



# CREATIVE COLLABORATIONS UNDERGRADUATE RESEARCH CONFERENCE



## WELCOME to the 27th 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 200 abstracts were submitted by students across a broad range of disciplines. 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 our strategic planning pathways, engaged scholarship conducted on campus and presented today is practicing "Changemaking," and has the potential to make real differences in knowledge and practice.

Among the presentations are studies that included measuring Affordable Care Act's impact on insurance coverage and health outcomes using a difference-in-differences regression model; investigating the effects of drought on aquatic macroinvertebrate communities; exploring how a politician's gender and sexual orientation affected a voter's choice; observing and recording an effective transfer of design and building instructions of an assistive device as a community project in Nigeria; examining how membrane technology can be used for gas separation, distillation, and filtration, areas of research potentially affecting environmental protection, water shortages, and energy consumption; and completing the next phase of the Tudor Plays Project, a multi-year, interdisciplinary project arising from the Digital Humanities initiative and the new Humanities Center.

Creative Collaborations is part of Research Week at USD (April 17-21, 2017), 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

Carole Huston, PhD  
Associate Provost

Maritza Castellanos  
Program Assistant

April 18 and 20, 2017 • 12–2 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

# TRAFFIC 2017

## STUDENT ART EXHIBITION

### OPENING RECEPTION

Humanities Center, Serra Hall  
Wednesday, April 19th @ 5 p.m.

### BRING YOUR OWN T-SHIRT TO BE SCREEN PRINTED

TRAFFIC 2017 is a student-led exhibition of current student work produced at USD. It consolidates and displays the various strains of creative production at the university. The multimedia and multi-locational show cuts across departments and covers everything from introductory courses to senior projects.

### FOLLOW US

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## EXHIBITION LOCATIONS:

### HUMANITIES CENTER GALLERY

*Overview of Works*  
Serra Hall  
April 9 - May 9

### SLP GALLERY

*Senior Projects*  
Student Life Pavilion  
April 9 - 26

### VISUAL ARTS GALLERY

*Film/Video*  
Sacred Heart Hall  
April 17 - 21

### YORTY SPACE

*Assorted Works*  
Camino Hall Basement  
April 17 - 21



## Schedule

### Welcome

**12 p.m.** Director, Office of Undergraduate Research  
Hahn University Center Forums

### Student Presentations

Tuesday, April 18

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

**12:10 to 1 p.m.** **Session One (Presentations 1-114)**

**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 1-115)**

**Poster Presentations:** Hahn University Center Forums

**Interactive Exhibits:** Hahn University Center Forums, alcoves, La Gran Terraza Patio

Thursday, April 20

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

**12:10 to 1 p.m.** **Session One (Presentations 1-116)**

**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 1-114)**

**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 2017 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

Creative Collaborations Undergraduate Research Conference is part of USD's 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).

Research Week is from April 18-21.





## Day One, Session I, Interactive Exhibits

Tuesday, April 18  
Session I; 12:10-1 p.m.  
VA/Exhibit Hall

### A Garden Compendium

EMILY MUELLER and John Halaka

In remembering painful events, a destructive cycle of reliving memories begins. This creates a preoccupation with the past that is characterized with guilt and longing for previous innocence. With this project, I attempt to unpack these issues and come to some personal reconciliation. I have conducted this research through a series of paintings that are a compendium of haunting memories. Each image draws on fragments of my history, and collectively, the series outlines a journey from a dark past to future possibilities. The figures in the paintings reference a pursuit of the innocence of my departed youth. They are placed among dense patches of plants that become grotesque gardens, which are allegorical to the overbearing presence of recollection. The relationship between the figures and the landscape is one of simultaneous tension and fluidity that suggests the duality of being stuck in a recreated past while life continues. With this project, I did not come to any concrete conclusion but instead came to understand and explore the issues that avail me. I wish to present these matters in a way that is truthful and reflective of the way I was feeling at the time they were painted. In doing this, I hope to gain some rapprochement and appeal to a wider audience that can relate and find comfort in my artwork.

#### GO MOBILE!

Download the mySDMobile app for information on student presenters, presentation times & presentation locations, all from the palm of your hand!



Download at



## Day One, Session I, Poster Presentations

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Tuesday, April 18  
Session I; 12:10-1 p.m.  
UC Forums

### Are Millennials Really Changing the Workplace? An exploration of generational differences in attitudes toward leadership, the workday, and person-job fit

ALLISON KNAPP and Stephen Pearlberg

Participants (n=100) responded to a twelve-item online survey designed to assess the workplace preferences of two cohort populations commonly referred to as Millennials and Generation X. Samples were obtained from an undergraduate population of Introductory Psychology students at the University of San Diego and from a district in Redwood City, CA accessed through Nextdoor, a private social network. Participants were prompted to imagine an ideal job ten years into their career before completing the survey items involving attitudes about four distinct constructs: Personal vs. Team benefit, Meaning vs. Money, Creative freedom vs. Structure, and Rewarding vs. Constructive leadership. Participants then indicated the extent to which they preferred statements representing opposite dimensions of each construct and ranked the relative importance of various workplace characteristics. Prior research has suggested that Millennials and Generation X differentially value personal development, work aligned with their interests, autonomous task structure, and encouragement from their managers. We hypothesized that Millennials would indicate preference for personal over team benefit, meaning over money, creative freedom over structure, and positive reinforcement over constructive feedback. Responses have been collected from the Millennial population, but this Abstract will change as we complete the collection of Generation X responses.

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Tuesday, April 18  
Session I; 12:10-1 p.m.  
UC Forums

### The Effects of Water Temperature on Crops in an Aquaponic System

ALYSSA FABOORG and Michel Boudrias

This project looks at the effects that water temperature has on various crops in an aquaponic system. The plants are grown in three different water temperatures, and measurements of their growth are taken weekly. This study aims to look at the possibility of growing summer and winter crops outside of their growing season by simply having the water temperature change.

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Tuesday, April 18  
Session I; 12:10-1 p.m.  
UC Forums

### The ABCs of ABA: Comparing Consequence Preferences for Maladaptive Behavior in Children on the Autism Spectrum

ALYSSA SERCEKI and Rebekah Wanic

Applied Behavior Analysis, or ABA, is a common therapeutic technique that has been implemented since the 1960s as a method of teaching appropriate social and functional behaviors to children on the Autism Spectrum and related disorders. ABA focuses on altering behavior by controlling the antecedents and consequences related to the targeted behavior. ABA is only implemented by trained practitioners, who select from a variety of consequence options when determining how to modify a given child's behavior. Because ABA is rooted in behavioral psychology and techniques of learning theory, it is possible that psychological education may play a role in the determination of appropriate consequences for the child. The aim of the present study is to determine whether differential exposure to psychological concepts (operationalized by the number

of psychology courses taken) would impact preference for certain consequences. Participants were asked to read scenarios describing a child's behavior and rank their preference of the consequence to be administered from a set of provided options. Results and conclusions will be discussed.

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Tuesday, April 18  
Session I; 12:10-1 p.m.  
UC Forums

### The Synthesis of Peptide-Based Polymers by Microwave-Assisted RAFT Polymerization

AMANDA ENNIS, Alisson Magsumbol and Joan Schellinger

Peptide-based polymers have a wide variety of useful applications such as controlled drug delivery, tissue engineering, and biosensors. A way in which to synthesize these polymers is by microwave-assisted reversible addition-fragmentation chain-transfer (RAFT) polymerization. RAFT polymerization is one of the most important and versatile methods for controlling radical polymerizations. Our research is looking to optimize the synthesis of peptide-based polymers through this method. The simple monomer aminopropylmethacrylamide (APMA) is used in the polymerization and the resulting polymer is characterized through the use of nuclear magnetic resonance (NMR). The data thus far indicates that a significant amount of conversion is taking place. Future work will be to characterize the simple monomer methacryloyl-L-lysine (Ma-Lys) by the same method.

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Tuesday, April 18  
Session I; 12:10-1 p.m.  
UC Forums

### Food For Thought: An Evaluation of the Impact Food Insecurity Has On Educational Achievement

ANASTASIA ZUNIGA and Alyson Ma

The state of Mississippi holds the highest ranking of food insecurity and the second lowest ranking for educational achievement in the country. With a failing school system, the test scores gathered from fourth graders within the 84 counties of Mississippi will be evaluated to determine the relationship between food insecurity and academic performance. Various additional variables will be included in the regression to test how significant the impact of food insecurity is relative to other researched factors on a student's environment. The results of this study can potentially implicate possible solutions to reforming the education system in Mississippi as well as addressing hunger in our country.

