine and understand the cause of preference for visitation to feeders.

## Biochemical Exploration of Macromolecules

ERICA SKERVEN, Louise Zhou and Jessica Bell

Malate dehydrogenase (MDH) is an enzyme important for energy creation as part of the metabolism in most living organisms. MDH catalyzes the oxidation of malate to oxaloacetate (OAA) with the concomitant reduction of NAD<sup>+</sup> to NADH. Parameters describing the enzyme's interaction with its substrate ( $K_m$ ) and the rate at which it is able to produce its products ( $V_{max}$ ) characterize the efficiency of the enzyme reaction. The goal of this product was to derive the  $K_m$  values for NADH and oxaloacetate. To observe the reaction, the oxidation of NADH to NAD<sup>+</sup> was followed. As the NADH is consumed in the reverse reaction, a reduction in light absorbed at 340 nm is measured. When OAA was varied (to determine its  $K_m$ ) with saturating NADH concentration, the data were not interpretable due to substrate inhibition and the sigmoidal character at low substrate concentrations. For NADH varied data with OAA saturating, a  $K_m$  parameter of 156  $\mu\text{M}$  for NADH and  $V_{max}$  parameter of 0.0037  $\mu\text{M}$  NADH consumed/second was determined. The inhibition studies suggested that succinate does not act as an inhibitor of MDH at the concentration tested, whereas citrate altered NADH kinetic parameters. These experiments will need to be repeated to validate the findings and confirm the  $K_i$  value determined for citrate.

## The Triumphant Rise of Motown Music: The Power of Berry Gordy and Lyrics on the Civil Rights and Anti-War Movement Lyrics

KACY SMITH and Kathryn Statler

Throughout America, music exemplifies cultures within our larger society, as well as societal change. In the 1960's black bands started to increase in popularity. Berry Gordy, Diana Ross, Marvin Gaye, Stevie Wonder, The Four Tops, The Temptations and other legendary artists and groups transformed black music forever. Motown music defined black culture into something that all races were excited about during a period of struggle. However, white CEO's and owners of music industries conflicted with Motown music because of the competition it created. Also people still preferred white bands during that era. As Italian groups like the Rascals and Frank Sinatra promoted soul music and Elvis Presley introduced "pop" music, Berry Gordy listened and watched what the audience liked and developed an industry that resembled that type of music but with black artists. Gordy then made Hitsville USA; Detroit, also called Motown. Berry Gordy's vision, influences, and talented artists helped transform lyrics that were mostly based on white middle class concerns, to racial, anti-war and social issues that concerned America during the 1960's. Gordy and Motown wanted to use strong lyrics that highlighted the civil rights movement, Vietnam War and poverty. They displayed a lot of courage in making a black music industry during a time when racism was prevalent in America. Thus, despite being overshadowed by white bands early on, Motown music became a dominant music industry by the 1960s because of the leadership of Berry Gordy, powerful lyrics, and a civil rights message that affected both black and white cultures.

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## Role of the Lysosome in *Drosophila* Models of Alzheimer's Disease

MICHELLE SYDNEY SMITH, Jillian Wothe and Adam Haberman

Alzheimer's (AD) is a neurodegenerative disease which causes dementia in its victims. Dementia is the result of nerve cells dying in the brain, which has been linked to protein accumulations, specifically amyloid beta 42 a derivative of a generally nontoxic transmembrane protein. The purpose of my study was to probe how amyloid aggregates despite our processes to degrade them as seen in AD. Using a *Drosophila* model expressing amyloid in its eyes, I tested how previous impairment to the lysosome by amyloid combined with light stress leads to photoreceptor degeneration in the fruit fly eye. To do this I raised these transgenic flies expressing amyloid-beta protein in their eyes for three weeks in light and dark conditions to manipulate stress of the lysosome, as light causes endocytosis of rhodopsin, a protein associated with the retina of the eye, thereby overwhelming the lysosome. After scoring degeneration of the eyes I found there is statistically significant more photoreceptor degeneration in flies reared the light environment compared to the dark ( $p < 0.05$ ). Preventing the formation of rhodopsin thereby taking away the stress associated with light exposure to the fly eye rescued the cell death seen in my initial experiment between the two light conditions ( $p < 0.001$ ). These findings support my hypothesis that lysosomal impairment by amyloid does lead to neuronal degeneration in my *drosophila* eye model. Therefore some part of this defective degradation of neurotoxic protein accumulations is the result of such impairment.

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## Seeking Asylum at the U.S.-Mexico Border

ERIN SNOKE and Everard Meade

Despite immigration being a hotly debated topic in the United States today, there is little attention focused on the process of asylum that some take in order to become U.S. citizens. Immigrants come to the United States for a variety of reasons that range from seeking economic opportunity to reuniting with families across the border. In addition, many immigrants, especially from Mexico and other areas of Latin America, seek asylum in the United States to escape the violence and corruption that has infiltrated the local society and the region as a whole. As part of the Trans-Border Institute's mission to fostering peace along our border with Mexico, it serves as a resource for providing expert witness testimony for asylum cases in the United States. This project will look at the process for applying for asylum in the United States as well as other immigration processes to gain a better sense of the push and pull factors that are involved in immigrating to the United States. It will also look for trends that can help us better understand the causes of violence in various regions in Mexico, which has become a strong factor in the decision to seek asylum in other countries.

## The California S.T.E.P. Act: Prosecuting Fraternities as Criminal Street Gangs

COURTNEY SPEARS and Erik Fritzvold

This thesis project examines the similarities in structure, initiation processes, affiliations, and motivations for joining both criminal street gangs and fraternities. These similarities serve as the foundation for the central idea of the thesis: using California's street gang legislation, mainly the S.T.E.P. Act, to more severely prosecute fraternities for their crimes. My application of the legislation is supported through both comprehensive gang data, as well as case studies of fraternity crimes, as comprehensive data for this group does not exist. My research has important implications, as recent legislation serves to protect fraternity offenders from facing punishment for their crimes, overall making college campuses more dangerous and allowing this criminal networking to thrive. If these fraternities, which in large part act as criminal street gangs, were to be prosecuted under the S.T.E.P. Act, not only would the offenders receive harsher punishments, but the groups themselves would have to be more selective in their choosing of new members so as to not ruin the reputation or good standing of their fraternal organizations. This thesis project will discuss the results of the application of the S.T.E.P. Act as well as suggest amendments to the legislation in order to make prosecuting fraternities under this act more cohesive.

## Real Virtual Reality: The Emergence of the Internet of Things and a Prediction of its Effects on Marketing Strategy

CHLOE SPILOTRO and Aarti Ivanic

The growing phenomenon of the Internet of Things (IoT), which is that any item capable of being connected to the Internet will be, presents an unprecedented opportunity for businesses. Using an extensive literature review, the current research examines the significant shift in marketing strategies that need to take place to target the millennial generation of as they adopt IoT. Most research defines the Millennial generation as those born from the early 1980s to the early 2000s. As individuals in this generation grow older, there are two behavioral implications: 1) their acceptance of technology suggests they will be quick to adopt IoT, and 2) their growing purchasing power and consumer behavior make them an ideal target for marketers. Millennials who adopt IoT offer their data more willingly to marketers and firms, which makes it easier for marketers to collect data and target customers more precisely. Additionally, IoT devices will enable various platforms for content marketing that are significantly different from a 30 second TV commercial or a banner advertisement. Marketing messages will be able to be personalized, customized, and more relevant to a potential customer than ever before. IoT offers unlimited creativity for content creation as well as targeted delivery of content, as opposed to traditional advertising avenues.

## Transmissive Spectrum Splitting Multi Junction Solar Module for Hybrid CPV/CSP System

ADAM OLLANIK, NICHOLAS FARRAR-FOLEY, QI XU, LEILA MADRONE, PETE LYNN, VINCE ROMANIN, MATTHEW ESCARRA, CHRISTOPHER SPITLER, ANDREW BILLIGMEIER, BRENT MACHEEL and Daniel Codd

A new scalable, modular hybrid solar power system is designed to generate electricity through two pathways, CPV and CSP, in order to better meet grid energy demands for reliable renewable energy. The key element, a transmissive, spectrum-splitting multi-junction solar module, is modeled and simulated to analyze its electrical, optical, and thermal properties. Optimized designs are proposed to deliver high efficiency visible light-to-electricity conversion while transmitting infrared light to a thermal receiver. USD faculty and students are working to design the thermal receiver and thermal energy storage systems.