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Tuesday, April 18  
Session I; 12:10-1 p.m.  
UC Forums

### Specific Immunoglobulin E Antibodies

ANDREW STIEB and Joachim Latzer

Immunoglobulin E (IgE) is an allergen-specific antibody designed to rid the body of any allergenic or pathogenic proteins. It serves a "gate-keeper function" by recognizing and attacking potentially harmful foreign material as soon as it enters the body. For unknown reasons, food-allergic individuals develop food-specific IgE (sIgE) antibodies to proteins in certain foods that are harmless to the non-allergic population. The goal of this project was to examine the binding-free energies, binding mechanisms, and any potential intermediates of two well-documented sIgE-antigen complexes, Beta-lactoglobulin (BLG) and PhPL2. In order to accomplish this, we used the Amber suite to isolate the amino acids involved in the bond between the bound structures, separate the bound proteins, and re-bind the antigen and antibody. At regular intervals during the rebinding process, we took snapshots in order to understand exactly how each antigen bound to its respective sIgE. The next step of our research is to compare the binding mechanism of allergenic BLG and its respective sIgE to the binding mechanism of sIgE to mutated forms of BLG that have been experimentally shown to be hypoallergenic.



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Tuesday, April 18

Session I; 12:10-1 p.m.

UC Forums

## How Has the Implementation of NAFTA Affected the Economic Standard of Living in Mexico?

ARTURO ENRIQUEZ DE RIVERA and Alyson Ma

This research paper analyzes the economic standard of living in Mexico after the implementation of NAFTA in 1994. The econometric approach is based on panel data, measuring the economic situation before and after NAFTA with variables such as FDI, job growth, exports, poverty level, emigration rate, and GDP. The hypothesis states that lowering tariff rates and investment restrictions will lead to an increase in exports, FDI, and job creation, thus increasing the GDP in the Mexican economy. Liberalization in Mexico should attract foreign capital and induce economic growth in the nation with the hopes of alleviating the poverty rate throughout the country.

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Tuesday, April 18

Session I; 12:10-1 p.m.

UC Forums

## Impact of Photo Angle on Food Evaluation and Consumption

AUSTIN JACOBS and Morgan Poor

Food photography is an increasingly popular phenomenon, especially on social media. There are over 208 million photos on Instagram with #food. There is a growing trend to showcase food on social media, as both health and “food art” has become a growing part of popular culture. The purpose of this project is to explore how the photo angle utilized in the image influences a number of consumer outcomes, including evaluations of the food itself as well as the company and desire to interact with the image. Specifically, pictures of food commonly employ either a  $\_$  angle (as if you were sitting at the table ready to take a bite of the food) or an overhead angle (to get a bird’s-eye view of the food). Through a series of four experiments, we show that photos of food taken from a  $\_$  angle are evaluated better in terms of perceived taste, attractiveness, and desire to eat the food, while photos of food taken from an overhead angle create brand perceptions associated with progressiveness and trendiness.

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Tuesday, April 18

Session I; 12:10-1 p.m.

UC Forums

## Educational Media Usage in Elementary and Middle School Classrooms: A Qualitative Interview Study

CAITLIN FOGARTY and Kristin Moran

Educational technology use in elementary school classrooms can pose benefits but also challenges to children’s engagement and material retention as observed by teachers who use educational technology in their own classrooms. The near ubiquity of media in children’s lives points to its potential influence on their development, but also presents a valuable opportunity for providing rich educational media experiences. This project explores past research using theories such as the social cognitive theory and Piaget’s theory of cognitive development to understand the implications of media on both child development and academic enhancement. In addition, general studies on growing media usage and effects on children in this digital age will be explored. This case study uses interviews with ten elementary school teachers in the San Diego area, whose responses offer a unique firsthand insight on the observable effects of educational media usage in the classroom. The qualitative data collected will be used to analyze the nature of the role that technology plays in the classroom. Themes from these interviews will offer valuable information to educators about the impact of educational media in the classroom, benefits for children’s learning, and challenges for the cognitive development of young students that might arise from the growing usage of media. Keywords: educational media, cognitive development, elementary classrooms

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Tuesday, April 18

Session I; 12:10-1 p.m.

UC Forums

## Below C Level: Visualizing x86 Stack Operation

CAITLIN FANNING and Saturnino Garcia

A vast majority of programmers write software in a high-level computer language (e.g. C) that is automatically compiled into a lower-level machine language consisting of a series of 0’s and 1’s. In the middle stands x86 assembly language that can illuminate the inner functioning of a computer, an integral part of a CS student’s education. While easier to understand, students often have difficulty visualizing how the execution of an x86 program affects its memory, especially in an area called the stack. This project aims to develop an intuitive program to aid in this visualization, while addressing the shortcomings of related programs. In order to assist programmers new to x86 to picture the operation of the stack, this project allows the user to create or import a list of x86 instructions while providing specific information describing relevant registers, values, and instructions. An image of a stack is generated and updated when the user progresses through the list. By using this program, students will save time in their quest to understand this complex topic.

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Tuesday, April 18

Session I; 12:10-1 p.m.

UC Forums

## Role and Identification of Aphid Salivary Proteins Involved in Plant Defense Responses

CHARLI WORTH, Steven Morrison, and Lisa Baird

Peroxidase activity in switchgrass (*Panicum virgatum*) increases following infestation by yellow sugarcane aphid (*Sipha flava*). To aid in feeding, YSA inject their saliva into the plant. Previous studies have shown peroxidase is synthesized in response to aphid feeding and is associated with the plant’s defense mechanism. Our research indicated that only the presence of components of aphid saliva, not damage to leaf itself, was needed to induce a response in the switchgrass defense mechanism. This study investigated the specific proteins found in aphid saliva responsible for the production of increased peroxidase activity. Switchgrass was planted in standard potting soil and grown to a fifth leaf stage. Aphids were harvested from infested sorghum leaves and boiled and non-boiled aphid extract was mixed into a DI-water /surfactant mixture that was applied to switchgrass leaf sections. Leaves harvested seven days following treatment with non-boiled aphid extract showed twice the specific activity of peroxidase compared to control plants in Summer and Kanlow. Leaves treated with boiled aphid extract showed no significant increase of peroxidase activity. The constitutive specific activity of peroxidase was also higher in Kanlow compared to Summer. Salivary proteins of aphids were collected after a 48-hour period of feeding on a cache using 15% sucrose solution. The solution was concentrated, digested, and analyzed using tandem LCMS. Data on aphid saliva peptides identified will be presented.

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Tuesday, April 18

Session I; 12:10-1 p.m.

UC Forums

## On Alternate Techniques for Fluid Flow Anomaly Detection in Intravenous Pump Infusion Sets

ED ALEXANDER, Nicholas Addiego, Jumana Jamal, Shannon Bailey and Shastri Venkat

This research explores alternative detection methods featuring the use of ultrasound or induced vibration to recognize when failure conditions are present within an intravenous pump infusion set. The objective is to develop a clearer understanding of the flow inside an infusion set to better recognize when alarms should be triggered to reduce the number of false alarms triggered by inaccurate failure detection. Unnecessary intravenous pump alarms require medical professionals to waste time verifying the pumping conditions when this time could be applied to the care of other patients with more immediate needs. This project aims to explore the feasibility of three different detection techniques that were researched and developed over the

past year. The first of these concepts uses two sets of piezo disk transducers to generate and receive an ultrasonic signal which can be used to count drops and monitor the volume of the fluid present in the drip chamber section of an intravenous line. The second concept explores using a single piezo disk transducer to generate and receive an ultrasonic signal to monitor the volume of the fluid present in the drip chamber with enough accuracy to recognize when drops of fluid have fallen. The third concept uses a vibrational motor to induce energy to the top portion of the intravenous infusion set. It is important study how the residual vibrations detected further down the set change depending on the different failure conditions which are imposed on the system.

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Tuesday, April 18

Session I; 12:10-1 p.m.

UC Forums

## Clinician Views on Ways to Present Timeout in Parent-Child Interaction Therapy to Culturally Diverse Families

YESSICA GREEN, ELLEY BERG, Berta Erika Luis-Sanchez, Gerri Zerr and Kristen McCabe, May Yeh

Parent-Child Interaction Therapy (PCIT) has been shown to successfully reduce disruptive behavior in children. Nevertheless, ethnic minority (EM) families are at increased risk for poorer PCIT outcomes associated with lower treatment engagement. A contributor to low engagement may be parenting styles incompatible with PCIT components. Timeout, a key technique employed during the discipline phase of PCIT, may be differentially perceived by parents endorsing a strict and harsh approach to discipline compared to parents who feel uncomfortable disciplining their child. Identifying ways of presenting timeout consistent with parenting style may contribute to improved treatment engagement among EM families. In the present study, a total of 10 PCIT-certified clinicians who have had at least 150 hours conducting PCIT with EM families were recruited to participate in a one to one-and-a-half-hour qualitative interview to provide insight on ways in which PCIT may be adapted for culturally-diverse families. Clinicians in this study reported conducting PCIT for an average of 8.90 years (SD = 8.29). Sixty percent of clinicians reported currently conducting PCIT at a community clinic, 10 % at a hospital/medical facility, 10% at a university clinic, 10% at a child welfare agency, and 10% through in-home services. Data collection is complete, and all interviews have been transcribed. Data will be analyzed following the Framework Analysis approach to determine clinician views on distinct ways of presenting timeout (Ritchie & Spencer, 1994). Results of this study will be discussed and implications for adapting the PCIT protocol that could be tailored to families based on parenting style will be provided.

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Tuesday, April 18

Session I; 12:10-1 p.m.

UC Forums

## Uncertainty Quantification using Polynomial Chaos Expansion in Numerical Simulations of Spent Nuclear Fuel Assemblies

HARRISON SCHMACHTENBERGER and Imane Khalil

A novel method that incorporates Uncertainty Quantification (UQ) into numerical simulations of heat transfer for a 9x9 square array of Spent Nuclear Fuel (SNF) assemblies in a Boiling Water Reactor (BWR) is introduced in this paper. Using a range of fuel burn up power, the results predict the maximum temperature inside a 9x9 BWR fuel assembly to be 462 K. Current modeling techniques used by researchers in the field to predict the heat transfer and the maximum temperature inside SNF assemblies rely on commercial codes and address the uncertainty in the input parameters by running separate simulations for different input parameters models. Polynomial Chaos Expansion (PCE) is incorporated into our computational models in order to develop a surrogate that permits the efficient evaluation of the distribution of temperature and heat transfer while accounting for all uncertain input parameters to our model. UQ computational methods generated results that are encompassing of continuous ranges of variable parameters rather than discrete simulations to conduct sensitivity analysis on heat transfer simulations of spent nuclear fuel assemblies.

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Tuesday, April 18

Session I; 12:10-1 p.m.

UC Forums

## Using Biophysical Characterization to Explore Suppressor of IKKepsilon Structure

MEGAN L. MACHEK, FLOWREEN SHIKWANA, SASHA-KAYE I. GRAHAM, IAN D. MINZER, Ryan Wey, Richard Cruz, J. Ellis Bell and Jessica Bell

The innate immune system is the first line of defense against pathogens. Suppressor of IKKepsilon (SIKE) is a downstream component of the antiviral TLR3 innate immune pathway, although its function in this pathway has not yet been determined. In order to derive information about SIKE function, we undertook characterization of SIKE structure to determine a structure-function relationship. Using PHYRE2, a SIKE model of the human isoform was predicted. The secondary structure of SIKE was assessed via circular dichroism. Thermal melts (15-80\_C) showed a linear, rather than sigmoidal, unfolding transition. Addition of up to 25% trifluoroethanol to stabilize helical structure increased the helical content of SIKE by 35%. Fluorescence polarization and size exclusion chromatography assessed the solution size of SIKE (23 kDa) with respect to globular standards. Limited proteolysis coupled to tandem mass spectrometry as well as crosslinking assessed by SDS-PAGE mapped accessible SIKE sequences and association between SIKE monomers, respectively. Crosslinking with bis(sulfosuccinimidy)lsuberate (BS3) identified predominantly a dimer species as well as a smaller proportion of a tetrameric species. 3DLigandSite proposed a zinc binding site. To confirm an interaction between SIKE and divalent cations, SIKE-ANS titration and fluorescence-based thermal shift assays were completed +/- Mg, Mn, Ca, and Zn. In conclusion, using various biophysical techniques, we have found that SIKE's structure has regions of disorder bookended by alpha helices; SIKE monomers associate primarily into a dimeric species; divalent metals contribute to SIKE stabilization, and the homology model presented is consistent with these biophysical characterizations.

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Tuesday, April 18

Session I; 12:10-1 p.m.

UC Forums

## The Effects of Zoning Regulations on Residential Housing Value

JALEN SMITH and Alyson Ma

Zoning regulations restrict the usage of land, which causes a reduced overall supply of land designated for residential housing where zoning codes are used. With this restriction in the supply of land, we see a forced increase in the value of housing. Observing factors attributed to altering the value of a single family home while accounting for zoning laws as the primary factor will give us the overall effect of zoning regulations on the value of a given home.

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Tuesday, April 18

Session I; 12:10-1 p.m.

UC Forums

## Effectiveness of the Welfare State in California

RYAN FUHRMAN and Alyson Ma

For years, the basis of socio-political arguments have centered on the role of the government in the economy. To what extent should the government control the outcomes in the economy? Should the government help those below the poverty line? These questions have been at the core of the perpetually polarizing economic issues debated in politics. We know that our government spends an exorbitant amount of money on the welfare support of citizens. The field of economics teaches that every worker contributes to the growth of a state's economy, which explains why the government supports the elimination of poverty. I will analyze the welfare state in California, specifically the Temporary Aid to Needy Families. I will study whether or not poverty is reduced in California by TANF. Previously studied is how policy adjustments have reduced the number of people on welfare. While this might imply that people are better off, it does not conclude whether one's means of subsistence has improved significantly. From these past studies, we know that TANF has reduced the number of people on welfare. I will

take this information further by studying how many people who have been on welfare actually move above the poverty line. This is a better test of the effectiveness of TANF. Conclusions can lead to implications for policy adjustments to make the welfare state in California more effective.

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Tuesday, April 18  
Session I; 12:10-1 p.m.  
UC Forums

## Vehicle Information Communication and Telemetry Over Raceway Electromagnetic Ether

AUSTIN PERRI, JACK LI, JASMINE YANG, Kathleen Kramer, James Gilb, Daniel Codd

A system is being designed to provide electrical safety features, vehicle diagnostics, and power for Torero Racing's entry into the Society of Automotive Engineers Baja Collegiate Design Competition. The system will be designed to meet competition requirements and provide the required lights, alarms, and kill switches for the vehicle. The system will also increase the competitive advantage of Torero Racing by providing voice communication and telemetry. With these features, Torero Racing hopes to gain a competitive edge over their opponents during both the various races as well as in the design competition. The vehicle diagnostics system will take the input of multiple sensors and transmit them into readable data for the pit team and the driver. This project has already accomplished processing multiple sensors, design of the power system, and preliminary communication design. Future work includes communicating data via the processors, outputting the data into a GUI and dashboard, and integrating the system with the vehicle.

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Tuesday, April 18  
Session I; 12:10-1 p.m.  
UC Forums

## On the Structure Orientation in Homogeneous Turbulent Shear Flows, Part II: Application to Stratified and Rotating Shear Flows

JOYLENE C AGUIRRE, ADAM F MOREAU, and Frank Jacobitz

Based on the results of two series of direct numerical simulations, the effect of stratification and rotation on the orientation of flow structures is investigated in homogeneous turbulent shear flows. For stably stratified shear flows, the Richardson number is varied from  $Ri = 0$  to  $Ri = 10$ . The growth rate of the turbulent kinetic energy is observed to decrease with increasing Richardson number. Similarly, the inclination angle of flow structures in stratified shear flow decrease with increasing Richardson number and are dependent on the growth rate of kinetic energy. For rotating shear flows, nine cases are considered: turbulent shear flow without rotation, with moderate rotation, and with strong rotation, where the rotation configuration is either parallel or antiparallel. The Coriolis parameter to shear rate ratio  $f/S$  is varied from  $?10$  to  $10$ . Positive values of  $f/S$  correspond to an anti-parallel configuration, while negative values correspond to a parallel configuration between the system rotation and the mean flow vorticity. Strong rotation results in strong decay of the turbulent kinetic energy. The inclination angle is observed to reach a maximum value in the anti-parallel configuration with moderate rotation with  $f/S = +05$  and to be reduced in the parallel configuration with moderate rotation. The strongly rotating cases result in smaller inclination angles, which are almost independent of the flow configuration. Therefore, the inclination angle of flow structures appears to be directly related to the dynamics of the flow.