## The International Criminal Court: Constraining Political Ties

LAVANYA SRIDHARAN and Vidya Nadkarni

To date, only crimes allegedly committed by leaders in African countries and situations in Africa have been investigated before the International Criminal Court (ICC). Based on the Court's activity in its first decade, the African Union has accused the ICC of a geographical bias and an unfair targeting of Africans. My research seeks to examine if the perceived geographical bias from the ICC against Africa truly exists. More importantly, it explores the process of how situations are selected by the ICC for investigations and determine which variables play a role in the selection of a situation. Investigations are influenced by cooperation from the state in which the alleged criminal activity has occurred, situational gravity of the alleged crimes, strength of the state's legal system where the alleged criminal activity is observed, and if the alleged crime implicates a veto-holding permanent-five member of the UNSC. Most of the situations investigated by the ICC can be explained by the first three factors, and for the outliers, the UNSC is the key variable that determines whether the situation was investigated or not. My research evaluates various situations based on the first three variables to see if the Court is consistent in its selection of investigations. After evaluating the situational referrals with the aforementioned criteria, the outliers that do not fit within this mold were extracted. Qualitative analysis was used to identify links between outlier situations and the Perm-5 members of UNSC to determine why a situation was or was not investigated.

## Solar Desalination

ALEK STASHIK, BORIS FRATKIN, BRENT MACHEEL, MARK HUPP, STEPHEN KRISTEDJA and Daniel Codd

Water is essential for life. According to the World Health Organization, it is estimated that the average adult human drinks anywhere from 2-3 liters of water per day and up to 16 liters depending on climate and physical activity. Water may be unacceptable for consumption due to levels of salinity, toxins, or suspended solids. Poor water quality can cause disease outbreaks and contribute to background rates of disease manifesting themselves at different time scales. Reduction of waterborne diseases and development of safe water resources is a major public health goal in developing countries. In order to solve the problem of providing potable water, with little to no infrastructure, there is a need to have a system that can produce water using only natural resources. The solar desalination still uses solar energy to directly separate water from the contaminants. Following the flow of water in the system, it begins in a seawater reservoir which proceeds into the evacuated tube heater. From the heater, the hot salt water is distributed into Concentrated Solar Evaporation and Condensation (CSEC) unit. The CSEC uses a wicking system to impede the flow allowing the concentrated solar power, from the parabolic mirrors, to evaporate and condense the fresh water, which then separates from the brine.

## The Prospects of a National Farm Workers Labor Movement in Mexico

MELISSA STENCIL and David Shirk

My research will be focusing on the farm work of Mexican laborers who work on mega-farms which supply U.S. chains and markets with cheap produce. Notably, many of these chains and markets buy from these farms without enforcing the social responsibility guidelines they agreed to, leaving millions of laborers vastly over-exploited. Richard Marosi of the Los Angeles Times published an investigation into these farms last December entitled “Product of Mexico,” revealing that many farm laborers are trapped for months at a time in rat-infested camps, often without beds and sometimes without functioning water supplies; some camp bosses illegally withhold wages to prevent workers from leaving; laborers often go in debt to company stores, resulting in many going home penniless at the end of a harvest; and those who seek to escape their debts and terrible living conditions are met with barbed wire fences and threats of violence from camp supervisors. I will specifically be looking at the tactics that Mexican laborers are currently using to combat these unjust conditions, under the larger umbrella of Mexico’s blossoming civil society, as they seek to turn their current union- the alianza- into a national farmworkers labor movement. After researching literature in the Industrial Relations and Social Movement fields, the farmworkers’ union will be analyzed through the lens of seven different independent variables, including resources, cohesiveness, balance of power between union and government, union-party ties, culture of the union, external environment and social movement alignment. This will help hone in on the strengths and struggles that unions and social movements face and will hopefully provide implications for the future of this union.



## Jesus's Teachings in Light of 1st Century Jewish Attitudes Toward the Poor

MICHELLE STENCIL and Eugenia Constantinou

The question I researched was “How do Jesus’ teachings on the poor compare to 1st century Jewish attitudes toward the poor and poverty?” The gospels appear to contain many instances in which Jesus elevates the status of the poor or challenged societal views and attitudes toward the poor. In order to investigate Jesus’ views and determine whether they were a departure from or actually in accordance with first century Jewish attitudes, I began with a theological investigation of the Hebrew Bible. The purpose was to determine what attitudes the Bible reflects about the poor in ancient Judaism and whether or not attitudes changed or developed over time into the Second Temple period. This research included an inquiry into provisions in biblical laws related to the poor in order to compare the ideals enshrined in the Law of Moses with the daily reality of ordinary people. I then proceeded to conduct a historical investigation to discover how the poor were actually treated, as this would shed light on how they were truly perceived in their society. Three distinct views emerged from this analysis: 1) Jews who considered the poor to be lazy, and thus undeserving of care, 2) Jews who considered the poor to be evil and were therefore receiving just punishment in the form of poverty, and 3) God’s view, that the poor were to be considered the Jews’ brothers and sisters and were to receive special care. After extracting these three perceptions from the Bible and historical study, I compared Jesus’ attitudes toward the poor as seen in his teachings and actions in the gospels. To discover whether Jesus was deviating from other Jewish teachers of the day or instead reflecting developments which had already taken place in first century Judaism, I also researched rabbinic teachings during Jesus’ time. Lastly, I offer some brief reflections regarding how my research might apply to the modern Christian.

## The Pariah of the Western Hemisphere: How the Organization of American States Isolated Cuba Diplomatically, Economically, and Militarily After the Cuban Revolution of 1959

ELIZABETH STENGER and Michael Gonzalez

With recent news about the United States and Cuba resuming diplomatic relations, it can be easy to gloss over the past fifty plus years and attribute much of the animosity between these two nations to miscommunication and Cold War paranoia. However, if the future of Cuban international relations is to be successful, it is important to look back and understand why and how Cuba had become so isolated in the Americas. How did Cuba become a pariah in the Western Hemisphere? What effects did Cuba’s isolation have on Cuban-Latin American relations for the rest of the twentieth century? When writing about the Cold War, it is easy for other nations to be overshadowed by the two superpowers of the era: The United States of America and the Union of Soviet Socialist Republics (USSR). Nevertheless, it is important to recognize the agency that each country had during this time. The Organization of American States (OAS), along with individual countries in Latin America, responded to the Cuban Revolution by isolating Cuba using diplomatic, economic, and military means. It is important to add that Cuba also played a role in its isolation by choosing to withdraw from various regional organizations. Cuba’s isolation had long-lasting effects on Cuban-Latin American relations and continues to affect politics and diplomacy in the Western Hemisphere.

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UC Forums

## Waste Reduction at Petco Park

JEFFERY STEPHENS and Michael Catanzaro

In collaboration with the San Diego Padres, the goal of this study is to reach a 100 percent waste diversion rate for Padres baseball games. San Diego's Miramar landfill is approaching maximum capacity, and will likely be decommissioned within the next 7 years. The San Diego Padres have the opportunity to reduce waste generated during games at Petco Park in order to minimize the stadium's ecological footprint. A waste assessment of Petco Park determines the stadium's waste diversion rate, and provides a baseline for further recycling initiatives. Ultimately, a higher diversion rate could be achieved by increasing the number of recycling bins and promoting more effective cleanup crews after games. This study also intends to highlight the CRV revenue potential for recycled bottles, which the Padres could invest in further sustainable initiatives.

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UC Forums

## Learning and Memory in the Traveling Salesman Problem in Rats

MARTA STOJANOVIC and Rachel Blaser

The traveling salesman problem (TSP) is a combinatorial optimization problem that is used to study spatial cognition in human and non-human animals. Although rats appear to use a distance-minimization strategy in this task, the mechanism by which they solve the task is not yet understood. While the TSP is similar to the radial arm maze and the Morris water maze, it may require different strategies than other popular spatial tasks. Most previous research with the TSP has focused on planning and route selection, but our goal was to determine whether the task could also be useful to study learning and memory. Rats were given five days of training with each of three different TSP arrays, and then given a memory test at 24, 72, or 120 hours post training. Performance improved significantly across days of training, providing evidence of learning. There was no significant effect of the delay of memory test on the performance of rats. Further research is needed to understand the cognitive processes mediating these effects.