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Tuesday, April 18  
Session I; 12:10-1 p.m.  
UC Forums

## On the Structure Orientation in Homogeneous Turbulent Shear Flows, Part I: Analysis Method Development

ADAM F. MOREAU, Joylene C. Aguirre and Frank Jacobitz

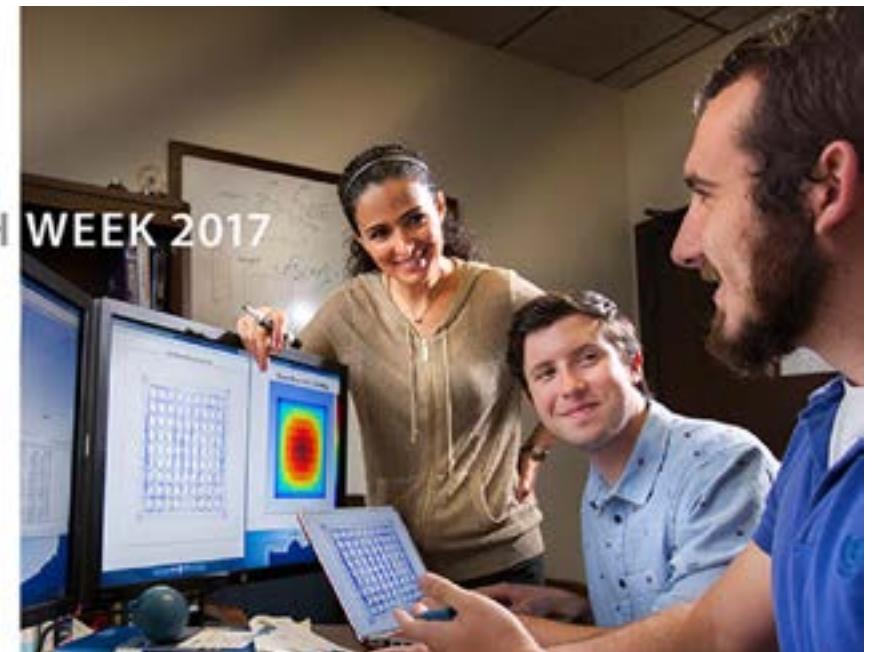
Direct numerical simulations were performed to study the orientation of flow structures in homogeneous turbulent shear flows. The incompressible Navier-Stokes equations were solved in the Rogallo frame with periodic boundary conditions. Structures inclined in the vertical direction are observed in instantaneous fields of velocity and vorticity magnitude. The three-dimensional two-point autocorrelation coefficient of velocity magnitude and vorticity magnitude is computed to quantify the orientation of flow structures. Isosurfaces of the autocorrelation coefficient closely resemble an inclined ellipsoid, which is directly related to the inclination angle of the flow structures in the vertical direction. A least-squares fit of an ellipsoid to the isosurface was performed, and the inclination angle of flow structures was determined. The inclination angle was found to depend upon the choice of isosurface value for very low and very high values. However, the angle reached a band of constant values for non-extreme choices of isovalue. At low autocorrelation coefficient values (about 0 to 0.3), the isosurface no longer represents the structure orientation and the surface is non-ellipsoid. At high autocorrelation coefficient values (about 0.7 to 1), the number of data points making up the isosurface decreased such that the inclination angle is no longer well-defined. Within the band of constant values (about 0.3 to 0.8), averaging was conducted to reduce uncertainty due to the use of a particular isosurface value. The inclination angle of flow structures in homogeneous turbulent shear flows was determined to be  $16.0_{\text{ or }} 19.2_{\text{ by this method for velocity magnitude or vorticity magnitude, respectively.}}$



UNIVERSITY OF SAN DIEGO  
**RESEARCH WEEK 2017**  
EVENTS

April 18 through April 21, 2017  
University of San Diego  
[www.sandiego.edu/osp](http://www.sandiego.edu/osp)  
Office of Sponsored Programs

Student-faculty  
Research  
Scholarship  
Creative Works



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Tuesday, April 18

Session I; 12:10-1 p.m.

UC Forums

## More than a Standard: Your Children’s Education

KAREN CLARK and Kathryn Statler

Through an analysis of the National and California History Standards, a historical debate can be identified. One side argues for explicit standards that emphasize specific details of history - which often by unsurprising happenstance are white-centric, while another side explores the possibilities of broader standards with a multicultural dimension. This debate has barred the creation of national standards and left education standards in the hands of the states. The differences in standards from state to state creates inequalities in content. Additionally, standards in education have faced scrutiny because they are often thought of as goals instead of standards. Standards should be considered the minimum a student is expected to learn, and teachers should ultimately be teaching beyond the standards and incorporating equity of different races, cultures, and sexes whenever possible. Thus, broadened national standards to guide state standard decision making should be created. Also included in the National Standards should be an instructional standard, leaving the balance of equity within a classroom in the hands of teachers. One way for teachers to move from standards to a larger equity of experiences is by utilizing the varying backgrounds of students within each classroom.

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Tuesday, April 18

Session I; 12:10-1 p.m.

UC Forums

## Auditor’s Going Concern Opinion: Consequences, Accuracy, and Outcomes

KATE GARDNER and Mary Durkin

The going concern opinion is an explanatory paragraph added to the end of an auditor’s opinion on the financial statements if the auditors believe there is a substantial doubt the company will continue as a going concern for the next twelve months. There are advantages to the going concern opinion, such as an increase in investor knowledge, but also disadvantages, such as causing issues acquiring new debt, which can cause a drop in the stock price and change how the company is valued. These consequences can lead to the company filing for bankruptcy, often giving the going concern opinion the reputation of the self-fulfilling prophecy. This project reviews previous research performed around these consequences. These consequences can be an issue for the company especially if the auditor gives a misclassification. Auditor accuracy has been a source of concern because auditors often misclassify companies through a type-one error of issuing a going concern opinion but the company does not file for bankruptcy. This project looks at the accuracy of public companies that recently received a going concern opinion and follows their eventual outcomes: bankruptcy, continuance of operations, or merger/acquisition.

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## Deterministic Pre-Conditions in International Trade Agreements

KATIE QUINN and Alyson Ma

This research paper seeks to demonstrate under which precursory conditions trade liberalization is successful by specifically examining the North American Free Trade Agreement (NAFTA) between Canada, Mexico, and the United States. The empirical methodology will consist of panel series data for Canada, the United States, and Mexico spanning from 1985 to 2015. Using the logit model, the right-hand regressors will produce respective probabilities for the dummy y-variable, a net increase of Gross National Income. It is the working hypothesis that free trade agreements themselves have a less significant role than deterministic pre-conditions, namely the exchange rates and level of development of the countries entering into said agreements.

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## Effect of Phytoplankton Growth Phase on Delayed Settling Behavior of Marine Snow Aggregates

KYLE PROCTOR and Jennifer Prairie

Marine-snow aggregates, collections of organic material and marine detritus, play a fundamental role in the marine carbon cycle. 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 distinct growth phases, we formed aggregates in a laboratory environment. We then observed individual aggregates as they settled through a stratified water column. 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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## Evaluating the Hand Morphology of Homo naledi in the Context of Evolution and Precision Grip

LAURA LUCERO and Jennifer Parkinson

The large assemblage of specimens from the discovery of Homo naledi in 2015 has led to new inferences about the beginnings of the genus Homo. Due to the location of the discovery, however, the temporal placement of these fossils has remained unanswered. In this research, we examine the morphology of a nearly complete right hand belonging to Homo naledi in order to determine grip capabilities, explore its possible relationship with tool use and manufacture, and help better position this species within the hominin evolutionary tree. Our sample consists of nine different species of hominins and two species of great apes, which are from published literature, and 3D printed casts of the Homo naledi fossils. We used these specimens to analyze the hand morphology of these species, and we determined the presence and absence of eight derived traits found in Homo sapiens, which are evolutionarily significant. We also took measurements of thumb and finger length for biomechanical analysis in relation to grip capabilities and tool use. The result will be the production of a phylogenetic tree using a parsimony analysis in the program Mesquite and inferences about the biomechanical capabilities of Homo naledi and the cultural development of tool manufacture.



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## Assimilation In America: From Manifest Destiny To Standing Rock

LAUREN CHARBONNEAU and Atreyee Phukan

The “new world” was conceptualized as a blank slate to create new beginnings for the European immigrants of the “old world” without recognizing that America already had a pre-existing history, culture, and society. With the colonization of the New World, Europeans believed it was their divine right to expand west and fulfill their belief of Manifest Destiny. By the late 1800s through the doctrine of Manifest Destiny, colonists took the land for themselves, while also pushing their lifestyle, values, and beliefs onto the first inhabitants of the land. Native Americans were forced to assimilate to European customs and eventually, “Americanize” themselves. In my project, I use art and literature as the lenses through which I evaluate why Manifest Destiny was able to convince people to colonize as they expanded the West. I also analyze Native American mythology that reflect the life-long effects their communities continue to live with today. Traces of Manifest Destiny can be seen in the Standing Rock protest movement. Native Americans were once relocated onto unwanted lands (e.g. reservations), and now they are being asked to allow major corporations to make decisions about their land and livelihood.

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## SDG&E Nano-Grid

SARAH ADAMS, MACKLIN GATHERS, EMMANUEL GOMEZ, Kahveh Atef , Michael Turner, Kathleen Kramer, and James Gilb

This system will provide renewable power to users who live in areas where connecting to a major power grid is problematic. The goal of this project is to create an isolated nano-grid system which generates enough renewable energy to provide 400 Watts of power. Current nano-grid systems do not offer customers the ability to customize their power needs. A system will be created so that the user can personalize their system's settings and improve the effectiveness of the overall power distribution. The system will have the ability to dynamically charge and produce 400 W of power to a load for at least two hours. The system is broken into four subassemblies: the energy generation system, the energy storage system, the thermal management system, and the system controller. An Arduino system controller has been chosen to tie all of the internal components together and monitor all of the nano-grid components at one time and ensure proper functionality of the system as a whole. Currently, research for this system has been completed and a functioning subsystem has been developed. This subsystem can correctly notify the thermal management system as well as offer a brief idea of how the user can configure their system. The integration of all the other three subsystems is currently in progress.

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## Analyzing Meiofauna Abundance and Distribution in Mission Bay, CA

MADISON LANGE and Nathalie Reyns

This study done on Mission Bay in San Diego, California serves as a baseline for future studies in order to have a long-term series to compare with new data collection. The general questions we will try to answer are: what are the major organisms found around various parts of Mission Bay; what is the variability of biological diversity between front, middle, and back bay; and what major conclusions can be drawn from the overall data set. My hypothesis is that meiofaunal diversity and abundance will be higher away from the freshwater inputs. Previous studies have been done at fewer sites and have collected less extensive data compared to what our class will be collecting and thus creating a major problem of extreme variability throughout the data. Therefore, this study is important in analyzing the overall meiofaunal diversity throughout Mission Bay.

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## Empowering the Other Half: Gender Equity and Economic Growth in Developing Nations

MARIA DIMACHKIE and Alyson Ma

This research investigates the impact of gender equity on economic growth in developing nations. More specifically, this study will look at how the United Nation's implementation of Millennium Development goals, particularly those of “promoting gender equality and empowering women” and “improving maternal health,” have contributed to economic progress in developing nations. Using regression analysis, data from the time span of 2000-2015 surrounding various female health and education indicators in developing nations is evaluated in order to explore the instrumental economic benefits of addressing gender disparities and to isolate the influence of the UN's Millennium Development Goal efforts. This study will expand on existing literature through its use of updated data, utilization of the millennium development goal indicators as a framework for measuring gender-equity, and the inclusion of both education and health variables. Beyond merely a method to evaluate the impact of UN efforts, establishing the relationship between gender equity and GDP growth will serve a greater purpose of informing future policy makers and allowing for more efficient, effective development policies to be implemented.

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## Examining the Neuronal Dopaminergic Pathway Underlying Sleep Behavior and Related Dopamine Sleep Disorders

MARY BETH PUTZ, Victoria Coleman and Divya Sitaraman

The human brain is an extremely complex organ with approximately 100 billion different neurons that are constantly sending and receiving messages. These messages are sent using the chemical messengers of the brain: neurotransmitters and neuromodulators. The mechanisms of neural control of sleep are substantially conserved across species. Evidence from multiple animal models including flies, zebrafish, and mice shows that the arousal, or wake phase, is regulated by conserved neuromodulators such as dopamine, norepinephrine, and serotonin. Since these neurotransmitter systems are distributed throughout the brain and sub-serve many functions in addition to sleep, the precise circuit mechanisms by which these neurotransmitters regulate sleep remain unknown in any organism. Because of their genetic tractability and mechanistic similarity of sleep to humans, we used *Drosophila melanogaster* (fruit fly) to study sleep behavior. Our data show that dopamine neurons are critical in controlling sleep behavior and that the modification of neurons expressing the dopamine receptor leads to sleep deficits. In addition to analyzing these experimental data, we will also examine the current research regarding established sleep disorders that have a strong dopamine component.

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## The Influence of Economic Factors on U.S. Home Prices

NICHOLAS DEIERLEIN and Alyson Ma

The last global financial crisis began with the plight of subprime mortgages here in the United States. This research involves examining what factors affect the value of the housing market. The goal is to identify fundamental economic variables that explain movements in home prices across all 50 states.

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## Mathigami Exploration with Middle and High School Students

PAINE HARRIS and ASHLEY MENDES and Perla Myers

In the summer of 2016, we explored the mathematics in origami, which led to unexpected discoveries and new artistic creations. We used insights from our experiments to develop and lead inquiry-based, mathematics learning activities for middle and high school students at a summer Science, Technology, Engineering, Art & Mathematics (STEAM) Academy hosted at USD. In our presentation, we will share our experiences and findings.

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## Christianity and Climate Change

PARKER KING and Alyson Ma

This project argues that urban American Christians, as a majority white and “first world” population, should not use their privilege to be indifferent to both climate change and its effects on the lives of the less fortunate. Privileged White American Christians need to have a stronger understanding of the implications involved with climate change and their role in speeding up the ramifications that disproportionately affect the same groups their doctrine teaches them to care for. Why is it so difficult for scientists and Christians to agree on climate change as one of the biggest threats to 21st century life especially as it is felt most by marginalized groups? Although scientists claim Christians deny climate change, there are some who passionately care and believe in it but paradoxically choose to ignore it. Christians ignore climate change because of their religious perspective, such as anticipating the end of the world with Jesus’ second coming, making climate change a symbol. When viewing it as a symbol, hundred-year floods, increasing heat and earthquakes, and other strange weather patterns are used as parts of a checklist for the second coming rather than as human-induced global problems. Within the evangelical denomination, for instance, there is a belief in an end to the world, where the earth is reborn through destruction. With this in mind, the physical environment is unimportant, making any talk about climate change white noise.

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PITCHAPOR JIARAVANON Leo Chiu-Leung, Adrian Chan, Paul Hodgson and Michel Boudrias

Coral reef fisheries provide an important source of food and livelihood for many communities in Malaysia. However, overfishing and destructive fishing practices have caused major degradation of delicate reef ecosystems. The tropical reefs in Malaysia are heavily influenced by the widespread use of illegal dynamite fishing, which is considered to be the most destructive impact on coral reefs. Since blasts do not discriminate species, mortality of non-target species, including corals and other invertebrates, are high. The objective of this study was to analyze the impacts of blast fishing on fish community structures in Sabah, Malaysia. To conduct this study, blast detectors were installed around various islands in Malaysia to record the frequency, magnitude and time of blasting incidences within a 10-kilometer radius. Underwater videography transects were recorded at each study site to conduct fish surveys to analyze the abundance of small, medium, and large fish. Findings in this study could be used in management programs to determine how fish communities in various areas are affected by blast fishing and identify potential areas that need to be addressed.

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## Synthesis and Evaluation of Peptides for RNA World Hypothesis

MICAELLA JORGE and RAJ PATEL and Joan Schellinger

The RNA world hypothesis describes how ribonucleic acid (RNA) molecules were present at the start of life and represented a precursor for all life on Earth today. The hypothesis holds that the RNA world on early Earth later evolved into our current DNA, RNA, and protein world. To study this, laboratories attempt to recreate and investigate RNA world organisms which includes investigating ribozymes (catalytic RNA molecules). Studies have shown that amino acids and peptides also likely existed during the emergence of the RNA world because they are easier to generate by prebiotically plausible reactions than nucleotides. The question we want to answer is: can peptides help in the function of ribozymes? Our research focuses on the synthesis, purification, characterization, and evaluation of twenty different peptides containing both naturally-occurring and prebiotically-plausible amino acids. In this report, we focus on the successful synthesis and characterization of ten peptides consisting of biological amino acids. The synthesis is accomplished via conventional Fmoc-tBu orthogonal protection strategy using an automated microwave-assisted peptide synthesizer and purified by C-18 reverse-phase high-pressure liquid chromatography. Peptide structure is confirmed by mass spectrometry. The synthesized peptides will be co-incubated with ribozymes using in-vitro selection assays to identify ribozymes that recruit specific peptides from a pool of peptides. Circular dichroism spectroscopy will also be used to study the potential of the peptides to form secondary structures. This research has the potential to gain a closer look at what a prebiotic world and an RNA world organism would have looked like.

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## The U.S. Dollar: Building or Breaking The BRICs?