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UC Forums

## Internship at the Office of Sustainability

SAMANTHA STRAUSS and Gary Gray

An overview of the projects and successes accomplished throughout a yearlong internship at USD's Office of Sustainability.

## U.S. Economic Growth: Liberalization of Immigration Policy and its effect on GDP

OMAR SULEIMAN and Alyson Ma

While goods, services and finance are regularly crossing international borders, individuals are not afforded the same benefit, as they remain landlocked due to immigration laws and policies. Immigrants are motivated to leave their former countries for a variety of reasons, including a desire for economic prosperity, family reunification, an escape from prejudice or conflict, or simply to follow one's passions. With the fear of terror threats and increased job competition, many Americans are opting for tightening immigration laws while others believe the United States is a country of immigrants and want to open borders to welcome all. In a United States election year, it becomes relevant to evaluate the effects that legal immigration have on per capita gross domestic product. In particular, we ask: what are the expected economic gains on liberalizing national immigration laws? As liberalized immigration policy is expected to increase the denominator of GDP per capita, each individual immigrant will ultimately have to significantly contribute to total GDP in order to raise the per capita level. After initially analyzing the relevant data, we believe that liberalizing immigration laws will ultimately increase per capita GDP in the long run.

## An Analysis on the Effect of Population Aging on Consumption Dynamics: A Case of Southeast Asia

SHREERAM SURESH and Alyson Ma

This paper analyses the empirical factors that have influenced the dynamics of consumption in the Association of Southeast Asian Nations (ASEAN) member states. The ten member states of ASEAN include Singapore, Brunei, Malaysia, Thailand, Vietnam, Philippines, Indonesia, Laos, Myanmar and Cambodia. As the region faces one of the most compelling structural transitions, the demographic shift towards an aging population suggests the need for macroeconomic policymakers to investigate its relationship with domestic consumption. Following past researches done by Mathieu Lefèbvre, (2006), and Fumio Ohtake and Makoto Saito, (1998), we test the impact by examining the data set of the 10 ASEAN member states from 1970-2010. The empirical results of the analysis based on time series data suggests that there is a strong positive correlation between aging in a population and domestic consumption. This implies that the aging population in the ASEAN member states are facing an increasing expenditure on support and health care and therefore must be taken into account by ASEAN governments while establishing policies.

## Il Potere della Donna: The Avenues of Power for Women in Florence and Milan, 1325-1475

KOURTNEY SWANK and Thomas Barton

The years between 1350-1475 witnessed significant societal and cultural changes happening in the Italian cities of Milan and Florence. One significant group affected was women. While scholars previously believed that women had a limited role in society, recent scholarship has suggested and proven that women held positions of influence. They were not necessarily active participants in the government, but they held positions of influence with their husbands, daughters and sons. Politically, women had no direct access to managing the city, but if they were able to manage their men then they would also be able to influence how a city's politics were shaped, albeit in a roundabout way. There are numerous ways that a woman exercised her power through her family; in educating children, arranging marriage alliances, and putting forward favorites who would enjoy their patronage. Women may not have held the positions of power as defined in modern terms, but for their time, they maintained various avenues of power and influence.

## Influence of Significant Wave Height on the Vertical Distribution of Barnacle Larvae

MARISA SWIDERSKI and Nathalie Reyns

Barnacles have a representative life cycle of many marine invertebrates and thus can serve as a model organism for understanding larval transport mechanisms. The objective of this study was to examine the relationship between the vertical distribution of barnacle larvae and significant wave height. To do so, an EBARA plankton pump was used to collect samples off the coast of San Diego, CA from 2-m depth intervals throughout the water column on days with varying significant wave heights. Samples were then preserved and sorted using a dissecting microscope to identify barnacle larvae to the lowest taxonomic level possible. In general, the mean depth distribution of barnacle nauplii and cyprids changed with environmental conditions that may be related to changes in significant wave height (high swell conditions). As the thermocline deepened, nauplii appeared to be mixed further down in the water column, while cyprids tended to remain deeper. However, in higher significant wave height conditions when the water column was well-mixed throughout, the cyprids were concentrated at a shallower depth, suggesting that vertical migration may be occurring. As previous studies have suggested, barnacle larvae are capable of exploiting shoreward transport mechanisms through vertical migration. Thus changes in the vertical distribution of larvae during swells has implications for larval transport. A better understanding of larval transport is necessary for the development of effective coastal management and conservation strategies.

## Investigating the Role of GTP Cyclohydrolase I Feedback Regulatory Protein (GFRP) in the Synthesis Pathway for the Cofactor Tetrahydrobiopterin (BH4) in *C. elegans*

DANIEL SYKORA, Joachim Lätzer and Curtis Loer

Synthesis of neurotransmitters involves multiple enzymatic reactions with various stages of regulation. BH4 is an enzyme cofactor that participates in a variety of synthesis pathways, including those for serotonin, dopamine, and the conversion of phenylalanine (Phe) to tyrosine. In mammals, GTP cyclohydrolase I (GTPCHI) catalyzes the first step of tetrahydrobiopterin (BH4) synthesis and is regulated by GTP cyclohydrolase I feedback regulatory protein, or GFRP. The end product of the synthesis pathway, BH4, binds to GFRP to inhibit GTPCHI. Since the reaction catalyzed by GTPCHI is the rate-limiting step in BH4 synthesis, the function of GFRP has a significant effect on the amount of BH4 produced. The goal of this study is to determine whether a predicted GFRP protein identified in the nematode *C. elegans* binds BH4 to inhibit GTPCHI and binds Phe to activate GTPCHI as it does in mammals. We are employing bioinformatic and computational chemistry techniques such as multiple sequence alignments and protein 3D structure modelling to analyze the BH4- and Phe-binding interface between GTPCHI and GFRP in *C. elegans* to identify possible differences from the known crystal structure of mammalian GTPCHI and GFRP, with the goal of attaining a more complete understanding of the allosteric interactions of these proteins.

## Linda Vista Community Relations

SZUKALA NEVIN, ALVARADO JUAN, RYAN STANLEY, WU BAISI, KURTIN HANNA and Alberto Pulido

The focus of our presentation is to explore how we might improve community relations between the University of San Diego and the people of Linda Vista. These two communities appear to be widely separated despite being neighbors, our focus is to help tie these two communities together through an engaged pedagogy project. The project entails gathering information from the Center for Community, Awareness and Social Action (CASA) in order to find a desired issue to specifically focus on. We will also be gathering information from Bayside Community Center who already creates programs to help the community of Linda Vista. With these two resources we will develop a specific plan of action to work on the Gentrification of the community. The project will be mutually beneficial. Our methodology will be to exhaust all resources that already exist to better understand the current relationship between University management and the community of Linda Vista at large. Our objective is to leave community relations between Linda Vista and USD better than before our work was conducted and completed. Due to the never changing fact that we will always be neighbors, sustainable relationships are very important and significant to the University's well-being. A major focus on this presentation is to incorporate an engaged pedagogies approach into our reflection and analysis.

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UC Forums

## A Phylogenetic Study of Cactus Genus Grusonia

VALERIE TEANO and Michael Mayer

The primary distinctions made between the genera *Cylindropuntia* and *Grusonia*, within sub-family Opuntioideae, are based on morphological differences. Historically this phylogeny has been proven difficult to resolve due to a lack of data, scarcity of external characters, and hybridization between species (Pinkava 2002). Based on current classifications, *Cylindropuntia* and *Grusonia* are sister taxa, that are both monophyletic. New molecular data suggests that there has been misidentification within Opuntioideae, when the Mayer laboratory discovered a *Grusonia* species appearing within a *Cylindropuntia* clade. This study found results supporting that *Cylindropuntia* is not monophyletic, based on molecular data gathered from *Grusonia* chloroplast DNA.

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Session II: 1:10 to 2 p.m.