SACHI PAREKH and Alyson Ma

Historically, stronger growth in developed countries like the U.S. is beneficial to the global economy, especially on emerging markets. However, a persistently strong dollar can have negative spillover effects on emerging markets, particularly those that depend on trade relations with the U.S. This research project aims to show the negative impact of an appreciating dollar on the growth of four key emerging markets from 1993-2016: Brazil, Russia, India and China (BRIC). A strong dollar reduces commodity prices, which, in turn, decreases the real income of net commodity exporters. Loss in real income further leads to decreased demand and decelerates growth rates. The BRICs are all net commodity exporters of either raw materials or finished goods. Another factor affecting BRIC growth rates is the increasing value of their dollar-denominated debt. An increase in the U.S. real interest rate increases financing costs for the BRICs, mitigating their growth. With the help of a paneled regression model, the study will show the negative effects of an appreciating U.S. real effective exchange rate and real interest rate on the real GDP growth rates of BRIC. The results, if statistically significant and conclusive, will shed light on the strength of economic policy and reform in the BRIC countries. Currently, they account for 30% of global GDP and thus, it is imperative for them to continuously grow.



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## Bending Iron Crosses Into Swastikas: The Damage Caused by Forcing Perceptions of WWII Germany Onto WWI German Soldiers

SAMANTHA DEDDEH and Kathryn Statler

The World Wars are two highly complex time periods that are still prominent in historical memory. Each nation's soldiers had diverse experiences in both wars. However, after World War II, there was a change in perceptions concerning Germany in WWI. WWI was originally seen as a pointless bloodbath where fault, if any, belonged to all nations involved. After WWII, some scholars equated WWI to WWII when regarding Germany, claiming that the Germans had the same goals and conduct in both wars. Thus, the Nazi brutality was transferred onto the WWI German soldiers, many of whom had, like several Allied soldiers, simply been young men who believed they were defending their country. This change represents a sustainment of the World Wars memory narrative, which claims Germans have an inherent brutality and cruelty that caused both World Wars and the Holocaust. This paper will highlight the German war experience, particularly through analyzing ordinary soldiers' memoirs and diaries. Equating WWI and WWII Germany overlooks the struggles these soldiers faced, and cruelly profiles the Germans as inherently prone to evil. Many regular WWI German soldiers faced the same hardships and disillusionments as Allied soldiers and should not have their memory blackened by the Nazis' horrific actions.

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## Daylight Savings and the Impact on Labor Productivity

SELENA GONZALEZ and Alyson Ma

This study researches daylight savings time and the impact it has on labor productivity. States within the United States have the option of exercising daylight savings or not. Many states choose to participate due to the thought of energy conservation. However, this concept of time change is something everyone knows yet people do not prepare for sleeping early for that hour loss. From this arises the question of what kind of effect is occurring on labor productivity?

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## Analysis of Sodium Hydrogen Exchanger 1 (NHE1) Stimulation By Means of PYK

SHANE DAVIS and Joseph Provost

Cancer incidence and mortality statistics report that lung cancer is one of the most common types of cancer in 2016. Non-small cell lung cancer is an aggressive malignancy, is insensitive to many forms of chemotherapy, and accounts for nearly 1/3rd of all cancer deaths. In order for carcinoma to continuously proliferate, the cells must be regulated to counteract intensified intracellular proton concentration. Mammalian cells express a ubiquitous membrane protein called the Sodium-Hydrogen Exchanger (NHE1). NHE1 promotes cell growth, proliferation, differentiation, and apoptosis. NHE1 is not an autonomous mechanism; it must be activated by the phosphorylation of various protein kinases upstream of the membrane protein. Although the impact of a number of protein kinases that phosphorylate NHE1 is unclear, the phosphorylation affects NHE1 protein kinetics. These apparent protein kinases are produced by multiple cell signaling pathways that are initiated by agonists. An agonist is a chemical substance that combines with a cell receptor and causes a reaction to create an active site. I am researching to determine if LPA as an agonist activates the proline rich kinase (PYK). PYK is a protein kinase with a serine/threonine consensus sequence. If identified as active, we would expect to find a serine/threonine consensus sequence in the c-terminus of NHE1, where NHE1 is phosphorylated. If the protein kinase is shown to phosphorylate NHE1, we will be able to detect a source for the healthy progression of lung carcinoma. Our hypothesis is that PYK as a protein kinase affects the stimulation of NHE1 by affecting protein kinetics.

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## Sizzling and Shivering in Shiley and Serra

TAYLOR LEDANG, NICHOLAS WAHL, SARINA HAGHIGHAT, Stefano Monzon, Lauren Roberts, Gracyn Otten, John Brady,

Christelle Matsuda, Timothy Holdsworth, Noah Egger , Justin Von Gortler, Laura Cilingiri Molin, and Jane Friedman  
Often times temperatures inside of USD classrooms are drastically different from outside temperatures, causing discomfort and restricting learning. Inside temperatures should depend on weather conditions and provide a comfortable learning environment. We tried to collect data throughout the day on student comfort levels in classrooms and compared it to outside weather conditions and clothing choices. We found USD students' clothing choices often represented the frigid temperatures inside rather than the real outside weather conditions.

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## Analyzing Differentiation in Phosphorylation in Old and Young Drosophila melanogaster

VERONICA VERPLANCKEN and Adam Haberman

Aging is a process that can cause negative effects on living systems. Past research has shown that aging is a controlled process that involves the regulation of proteins. One type of modification strategy is phosphorylation. Certain proteins will be differently phosphorylated (i.e. phosphorylated when young but not when old or vice versa), and some of these alternatively phosphorylated proteins may affect phenotypes in a detrimental manner. This is tested by dissecting one-day-old or 5-week-old Drosophila melanogaster heads. 2G-PAGE is used to separate phosphorylated protein samples. Protein samples are run in an LTQ Mass Spectrometer for identification. 2D-PAGE analysis reveals that phosphorylation levels are higher in old flies. The identity of these phosphorylated proteins still remains unclear. Further identification of these phosphorylated proteins is an essential part of understanding aging and treating age-related diseases.

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## A College Education May Eventually Be Worthless

WADE BENNETT and Alyson Ma

Given the rising cost of college tuition in the United States, the growing problem of student loan debt, lower-than-expected post-graduation salaries, and no change in median household income over the last 18 years, obtaining a college degree may not be a worthwhile investment for many students in the coming years.

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## KickForce Martial Arts iOS Application

LILY HOFFMAN and Saturnino Garcia

KickForce is a traditional martial arts gym in San Diego. The KickForce app will serve as a resource for students to complement their training done in the gym. The app will store videos of basic techniques, forms, weapons trainings, self-defense techniques, acrobatic martial arts moves, and other workout routines. The students will have access to training material from their iOS device to be able to train on their own and reflect on their progress, with content tailored to their belt rank and training goals. While there are a wide variety of martial arts training resources freely available, the videos presented by the app will be specifically designed to complement the KickForce curriculum. The app will also foster a sense of community by providing each student with a personal profile where they can share content and communicate with other KickForce members.

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## Analyzing the Social Change Model in the Context of Women’s Rights to Education

ABBEY SOLNET and Kenneth Bates

For my Honors Senior Thesis, I am analyzing a leadership theory called the Social Change Model. This model was created by Susan Komives, and consists of the “7 Cs” of leadership. These Cs are divided into Individual (consciousness of self, congruence, commitment), Group (collaboration, common purpose, controversy with civility), and Societal/Community (citizenship) values, and are important in creating positive social change. I will be analyzing and critiquing the Social Change Model, and applying it to a real-life scenario: the human right to education. This human right is currently being violated in various areas around the world, and since human rights are intersectional, it is important to look at specific populations who are marginalized- specifically women. I will do a case study to see how the Social Change Model applies to Malala Yousafzai and Emma Watson and their work to advocate for women’s rights to education. I will offer insights into how they can improve their work, as well as critiques on the limitations of the Social Change Model. I will conduct primary research within the University of San Diego community by hosting a screening of the film “He Named Me Malala” and do surveys and discussions to see if people can understand the Social Change Model in the context of this film. Overall the goal of the research is to better understand the Social Change Model for leadership and how it can be used to create social change for education on both a local and global level.

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**JEHARRAH PEARL and Saturnino Garcia**

This project probes the inherent limitations of perception in order to formulate an expanded understanding of consciousness, one which transcends behavior and neurological process. Neurological data probing the systems of consciousness is fundamentally rooted in perception. Computer programmed visualizations and light prism studies operate as the primary methodology to analyze a series of enigmatic questions. These visual studies will inform the larger immersive installation which utilizes sound. Using an embedded system these components will be integrated and interfaced with an API application that retrieves heart rate data using this information to influence the movement of the prisms and installation structures. By programming a collective visual-audio installation based upon the earlier visual studies, the installation operates as a constructed space aimed to displace awareness. The final space will be rendered as time base sequence in order to map correlations and possible trends at a given point and time during the exhibition. By studying physiological connections as well as experiential accounts we can critique the fundamental fallacies of human perception, thus, disrupting prior understanding regarding the nature of reality.