UC Forums

## A Naked Man Striking Across Mark's Gospel: Fleeing Shamefully and Rising Angelically

BRYAN TERESI, John Fendrick and Florence Gillman

"A curious character appears in a pivotal moment in the life of Jesus, only to disappear just as quickly, albeit without clothes, fleeing when confronted with death. He has no name, and seemingly little purpose. But why would someone writing such a significant story, one regarding life and death and the revelation of the Son of God, toss in such a distraction? My thesis suggests that this young, naked man has a purpose within the story. Passages in the original Greek of the New Testament reveal possible links between this character and the young man in the empty tomb of Jesus, and perhaps even Jesus himself, as both have linen cloth wrapped around themselves. Using various commentaries, I suggest several potential meanings for the seemingly bizarre interlude that highlight the importance of the death and resurrection of Jesus. The naked young man and the young man at the tomb may help to explain the cliffhanger ending of the gospel of Mark, offering examples of both failing to follow Jesus and rising gloriously with Jesus."

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Session II: 1:10 to 2 p.m.

UC Forums

## An Experiential Approach to Understanding the Engineering Design Process

MAARON TESFAYE, Sarah Gray, Rishika Daryanani and Odesma Dalrymple

The engineering design process is best taught using active learning techniques rather than rote methods. By first engaging in a design challenge, followed by guided reflection, students can learn and appreciate the concepts and related ways of thinking associated with the design process. One activity that has been successfully used to introduce students to the engineering design process is the tower of straws exercise. In teams, students are provided with a fixed number of straws and fasteners and are instructed to build a structure as tall as possible, within a limited amount of time. Given the context of the challenge, additional requirements or constraints can be added, such as the tower must support a minimum load or be constructed using the least amount of materials. The scope of the activity is well defined, allowing for the entire engineering design process to be accomplished, with iteration, within a short period of time. The tower of straw activity was used as an introductory activity with 3 groups of participants: 1) a group of California science teachers attending a week-long professional development training; 2) first-year college students in an introductory engineering course at the University of San Diego; and 3) students (ranging from middle school - college) engaged in an after-school enrichment program in Tijuana, Mexico. At the end of the activity, all participants created a graphical model to represent the process their team used to complete the tower challenge. This poster presents the derived understanding of the engineering design process for each group of participants, i.e., science teachers, first-year college students, and students in the after school enrichment program, based on the evaluation of their graphical models. The similarities and differences between these three groups are discussed in terms of possible implications of their understanding of the engineering design process on their future learning of and engagement with the topic.

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Session II: 1:10 to 2 p.m.

UC Forums

## Beta-Borylation and Beta-Silylation of Enals Toward a Method to Access Trisubstituted Vinyl Boronate Esters and Vinyl Silanes

TAYLOR THANE, Wendy Guan and Timothy Clark

“Conjugate borylation and conjugate silylation have been proven efficient ways of accessing beta-borylated and beta-silylated carbonyls from the corresponding alpha, beta-unsaturated carbonyls. Application of these methods to alpha, beta-unsaturated aldehydes, however, has been more limited due to the propensity of the resulting aldehydes to decompose during isolation. Our group sought facile access to beta-borylated and beta-silylated aldehydes as synthetic precursors to trisubstituted vinylboronate esters and vinylsilanes by dehydroformylation. Both copper and metal-free reaction conditions were examined. Copper-catalyzed conjugate addition has proven to be most effective in both cases using an electron-rich N-heterocyclic carbene as the ligand. Products from aldehydes substituted in both the alpha- and beta-positions have been accessed, as well as those from mono-substituted enals. The scope of the conjugate addition for both borylation and silylation will be presented.”

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Session II: 1:10 to 2 p.m.

UC Forums

## Phosphorylation of Neuronal Proteins in *Drosophila melanogaster* Changes With Age

ALEXIS THOMAS and Adam Haberman

Cells, such as epithelial and red blood cells, have the capacity to regenerate throughout an organism's lifetime. However, neurons are unique because they do not regenerate; once neurons are formed, they last the lifetime of an organism. This lack of regeneration is the reason that neurodegenerative diseases, including Alzheimer's Disease and Huntington's Disease, are so detrimental; they target cells that can't be replaced once damaged. These diseases occur later in life, which indicates a problem with the normal aging process of neurons; these diseases are associated with abnormal protein accumulation. As neurons age, they acquire intracellular aggregates despite degradation pathways, and some of these aggregates are key features of neurodegenerative diseases. We are interested in understanding how well degradation pathways work in neurons of different ages, and what changes in older cells lead to intracellular aggregates. Changes in protein abundance or post-translational modification of existing proteins could severely affect how cells deal with the stresses of aging. To determine how proteins change with age, protein levels and post-translational modifications are compared between young and old neurons to determine how the same protein differs over time. The changes are then analyzed to identify post-translational modifications that are important for healthy neuronal aging and investigate the functional significance of the modifications. Preliminary results have found increased levels of protein phosphorylation in old *Drosophila melanogaster* heads. Once we analyze these findings through mass spectroscopy, we will be able to identify the exact proteins that differ in order to study their function in *Drosophila*.

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UC Forums

## Redefining Navigation- The USD Experience

NOAH THOMAS and Eric Jiang

The University of San Diego is visited by tourists, parents, and students year round. Though not very large in size, navigating the campus can be difficult due to the variety of names given to and similar architecture of each building. Because of this problem, there is a need for an app that gives users the campus information they need at their fingertips. This project resulted in an intuitive mobile application, available for download from the Apple and Google Play Store, that can be used by students and visitors alike to navigate the campus of the University of San Diego.

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UC Forums

## HCN, Formamidic Acid and Formamide in Aqueous Solution: A Free Energy Map

KYRA THRUSH and Jeremy Kua

Given an aqueous solution of ammonia and HCN, what might be the reaction products? What about their relative stability and abundance? What tautomerizations might occur to allow for transformation to lower energy conformers of certain products? This project employed density functional theory and computational methods to predict the free energy of small molecule oligomers of HCN, ammonia and water and evaluate their relative stability to create a free energy map. This map was a result of calculations of the free energy of the molecules themselves, as well as the energies of their lowest energy transition states. For a C1 system, it was determined that formamide, a tautomer of formamidic acid, is the free energy sink of the system, despite the high barrier of hydration from HCN to formamidic acid that must first be overcome. In addition, the energies of certain 6-membered ring trimerizations of small molecules (HCN, formamidic acid, and formamide) were also explored, and demonstrated that HCN produces a planar ring whereas formamidic acid and formamide produce non-planar rings.



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UC Forums

## Tijuana: The Third Space

MARIBEL TOVAR and Kimberly Eherenman

The war between the United States and Mexico began in 1846 beginning with the annexation of Texas by the United States in 1845. It was not until 1848 that the Treaty of Guadalupe Hidalgo was formed and México lost more than half of their territories. Nearly 98% of one hundred thousand Mexicans, who lived in these lands at the time, chose to remain where they lived. Faced with territorial changes, Mexicans were then forced to adapt and survive in an intermediate, “third” space. This space, defined as a site where ethnic Mexicans attempted to mediate the profound sense of displacement, became one where Mexicans could once again feel comfortable with their own culture. In this project, the approach taken to better understand the third space is through an obvious example, Tijuana, Mexico, a border town. Tijuana can be seen as neither being fully American or Mexican, instead being seen as a combination of both. In further detail, Tijuana is to be analyzed as a third space that serves as a place of work and as a barrier for both Americans and Mexicans. In the end, taking a step back from the obvious examples of border towns, on a smaller scale, we can see how the third space doesn't necessary have to only be defined as a physical space but can also be a concept seen through humans themselves.

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Session II: 1:10 to 2 p.m.

UC Forums

## Diego the Torero: What Does He Mean to Us?

TAYLOR TOWNSEND and Alberto Pulido

Diego the Torero was featured in The Demands made by the Black Student Union of USD. They demanded that he be replaced by a mascot which does not offend via caricature. The significance of this topic lies in how most USD students don't identify with toreros partly because they don't know what a torero is. Diego is our mascot, he symbolizes us as students here and the majority of students don't know who he is or why he was chosen as our mascot. Originally, our mascot was Pete the Pioneer (a symbol of manifest destiny to many). In the 60s, Bishop Buddy changed our mascot to Diego the Torero (a Spanish bullfighter) to reflect our nearness to Mexico (did the Bishop realize that Mexico is not, in fact, Spain?). We will explore these issues as well as the relevance of Diego to USD. We will be researching Diego's historical and cultural significance, in particular how it relates to our school and our student populace by questioning students and finding reliable written sources.

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Session II: 1:10 to 2 p.m.

UC Forums

## Distribution and Physicochemical factors of *Limonium duriusulum* in San Diego Estuary and River

CLAUDIO J. TRESPALACIOS and Bethany O'Shea

*Limonium duriusulum* is a non-native plant inhabiting Ocean Beach and Santee. It is a problem because the plant is taking over the land usually occupied by native plant species. In order to determine the factors that aid the growth of this invasive plant species, ten samples were collected at each of the two sites: the Ocean Beach estuary, and a fresh water site in the San Diego River (Santee). Soil was collected in the root zone and analyzed for pH, salinity, moisture, grain size, extractable Na, K, Mg, Ca, and total trace elements such as Cu and Zn. Statistical analysis showed that the soil chemistry at the two sites was different for seven physicochemical properties (moisture, K, Mg, Cu, Zn, Fe, Mn) and similar for only four (pH, salinity, P, S). This suggests that *Limonium duriusulum* is tolerant over a range of soil conditions, and/or other factors, such as microbiological, could influence the occurrence of limonium in these two environments. To determine the role that microbiological factors might play, we subsequently analyzed the composition of the microbiome in the soil root zone at each site. This study is a first step towards understanding the relationship between soil chemistry, microbiology, and distribution of limonium and provides the first known detail on this plant species occurring in fresh water reaches of an estuary. Overall, these results will help inform conservation groups on how to best manage limonium to prevent future invasion of this species.

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Session II: 1:10 to 2 p.m.

UC Forums

## An Examination of Movement and Refugees as it Impacts Social Justice

COLLIN TROTTER, Charlotte Vitak, Kayla Williams, Parker Garland and Greg Prieto

Through our research we hope to gain a deeper understanding of the way the immigrants and refugees impact social justice and the development of their nation state. In order to focus our research we will narrow our study to southern and Central American immigrants into the United States as well as the movement of sub-Saharan refugees in Africa. Through comparing and contrasting these groups we hope to gain compelling insight into how these groups impact their communities and the wider advancement in social justice in the globalized world we live in today.

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Session II: 1:10 to 2 p.m.

UC Forums

## Currency Appreciation and Its Effect on Country Risk Premiums

TUDOR BRYAN and Alyson Ma

In today's global economy, exchange rates prove to be a crucial determinant of capital and trade flows throughout the world. Exchange rates can influence a country's inflation and interest rates and can, therefore, affect the flows of money into and out of a country. A stronger exchange rate tends to make goods in foreign countries with lower relative exchange rates cheaper. Resultantly, this increases imports for a country, which leads to current account deficit. Concurrently, a current account deficit leads to a capital account surplus as foreign investment in capital flows in to the country. Foreign investors are attracted by the higher rate of return due to higher interest rates, however, in lower interest rate conditions premiums often compensate for higher risk. In this case, investors in a country with a higher valued currency may actually choose to invest in a country with a lesser-valued currency with higher premiums. This is the relationship I want to analyze, as to whether having an over-valued or appreciated currency instigates risky investments and/or lending behavior in low interest rate and high premium areas.

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UC Forums

## Phylogenetic Analysis of the Tribe Thelypodieae (Mustard Family) Utilizing Chloroplast DNA Sequences, Morphological Traits, and Geography

ELIZABETH URIBE and Michael Mayer

This project attempts to provide resolution in relationships between genera in the mustard plant family, called the tribe Thelypodieae. Though studies have been done in an attempt to create a clearly defined phylogenetic (evolutionary) tree from which to base phylogenetic relationships between the genera, much resolution in current data is lacking. Through the analysis of the non-coding trnQ and trnH chloroplast DNA sequences of 59 genera, we attempt to further the resolution and find more specific relationships in the tribe. By analyzing the comparisons, it may be possible to determine how closely related the species, and therefore genera, are to each other, giving a basis for creating a phylogenetic tree of the tribe and giving insight into its evolutionary history. In addition, morphological and geographical characteristics will be used in conjunction with this data to add strength to the molecular findings of the relationships between the genera.

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UC Forums

## The Spending Paradox of International Sports Mega Events

TIM VAN TUYLE and Steven Sumner

There are certain sporting events that have the ability to capture the world's attention, such as the Olympics and the World Cup. In our current popular culture, it is considered a great honor to host one of these mega events, as the eyes of the world will be fixated on a country for a few weeks. The initial economic intuition is that this has the potential to revitalize an economy and bring in a lot of foreign money, but because of internal or external variables, it is possible that there is a reverse effect and such an event can actually cripple a nation's economy in the long-term. There has never been a more appropriate time to explore this phenomenon because of all of the recent media attention over the corruption in the governing bodies that run these events, and the public is eager to learn to see if the money is flowing in the right direction. In my project, I will be analyzing the changes in real GDP for the decade after a country hosts the Summer and Winter Olympics or the World Cup, compared to how the country was doing in the years leading up to the event. Instead of spending billions of dollars on hosting these events, there are much better places that this money can be spent to promote sustainable development.

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Session II: 1:10 to 2 p.m.

UC Forums

## Developing a Group Additivity Method for Aqueous Organics

VANESSA VARGAS and Jeremy Kua

Calculating energies of various molecules provides insight regarding their stability and possible reaction outcomes. The goal of this project is to determine a method to develop tables of free energies in the solution phase. Ultimately, finding values for free energies in solution of any organic molecule will produce ease and efficient access to a chemical's properties. This is important because there are limited values of energies in the gas phase that can be found in tables. Furthermore, this will provide energy values of more complex chemical reactions.

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Session II: 1:10 to 2 p.m.

UC Forums

## Sports and Personality Types: Risk Factors for the Development of Anorexia Nervosa

ALEXANDRA VAUGHN and Rebekah Wanic

Female athletes have a higher incidence than the general public for developing an eating disorder and score higher on indices of Anorexia Nervosa in comparison to non-athletes. Their heightened risk has been hypothesized to result from personality and psychological factors often fostered by the sports' environment. This research will investigate the personality traits of female athletes on several different teams at USD (Rowing, Dance Team, Cross Country). Each sport will be evaluated according to the presence of certain criteria, such as aerobic/anaerobic exercise, importance of team work, and outfit type. Athlete risk factors such as perfectionism, the ability to cope with stress, psychological well-being, and reasons for exercising will be assessed along with personality traits previously associated with disordered eating, such as neuroticism and perfectionism. Thus, the aim of this study is to investigate the personality dimensions of females participating in three different sports and variables related to each sport to assess and compare the risk for developing disordered eating.

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Session II: 1:10 to 2 p.m.

UC Forums

## Psychology and Leadership: A Necessary Connection

JORDAN VAUGHN and Rebekah Wanic

"The study of leadership is a field that continues to grow and prosper. The theoretical understanding behind leadership outlines what characteristics and conceptual understanding leaders need to succeed and enact change. In theories ranging from Adaptive Leadership to Emotional Intelligence, a constant theme is that leadership requires a focus on people. That essential connection to people facilitates incorporating psychology as a backbone to leadership education. Although this connection seems self-evident, there is relatively no research on what psychological concepts are essential for leaders to know. The goal of this study is to examine the connection between psychology and leadership and outline specific psychological concepts that underlie leadership success."

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Session II: 1:10 to 2 p.m.

UC Forums

## Incorporating Contemporary Art and Socio-Constructivist Philosophies in the Kindergarten Classroom

ANA PAULA VILLARREAL, Sara Pielsticker and Danielle Michaelis

Often, elementary schools and their classrooms in our district fail to recognize the benefits of incorporating a socio-constructivist approach to learning. We conducted action research to incorporate both socio-constructivist ideas and contemporary art practices in the classroom, and evaluated student learning. In contemporary art, where unconventional and common, accessible materials are often used, there is a higher value placed on the process rather than the product. This was our main focus: to teach, over two sessions, an experimental lesson in a Kindergarten classroom. Following the content matter they were learning about (past inventors and their inventions) we gave our students the freedom to create their own inventions. Our action research showed the advantages of building on classroom instruction by giving students the opportunity to problem-solve, collaborate, and construct their own knowledge through art, without the common practice of teacher modeling of a particular outcome. Throughout this process, we learned much about applying new perspectives to teaching and learning, and hope we can encourage teachers, particularly primary teachers, to integrate some of the concepts from this research in their classroom.

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Session II: 1:10 to 2 p.m.