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## An Assessment of Sponge Coverage and the Abundance of Spongivorous Fishes on the Reefs of South Caicos

KATHRYN JACOBUS, Kalla Fleger, Matt Speegle, Erin Lyons, Amanda Paskavitz, Heidi Hertler, Lily Zhao, Claire Gonzales, Eva Ramey, Chris Casacang, Clarence Stringer and Steven Searcy

Coral reef ecosystems are vitally important to maintaining fisheries and supporting many tourism attractions of the Turks and Caicos Islands. Environmental resilience to stressors relies on the existence of healthy, biodiverse ecosystems. While sponges are crucial members of benthic food webs, coral to sponge dominance phase shifts have been observed in some areas, which threaten biodiversity by making habitats more susceptible to natural and anthropogenic impacts. This study examines geographical, seasonal, and depth patterns of sponge benthic coverage off of the Southern coast of South Caicos and relates sponge cover to the abundance of spongivorous fish species, which include Pomacanthus arcuatus, Pomacanthus paru, Holocanthus tricolor, and Cantherhines macrocerus. A positive relationship was found between mean percent sponge cover and depth, and a significant positive correlation was found between sponge cover and spongivorous fish presence.

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## Utility and Examination of Boronate Esters

TAYLOR THANE, Alexis Ogtong, Carl Ferber and Timothy Clark

Diboration has proven to be an efficient way of incorporating boron into molecules. New reactions that insert a carbon-containing molecule into a carbon-boron bond of these diboration products (homologation) will be described. By choosing effective protecting groups the homologating step is improved. The addition of Lewis acids has also been shown to improve the homologation.

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## Internship at the Office of Sustainability

BRIDGETTE REDDINGTON and Sarah Gray

I was the marketing intern for the USD Office of Sustainability for the spring semester 2017. The mission of the Office of Sustainability is to promote sustainable initiatives throughout USD’s campus through programming and outreach to both the USD and local communities. My findings have included analyzing the ways students react to social media outreach about sustainability and the parts of sustainability that are most interesting to students. I have found that students are most interested in learning about ways they can live a more sustainable lifestyle on campus. I have also found that sustainability on college campuses is evolving and progressing, especially in California. I have learned about the importance of marketing sustainability properly and how to market events so that people will attend. My internship experience has taught me the importance of media outreach to increase participation in, and knowledge of, sustainable activities on campus. It has also supported my academic studies because it has allowed me to spend time researching sustainability issues and career opportunities to share with others through media.



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## Molecular Engineering using Dipyrromethene Ligands

QUAN LAURA LE, HOLLY CUNNINGHAM and Mitchell Malachowski

Our interest is in designing organic molecules with particular shapes. In order to do this, we have synthesized rigid organic molecules based on the various organic units, including benzenes and biphenyls. These organic molecules were designed to have a shape that will lead to a predictable shape or cavity when complexed to metal ions. After preparation of the organic molecules, they were bound to metal ions such as cobalt, ruthenium, and copper. The complexes were characterized by a combination of elemental analysis, UV-vis spectroscopy, and X-ray crystallography. From these results, we were able to determine whether our basic premise about building particular shapes into the ligand is transferred to the metal complexes. We will highlight our successes using a collection of dipyrromethene ligands.

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## Dawncrest Procedural Gaming

CASEY OLIVETTE PETER GUSTAFSON DANIEL MYERS MICHAEL FRANKLIN and Scott Lundergan

Dawncrest is a prototype for a fully-immersive role-playing game, designed using the Unity game engine. Dawncrest was created in order to explore the possibilities in procedural generation of game content. Almost everything in the game is generated only after you have begun playing. Dawncrest's 3D world has a procedurally generated terrain, with procedurally generated music, items, and AI elements that interact with the player. Our objective is for every player to have a unique experience.

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## USD's 2017 Mini-Baja

MASON POWERS, MICHAEL POWER, Jessica Koch, Adam Dang, Austin Perri, Jasmine Yang, Duy Ngo, Elliot Kadota, Jack Li, Jessica Lowery, Joe Losecar, Rachel Gledhill, Valeria Estrada, Soud Alenazi and Daniel Codd

For the second year, the University of San Diego will compete in the Mini Baja Collegiate Design Series, hosted by the Society of Automotive Engineers (SAE.) University students design, engineer, build, and test a single seat off-road vehicle. There are 3 sanctioned events each year, each in different parts of the United States. Our team, Torero Racing, will be competing in Gorman, California, from April 27th to the 30th. Over 100 teams will attend and will be judged on the ability to meet various design specifications. There are multiple events to test the vehicles, including maneuverability, hill climb, acceleration, and endurance. Judges will also rate the teams on their vehicle designs and manufacturing costs. Last year was Torero Racing's first time competing and placed 30th overall out of 104 teams. This year we aim to surpass this placing. Completing this project will include computer-aided design; computer-aided manufacturing, finite element analysis, manufacturing, system integration, testing and development, and dynamic performance. After in-depth research and analysis of various solutions, our team has decided on designs for each subsystem that will excel in performance and reliability. The Inner Chassis Team has goals of improving on Torero Racing's 2016 frame design by removing excess weight, strengthening integral parts, and improving ease of manufacturability. The Front Suspension Team will implement a dual A-arm design to optimize key characteristics such as roll center, shock placement, camber gain, kingpin angle, and scrub radius. The Rear Suspension Team will utilize a 3-link trailing arm independent suspension to keep weight at a minimum while maintaining enough strength to achieve the maximum amount of travel and damping from the shock absorbers. The Drivetrain Team has chosen to use a continuously variable drive transmission in combination with the Dana H-12 FNR limited slip differential to transmit the engine's power to the wheels.

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## Evaluation of Efficiency for an ARM-based Beowulf Cluster versus Traditional Desktop Computing Utilizing High Performance Computing

NICHOLAS ADDIEGO, Shannon Bailey, 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 total power consumption of cluster will be monitored and analyzed over varying computational loads. This presentation highlights these power consumption values and compares them with the power required to complete identical calculations with a desktop computer. This project has required 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.

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UC Forums

## Examining First-Year Engineering Students' Service-Learning Experiences

AVA BELLIZZI and Susan Lord

While technical training and design projects are staples in engineering curricula, the incorporation of service-learning into engineering education has been found to be beneficial to students' professional development. This study examined the experiences of four first-year Honors engineering students. Students prepared presentations and corresponding hands-on activities to expose teenagers at an afterschool program at a local teen center to engineering design. Evaluations of these student-presenters' engineering background, project goals, and extent of project preparation were conducted prior to and following their presentation of these mandatory service-learning projects by way of anonymous surveys. Data from these surveys was analyzed to investigate students' experiences with particular attention to variation by gender and previous engineering experience. According to their responses, participants found this experience to be valuable to their engineering education, and they reported interest in engaging in future service-learning projects. Participating females reported at least one engineering-related pre-collegiate experience, but males did not. Additionally, female participants stated that they valued the emphasis service-learning places on community engagement and effective communication, while males cited the sharing of ideas to solve problems as the highlight of their experience. A unique aspect of this research was that the primary investigator was one of the engineering student participants.

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Tuesday, April 18

Session I; 12:10-1 p.m.

UC Forums

## Smart Rehabilitation Insole with Haptic Feedback and Smartphone Connectivity

SARAH KAPPLE, TANNER HENRY, MICHAEL THILENIUS, MARK SASAKI, James Gilb, Tom Lupfer, John Fox, Rod Milan and Orlando Crespo and Kathleen Kramer

The smart rehabilitation insole is a device designed to assist in the walking rehabilitation of stroke victims. To do this, the system utilizes an array of force sensors to measure weight distributions and a haptic device to provide feedback. The unit wirelessly connects to a smartphone in order to provide additional feedback to the user. This system intends to give stroke patients the opportunity for at-home physical therapy in addition to a more robust treatment with their physical therapist.

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Tuesday, April 18  
Session I; 12:10-1 p.m.  
UC Forums

## Riot Grrrl and the (R)Evolution of Feminism

KATELYN JOHNSON and Cessily Heisser

Riot Grrrl was a movement within the American and British punk scene from 1989 to 1996. Originating amongst students at Evergreen State College in Olympia, Washington, the movement initially formed to combat sexism in punk. What began as an inclusion effort for girls at punk shows, eventually became a music subgenre, a zine network, a collection of support groups, and a political cause. This research focuses on Riot Grrrl from 1989 to 1996 and its lasting impact on global feminism. To quote Bikini Kill's song, "Double Dare Ya", the individuals associated with the movement were hoping for a "Revolution, girl-style, now." [1] However, by 1996 riot grrrls abandoned the cause because sexism persisted, and because the media had commodified their original message. Although many have viewed Riot Grrrl as a failed revolution, this research takes the stance that it was not a failure, that it facilitated the evolution of feminism from Third to Fourth Wave. The first section organizes an ideological timeline of the four waves of feminism, highlighting key ideologies, literatures, and music that contributed to the formation of Riot Grrrl. The next section examines the Riot Grrrl era and its cohesion with Third Wave feminism. The last sections will demonstrate how, although the movement ended, elements of Riot Grrrl have evolved into a Fourth Wave of feminism today.