UC Forums

## Rate of Marine Snow Aggregate Formation: Effect of Phytoplankton Growth Phase

CIERA VILLEGAS, Quinn Montgomery, Kyle Proctor, and Jennifer Prairie

Understanding the formation of marine snow aggregates can provide insight into the carbon cycle, the biological pump, and other ocean processes. Marine snow aggregates, particles that form in the surface ocean from phytoplankton and other organic and inorganic matter, are one of the vehicles responsible for the flux of carbon from the surface ocean to greater depths. One factor which is necessary to understanding the role of marine snow aggregates in the ocean is the rate at which they form. Previous studies suggest that marine snow aggregate formation rate depends upon size and concentration of the particles, the probability that they will stick together, the species composition and physiological state of phytoplankton, and presence of TEP (transparent exopolymer particles). The objective for this study is to determine how the formation rate of marine snow aggregates is affected by the growth phase of phytoplankton from which they are formed. Three cultures of *Thalassiosira weissflogii*, a marine diatom, were stopped at different times representing three separate phytoplankton growth phases. For each culture, a rotating cylindrical tank was used to induce aggregate formation. The rotating tanks were stopped every twenty minutes for a complete duration of eighty minutes. Cell counts were conducted at each interval to quantify how particle size and particle concentration changed vs. time. Results showed a small yet insignificant increase in particle size and decrease in particle concentration indicating aggregate formation. In future experiments, a Coulter Counter will be used so that more particles can be quantified per time point.

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Session II: 1:10 to 2 p.m.

UC Forums

## Concept Avalanche Rescue Device

NEIL VRANICAR, IGNACIO ESCUDERO, ZAINAB ALDHANHANI and Kathleen Kramer

The goal of our design project is provide insight into the process of increase the efficiency in which rescue teams operate in avalanche disaster situations. We will be proving the concept that a drone can be utilized to image a disaster area in order to find victims more efficiently then current techniques used today. This is an important issue because 93 percent of victims survive if dug out within fifteen minutes of being buried, compare that to only 20 percent of victims surviving if buried for forty five minutes. Our device aims to start a conversation about the different applications of radar and drones within search and rescue operations.

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Session II: 1:10 to 2 p.m.

UC Forums

## Petco Park Food Sustainability

CHRISTOPHER WAITE, HALEY CAHILL, AYAH KARADSHEH and Michael Cantanzaro

Food waste is an overlooked area in terms of improvements in sustainable businesses and even within private households. Over consumption often leads to waste rather than the utilization of those resources in different food diversion or food reuse programs. Through collaboration in the sustainability internship class, a look was taken at the Padres food waste stream at Petco Park and how these remnants from day to day use could be captured and converted into more productive, cost effective and beneficial practices. The scope of the study includes a comprehensive look at the amount of food waste being diverted by composting, charitable causes, as well as looking into converting used kitchen oil to biofuel through one of the biotech companies located in San Diego. Furthermore, a list was compiled to observe the amount of food being shipped in versus being delivered from local suppliers.

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Session II: 1:10 to 2 p.m.

UC Forums

## Grounded: Tokyo Perspectives on Fukushima

KAYLEIGH WARD and Judith Liu

This research evaluates the sociological implications of the Fukushima nuclear disaster by examining the urban perspectives of Tokyo residents about nuclear radiation and their affects upon residents of Fukushima. As the most populous urban area and the capitol, Tokyo residents may have a greater influence on potential outcomes for Fukushima prefecture and are therefore important to further analyze. Since media coverage has been one of the only available sources of information, the quality and quantity of information may have influenced the perceptions of Tokyo residents about the disaster. Interview data and current literature reveal that the prefecture of Fukushima has become largely isolated from the rest of Japan and as such, the information and perspectives surrounding the disaster aftermath highlight larger issues such as risks to Japanese society.

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Session II: 1:10 to 2 p.m.

UC Forums

## Sink or Swim: Barnacles in the Surf Zone

HANNAH WARDE and Nathalie Reyns

Many marine organisms have a two-part lifecycle with nearshore adults associated with the bottom and pelagic larvae. Understanding larval distribution is important for placement of marine protected areas (MPAs). Barnacles are a model species because pelagic large are abundant and sessile adults are easily tracked. Previous studies show vertical segregation of barnacle larvae in deeper water: early-stage nauplii at the surface and late-stage cyprid at the bottom. The purpose of our study was to see if this distribution pattern is found in the surf zone. We sampled at different depths off Bird Rock, La Jolla, California, focusing solely on the surf zone. Samples were preserved and then systematically sorted using a dissecting microscope. We found greater concentrations of nauplii at the surface and greater concentrations of cyprid at the bottom. Our findings are consistent with previous research. Well-mixed water suggests the larval distribution was not influenced by external factors. These findings are important because it can give insight into the dispersal of other species and ultimately influence the placement and extent of MPAs.

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Session II: 1:10 to 2 p.m.

UC Forums

## Active Microrheology Reveals Molecular-Level Variations in the Viscoelastic Properties of *Chaetopterus mucus*

WILLIAM WEIGAND and Rae Anderson

The sea annelid, *Chaetopterus variopedatus*, secretes a bioluminescent mucus that also exhibits complex viscoelastic properties. The constituents of the mucus are relatively unknown but it does play an important role in the development of the worms' parchment-like housing tubes. In order to determine how and why this mucus can exhibit material properties ranging from uidity to rigidity we perform microrheology experiments. We determine the microscale viscoelastic properties by using optical tweezers to produce small oscillations in the mucus which allow us to determine both the linear storage and loss moduli ( $G'$ ,  $G''$ ) along with the viscosity of the uid. By varying the size of the microspheres (2-10  $\mu\text{m}$ ) and oscillation amplitude (.5-10  $\mu\text{m}$ ) we are able to determine the dominant intrinsic length scales of the molecular mesh comprising the mucus. By varying the oscillation frequency (1-15Hz) we determine the crossover frequency at which  $G'$  surpasses  $G''$ , to quantify the longest relaxation time of the mesh network. Initial results show a strong dependence on bead size which indicate that the dominant entanglement lengthscale of the mucus mesh is  $\sim 5 \mu\text{m}$ . Microspheres of this size exhibit a wide variety of stress responses in different regions of the mucus demonstrating the substantial microscale heterogeneity of the mucus. We carry out measurements on a population of worms of varying size and age to determine mucus variability between worms.

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Session II: 1:10 to 2 p.m.

UC Forums

## Shaping Identity for Multiracial Children and Families

SAMANTHA WEINSTEIN and Jesse Mills

Race is a socially constructed concept which has allowed for categorization and division within our society. By pointing to visible differences in black women and white women, for example, US society in particular has been able to justify dehumanizing entire groups of people, while stating that everyone must belong to one of these segregated groups. However, with multiracial families becoming more prevalent in today's world, the question of identity for the children of these families is brought to life. Through the collection and analysis of diverse data--qualitative questionnaires filled out by individuals who self-identify as multiracial, conversation with children's books vendors, and examination of resources directed toward multiracial and non-white children and families, I have come to the conclusion that more resources are needed for multiracial families and children surrounding identity. As a result, I have attempted to create a resource which will at least serve as a basis for the much needed expansion of this topic. My children's book seeks to help multiracial children negotiate fitting across specific categories in society. My hope is that this story will be used as a tool for teaching multiracial children to understand their self-worth and value to society, while encouraging them to embrace who they are, even if that is different from those around them.

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Session II: 1:10 to 2 p.m.

UC Forums

## Fate of Microplastics in an Urban Coastal Watershed

RACHEL WHELAN, Allison Malunes and Theresa Sinicrope Talley

Microplastics are pervasive in ocean and coastal ecosystems, and are of concern because of their high potential for ingestion by organisms, transport, and chemical absorption and leaching of semi-volatile organic compounds (SVOCs) that comprise plastics. Our project determined the extent to which wetland fish living at the mouth of an urban watershed were contaminated with microplastics and SVOCs. We hypothesized that microplastic composition and abundance in sediments would be reflected in fish gut content (i.e., non-selective consumption), and that SVOC contamination would be common in all fish species. Using samples collected from Chollas Creek, San Diego, we analyzed surface sediment microplastic content and gut contents of three wetland fish species. We also analyzed a subset of the gutted fish for 67 SVOCs. The sediments contained an average of almost 10,000 microplastic pieces per m<sup>2</sup> consisting mostly of synthetic fibers, and hard and soft plastic pieces. Nearly 25% of the fish guts examined contained microplastics. While fish ate 10-11 different types of plastic items, they preferred fibers and hard pieces that resembled prey items, such as filamentous algae and nematodes. Higher rates of ingestion occurred in larger individuals of California killifish and sailfin molly females. Multiple phthalates, or plasticizers, were found in the tissues of all fish analyzed for SVOCs, with the highest concentrations being compounds that accumulate in sediments. The presence of phthalates reveals the potential for contamination from uses related to plastics. This study provides evidence that plastics pollution has ecosystem-level impacts through incorporation into the coastal food web.

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Session II: 1:10 to 2 p.m.

UC Forums

## Do Novel Enrichment Objects Increase the Activity of Captive Hermann's Tortoise, *Testudo hermanni* ?

KARISSA WHITE and Chris Allen

A common concern with captive animals is the lack of exercise they receive. During the summer of 2015, I conducted an environmental enrichment based project for a *Testudo hermanni* (Hermann's Tortoise) at the Oakland Zoo. Environmental enrichment is the process of providing stimulating environments for zoo animals in order for them to demonstrate their species-typical behavior, to allow them exercise control or choice over their environment, and to enhance their well-being. This project studied habitat use and daily activity times of a male Hermann's tortoise. To increase the animals activity, I created a climbing ramp with a burrowing area underneath to allow the animal to mimic behaviors exhibited in the wild. I recorded the actions of the tortoise using predetermined time intervals (every 30 minutes). Over the 10 day sampling period, the animals exhibit contained the ramp for 5 days. The tortoise's walking activity did not increase, but it did participate in more frequent use of the burrowing section under the ramp, and could be found bringing other items into the area.

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Session II: 1:10 to 2 p.m.

UC Forums

## Alcoholic's Economics: A Study of Determinants in Variation of States' Binge Drinking Levels

TRAVIS WILLIAMS and Alyson Ma

Over the years, "Binge Drinking" and the college experience have all but become synonymous; however, many graduates do not abandon these behaviors as they attempt to enter the work force. Economic costs occur as a result of abusive drinking habits; finding if economic factors are determinants of these habits can bring to light a potential positive feedback loop and identifying this is the first step in interrupting its destructive effects. Past research illustrates a negative relationship between heavy drinking patterns and employment rates. This study researches whether there is any causation in the reverse direction and, moreover, will be sampling data across all 50 United States to find what economic and demographic factors cause such variation in binge drinking rates across states. Through an Ordinary Least Squares regression approach on panel data from 2008-2015 I determine which factors are credited with causing the most variation in levels of binge drinking. Expected results include a positive relationship between unemployment and binge drinking rates and a majority of variation determined by each state's fixed effects.



## SAE Mini Baja Collegiate Design Competition

**BROCK WILSON, GREG HOPKINS, OMAR ALZAMEL, AZIZ ALRASHED, KHALIFA ALDHAEN, JAMAL JAMAL, RYAN SMART, JOSEPH DEI ROSSI, DAVID PENNINGTON, COURTNEY ROGERS, DANIELLE MAVRIDIS, CHARLIE PENN, JORDAN TOLAND and David Malicky**

The Baja Collegiate Design Series hosted by the Society of Automotive Engineers (SAE) challenges student teams from around the country to design, engineer, build, test, and compete with an off-road vehicle every year. Our team will be judged on the ability to meet various design specifications. This will include computer aided design, analysis, testing and development, manufacturability, serviceability, system integration, and dynamic performance. The 2016 West Coast competition will be held in Gorman, California from May 19th to the 22nd, and will host over 100 universities. After analyzing many approaches our team has chosen its design path within the context of each subsystem. A CVT and transaxle with limited slip differential will achieve the necessary gear reduction and balance simplicity with vehicle performance. The front suspension's design will be a non-parallel short-long arm (SLA) design which is to optimize critical parameters such as roll center height, shock placement, kingpin angle, scrub radius, and camber change. The rear suspension will design a 3-link while providing the geometry for suitable dynamic parameters. The chassis team maximizes strength, ease of fabrication, safety, and ergonomic features, while minimizing weight and complying to the 2016 Baja SAE rules.

## Localization of Reactive Oxygen Species in Switchgrass (*Panicum viratum*) Following Infestation by Yellow Sugarcane Aphids

**Charli Worth, Caitlin Hart, Steven Morrison and Lisa Baird**

Expression of peroxidase in switchgrass (*Panicum viratum*) increases in activity following insect infestation by yellow sugarcane aphid. Reactive oxygen species (ROS) such as superoxide and peroxide increase following aphid infestation shown by specific staining. However, where these enzymes are located is a different matter. Switchgrass was planted in standard potting soil in the USD greenhouse and grown to a fifth leaf stage. Aphids were harvested from infested leaves and their extract was mixed into a DI-water /tween-20 mixture which was then applied to a leaf section. Treated leaves were harvested by a week long period with leaves exposed to the aphid extract having an increased specific activity of peroxidase up to twice the amount compared to control plants for both Summer and Kanlow strains. The specific activity of peroxidase was also higher in Kanlow than compare to Summer. Aphid strikes were located by staining by with acid-fuscin to stain both Kanlow and Summer leaf tissue. Strikes were shown to have entered through the leaf epidermis and enter the phloem. Staining procedures as well as localization of these ROSs will be discussed.

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Session II: 1:10 to 2 p.m.

UC Forums

## Lysosomal Function in a Fly Model of Alzheimer's Disease

JILLIAN WOTHE and Adam Haberman

Neurons are specialized cells that have prolonged life spans due to protective mechanisms that limit cellular damage and death. The lysosome protects neurons by degrading damaged proteins through the use of hydrolytic enzymes. When a protein becomes damaged, it is sent to the lysosome via autophagy and degraded, with some of its parts being reused. One hallmark of Alzheimer's disease, a neurodegenerative disorder, is the accumulation of toxic protein aggregates in neurons. It is unknown why these proteins are not being broken down in the lysosome. In our experiment, we designed a genetic construct that will allow us to express a fluorescent protein called GFP under certain conditions in the neurons of the *Drosophila melanogaster* fly eye. GFP will be tagged to be degraded in the lysosome, allowing us to measure the efficiency of the lysosome at breaking down proteins in flies that are disease models of Alzheimer's. From our results, we will learn how severely Alzheimer's disease affects lysosomal degradation, allowing us to better understand the pathology of the disease and design more effective treatments.

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Session II: 1:10 to 2 p.m.

UC Forums

## Phosphine-Directed Aryl C-H Borylation

SHAWN WRIGHT, Effie Albitz, Nicholas Huynh, Kristina Crawford, Timothy Ramseyer, and Timothy Clark

Ambiphilic phosphine-substituted boronate esters have significant potential as synthetic intermediates and in their applications as organocatalysts and ligands in metal-catalyzed transformations. New methods to access a variety of scaffolds containing both a phosphine and a boronate ester are necessary to continue the exploration of these intriguing catalytic systems. The iridium-catalyzed C-H borylation of a variety of aryl and benzylic phosphines is described herein. Moreover, two methods of regioselectivity are explored: phosphine-directed C-H borylation in which the phosphine is used as a directing group to provide selectivity at the ortho position, and the non-directed C-H borylation with borane-protected phosphines that provide sterically-controlled selectivity. Analysis of the effects of various ligands on the general reaction conditions allows for an expanded substrate scope of these transformations and a proposed mechanism will be discussed.

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Session II: 1:10 to 2 p.m.

UC Forums

## Using Selective Plane Microscopy to Understand Fluid-Fluid Phase Separations

Devynn Wulstein and Ryan McGorty

Selective Plane Illumination Microscopy (SPIM) is an optical technique that allows for high resolution imaging of microscopic specimens. SPIM uses a light sheet to take images of a specimen along an axis to make a 3D image. The design of SPIM allows for a large degree of developmental freedom. A major problem facing light microscopy techniques is the balance between resolution, imaging speed, field of view, and decreasing photo-bleaching of specimens. SPIM is able to maximize these, and will lead to further improvements in the imaging capabilities. We built a SPIM and have been working to optimize the resolution and imaging speeds. We have used SPIM to image microscopic fluorescent beads, pollen grains, growing plants, and fluid-fluid phase separations. SPIM has a wide array of usages due to its design. Our current use of SPIM is to image fluid-fluid phase separations. The imaging capacity of SPIM will help to broaden the understanding of soft matter physics. Imaging the phase separations of different polymer colloid concentrations will produce data that will explain the causes of these fluid-fluid phase separations. We will be able to calculate the surface tension of the fluids by using the high resolution that SPIM has to offer.

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Session II: 1:10 to 2 p.m.

UC Forums

## Interactions between the native (*Chione fluctifraga*) and introduced (*Venerupis philippinarum*) clams in Mission Bay

YURI BEJARANO RODRIGUEZ and Drew Talley

The Manila clam (*Venerupis philippinarum*) was introduced from Asia in the 1930's to the northwest coast of North America. Human alteration of the habitat appears to have facilitated the increase of Manila clam populations in Mission Bay. The effects of Manila clams on both native clams and other species along the west coast of North America are only recently starting to emerge. In this study, we measured the growth and survival of the native and manila clams under two different conditions: 1) monospecific culture: tanks with either manila clams or native clams only, 2) mixed culture: tanks with an equal number of native and invasive clams together, with a goal of better understanding potential competitive interactions between the two species. There was no statistically significant difference in growth between species or between culture conditions (monoculture or mixed culture). There was, however, a trend ( $p = 0.09$ ) towards higher growth of *Venerupis* housed alone versus *Chione* housed alone. There was a significantly higher mortality among monocultured *Chione* (~83%) relative to *Venerupis* (~58%). This suggests that whatever underlying stressor was responsible for the overall high mortality (likely overcrowding), invasives showed higher tolerance. Tolerance to a wide range of environmental conditions is a common feature of invasive species. This resilience could indicate that these clams are better able to survive in bad conditions, affording them a competitive advantage over the native clams.

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Session II: 1:10 to 2 p.m.

UC Forums

## Development of Chiral, Tridentate, Mer-Coordinating, Nitrogen-Based Ligands For Use in Enantioselective Catalysis

KRISTINA ZIVKOVIC, ALEXA VILLASENOR and Christopher Daley

The continued development of chiral ligands is important in enantioselective catalysis in order to prepare systems that catalyze a wide range of reactions with substrates containing various functional groups, at a decreased cost. We have focused on the preparation of C<sub>2</sub> symmetric chiral mer-coordinating tridentate nitrogen donor ligands, 1,3-bis(4,5-dihydrooxazol-2-ylimino)isoindolines, for use in metal-mediated enantioselective catalysis reactions. Herein we report an improved in-situ synthesis of the desired deprotonated ligands coordinated to a cadmium(II) metal center using a microwave reactor, as well as the subsequent decomplexation via a ligand-displacement strategy using thiol based chemistry. Characterization of both the solid (X-ray crystallography) and solution (NMR spectroscopy) states are reported. Also reported is the synthesis of new metal complexes, as 1:1 metal:ligand compounds, prepared from the decomplexed 1,3-bis(4,5-dihydrooxazol-2-ylimino)isoindoline ligands, and the preliminary results of their use as enantioselective catalysts for organic reactions.

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Session I & II ; 12:10-2:00PM

UC Forums

### Exploring Electrical Engineering

ESTHER CHO and Susan Lord

Electrical Engineering (EE) is often seen as abstract, theoretical, and mathematical. However, EE is an important major in the 21st Century due to recent technological developments. The author thought it is vital to encourage more students to appreciate and major in EE by introducing the larger context of technical work early on. When learning about the EE major at the University of San Diego (USD), engineering students see some concepts in their two introduction to engineering courses and then take an Electrical Circuits course, typically as sophomores. Often in the Circuits class, students struggle in connecting the course topics with real world cutting-edge technology. To enhance and motivate student interest in the major, the author has designed a learning module that includes a mini lecture and hands-on activities that relate material covered in the Circuits class to real-world applications using the engineering design process. Pilot testing of the module will be done with volunteer EE juniors and seniors. After making improvements based on this testing, further testing the effectiveness and clarity of this module will be done by delivering this project to students currently enrolled in Circuits. For the final module, students will be asked to present what they discovered in a team to integrate professional skills to the learning outcome.

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Session I & II ; 12:10-2:00PM

UC Forums

### Humanitarian Unmanned Aerial Vehicle

MORGAN MCDOWELL, JACOB HIRSCH, ANDREW RING, KHALED ALASKAR, BEN REISMAN  
and Austin Choi-Fitzpatrick

“Complex emergencies and humanitarian aid efforts require rapid response, and unmanned aerial vehicles (UAVs, or drones) are increasingly used to support these efforts. They can be rapidly deployed to capture important information about local conditions and relay data in real-time to first responders. The problem, however, is that some drones can hover for short periods of time, while others can fly long distances for long periods of time. Our team is collaborating with Austin Choi-Fitzpatrick, an Assistant Professor at the Kroc School of Peace Studies, to solve this problem by creating a drone that can both fly long distances and hover. The Humanitarian UAV team is designing and building a UAV that will hover vertically and glide horizontally, which will increase battery life substantially. The front propellers rotate between 0 and 90 degrees to provide both horizontal and vertical thrust. This will greatly improve the ability to travel efficiently between locations without additional motors or propellers. This design also limits the complex mobile components to a single rotating part. Our goal is to field-test this in real-world conditions, and in this way ensure that we are helping humanitarians take advantage of the newest technologies. “

## Development of a System for Rapid Prototyping of Flexible Electrical Circuits and Antennas Using Conductive Ink

ADAM MOREAU, CHRIS HODGE, RYAN ST ONGE and Ernie Kim

One of the major downsides to traditional electrical circuitry is its dependence upon rigid components which lack flexibility. One innovative solution to this design constraint is the development circuits using room temperature liquid metal alloy inks. Although this class of advanced materials requires unique printing techniques and application methods, the benefits afforded by flexible electronics are numerous. The ink which we have been investigating is a Gallium-Indium alloy which is liquid at room temperature, but will form a solid metallic oxide layer when exposed to air. This allows for an internal conductive liquid channel to form which will not be negatively affected by physical deformation. Our work can be divided into two main research branches: Construction of a printing device, and the Testing of Ink. There are two main application methods which we are pursuing. The first method is a hand application method. Which while useful for constructing prototype test devices, is not a long term solution. The second is the construction of an microcontroller X/Y Gantry with a micro-spray nozzle. Initial prototypes such as RFID sensors, Faraday Devices, and LED test circuits have been constructed with no losses when compared with traditional materials.

## Motorized Camera Slider

Chris Szczur, Scott Matthews, Sarah May, Tyler Lagomarsino, ALEXANDER BENSON and Daniel Codd

Today's cameras are rapidly evolving to be smaller, more powerful, and higher quality than ever before. In the past, taking high quality photos required a bulky professional style DSLR. Now, the same quality can now be achieved with a camera that fits in the palm of one's hand. The camera accessory industry has yet to keep up with this revolution in the camera industry. Many camera accessories are widely available for DSLR cameras. However, there are few that are designed and optimized for small cameras. Our senior design team will address this gap in the camera accessory market by designing an easily manufacturable motorized camera slider optimized for small camera devices. Designing with small cameras in mind, we are able to optimize the functionality of the product and minimize the cost. The user can use an app to control the system on any range of inclines from horizontal to vertical and take advantage of the 1-60 feet/hour range of speed. We will use a friction drive roller mounted inside the shuttle attached to the camera. Mounting the drive system in the shuttle eliminates the constraint of having a fixed track length and allows for more portability. The entire system can be packed up in a small bag or backpack to bring to shooting locations. Each track piece will be 18' in length, with a trapezoidal cross section. Track segments can be connected and are supported by track leg pieces that can be mounted in various locations.

## With Gratitude

Many thanks to faculty across all disciplines for their dedicated mentoring of undergraduate students in research, scholarship and creative works. We would especially like to acknowledge the 2016 recipients of the Outstanding Undergraduate Research Mentor Award, Dr. Rachel Blaser (Department of Psychological Sciences, College of Arts and Sciences) and Dr. Rae Anderson (Department of Physics and Biophysics, College of Arts and Sciences), as well as all the mentors that oversaw the student projects and mentored them through the CC URC submission process.

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