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Tuesday, April 18  
Session I; 12:10-1 p.m.  
UC Forums

## The Games of Gentrification

MICHAEL GIRARD and Cid Martinez

One viewpoint classically defines gentrification as a "process" whereby evolving organically to change depressed neighborhoods into prosperous ones. Another perspective suggests that gentrification is engineered by the influences of upwardly mobile professionals, whose agency creates a new form of gentry, whereby directing the course of potential change for a blighted area. While these two views traditionally have acted separately, a new approach proposes that gentrification involves the combined influences of upwardly mobile professionals, or "gentrifiers," whose influence directs the socio-economic process of restructuring depressed neighborhoods, often labeled simply as "gentrification."

To better assess these vast concepts, the findings from this research will assess how the process of gentrification, and the participating gentrifiers, have helped or hindered the neighborhoods of Ocean Beach in San Diego, Calif. After conducting extensive field work, the researcher will attempt to determine whether Ocean Beach's neighborhoods have received or resisted the onset of gentrification. In doing so, this study will examine several questions in particular. To what extent has gentrification inverted the historic sociocultural and economic structures of Ocean Beach? To what degrees has this change affected the demography of Ocean Beach's neighborhoods? Have the participating gentrifiers, who engineer the process of gentrification, restructured the diversity of Ocean Beach to be perceived as social deviance?

The ultimate goal is to determine if the famed community cohesion of Ocean Beach still exists, or if it has become nearly extinct, due to the outcomes resulting from, the games of gentrification.

## Day One, Session II, Interactive Exhibits

Tuesday, April 18  
Session II; 1:10-2 p.m.  
VA/Exhibit Hall

### JEHARRAH PEARL and Saturnino Garcia

This project probes the inherent limitations of perception in order to formulate an expanded understanding of consciousness, one which transcends behavior and neurological process. Neurological data probing the systems of consciousness is fundamentally rooted in perception. Computer programmed visualizations and light prism studies operate as the primary methodology to analyze a series of enigmatic questions. These visual studies will inform the larger immersive installation which utilizes sound. Using an embedded system these components will be integrated and interfaced with an API application that retrieves heart rate data using this information to influence the movement of the prisms and installation structures. By programming a collective visual-audio installation based upon the earlier visual studies, the installation operates as a constructed space aimed to displace awareness. The final space will be rendered as time base sequence in order to map correlations and possible trends at a given point and time during the exhibition. By studying physiological connections as well as experiential accounts we can critique the fundamental fallacies of human perception, thus, disrupting prior understanding regarding the nature of reality.

Tuesday, April 18  
Session II; 1:10-2 p.m.  
La Gran Terraza Patio

### The staff of The Alcalá Review

The staff of The Alcalá Review, USD's student-run literary journal, will read selections from recent issues.



## Day One, Session II, Poster Presentations

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Tuesday, April 18  
Session II; 1:10-2 p.m.  
UC Forums

### The Role of the Medial Entorhinal Cortex in Temporal Aspects of Memory Processing in Rats

TEDDY FISHER, ALYSSA MORSE, ANGELA CAMACHO, Peter Breslin, Lindsay Benster and Jena Hales

The hippocampus is critically involved in the formation and maintenance of episodic memory, a specific kind of declarative memory that has both spatial (“where”) and temporal (“when”) components. It is well established that the hippocampus is necessary for the formation and maintenance of spatial processing and memory. The discovery of two classes of spatially-selective cells, place cells in the hippocampus (O’Keefe and Dostrovsky, 1971) and grid cells in the adjacent medial entorhinal cortex (MEC; Hafting et al., 2005), was awarded the Nobel Prize in 2014. The MEC provides projections to the hippocampus and contributes to the normal function of hippocampal place cells (Steffenach, et al. 2005; Hales et al. 2014). The hippocampus is also involved in temporal processing, containing “time cells” (MacDonald, 2011), and is important for temporal aspects of memory (Fortin, 2002). Despite the attention paid to the role of the MEC in spatial processing and memory, researchers have only begun to examine the temporal functions of the MEC. Recent studies have suggested that the MEC may play a role in hippocampal-dependent temporal processing (Schlesinger et al., 2015), though its role in temporal memory is unclear. Based on pilot data from our lab, we hypothesize that the MEC is critically involved in sequence learning, a measure of temporal memory. Testing rats with MEC brain lesions on an object-sequence learning task, we will examine the involvement of the MEC in temporal aspects of memory.

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Tuesday, April 18  
Session II; 1:10-2 p.m.  
UC Forums

### Instagram-Fit: A (Potentially) Positive Space for Women in Fitness

ALLIE ROSS and Bradley Bond

Media consistently presents women with an unrealistic expectation of what their bodies should look like. The “thin ideal,” or the presentation of incredibly thin women as the ultimate beauty ideal has real, negative consequences to women’s self-esteem and body image, often in the form of eating disorders or other disordered behavior. Increasingly, fitness has become an important part of the lives of many women; yet, the motivations for a woman to achieve fitness are often centered on reasons that elevate beauty and sex appeal over health. This project examined the self-presentation of members of the women’s fitness industry as presented on Instagram. The intention is to examine the sexual and objectifying content within the images, commentary from both men and women, and overall self-presentation of the women behind these fitness accounts. Social Comparison Theory was utilized to understand the way in which posters and commenters interact with each other over social media and how the images can be viewed as meaningful to women. A content analysis of 30 of the most popular Instagram female fitness accounts was conducted, taking ten images from each account and twenty comments from each image. Images were attributed to either a professional, sponsored, or amateur account holder in order to examine differences between them. Findings indicate that most images are at least mildly sexual in nature, and that degrading commentary, while not as prevalent as positive encouragement, is frequent in the posts.

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Tuesday, April 18  
Session II; 1:10-2 p.m.  
UC Forums

### Adaptation or Ancestral Trait?: Investigating Ionoregulatory Patterns of Characiformes Native to the Rio Negro

AMANDA CRADEUR, Margaret Guinnip and Richard Gonzalez

The Rio Negro, a tributary of the Amazon River, is characterized by its ion-poor, acidic waters that pose physiological challenges to its inhabitants. Previous research investigating the ionoregulatory patterns of two Characiformes, Congo tetras (*Phenacogrammus interruptus*) and Black neon tetras (*Hyphessobrycon herbertaxelrodi*), which are non-native to the Rio Negro, have shown evidence of high-affinity, high-capacity transporters insensitive to low pH (Gonzalez et al.). We examined the ionoregulatory characteristics of four species of Characiformes native to the Rio Negro (Penguin tetra [*Thayeria boehlkei*], Rosy tetra [*Hyphessobrycon rosaceus*], Serpae tetra [*Hyphessobrycon eques*], and Emperor tetra [*Nematobrycon palmeri*]) to determine whether their ionoregulatory patterns are a unique adaptation to their inhabitation in the Rio Negro. These Characiformes demonstrated high tolerance when exposed to low pH levels, down to pH 3.25, with minimal inhibition of Na<sup>+</sup> uptake. When exposed to the lowest pH, Penguin tetra notably showed an increase in uptake (Jin, pH 3.25 = 1275.7) when compared to uptake levels at pH 7.5 (Jin, pH 7.5 = 790.5). Additionally, Na<sup>+</sup> uptake kinetics performed on all species established that these Characiformes show a high affinity (K<sub>m</sub> < 50 μmol/L) and high capacity for Na<sup>+</sup> (large J<sub>max</sub>) even in ion-poor waters. Our experimental data collected from the specified Characiform Rio Negro natives along with previous research investigating non-natives, show evidence of analogous ionoregulatory patterns, suggesting that these characteristics may be ancestral physiological traits rather than adaptations to the harsh conditions of the Rio Negro.

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Tuesday, April 18  
Session II; 1:10-2 p.m.  
UC Forums

### The Tudor Stage in a Digital Age

ALEXANDRA ANNEN, EMILY BEZOLD, CARA CARUCCI, YOUSIF HERMIZ, MAYA MCAULIFFE, ERIN MCDONALD, KATHRYN MORTON, AMANDA PENDLETON, MARK SASAKI, CONNOR SULLIVAN and Ryan Scrimger and Paul Evans

The Tudor Plays Project (TPP), which Maura Giles-Watson (English) launched at USD two years ago, is the first large-scale long-term Digital Humanities (DH) project at USD. With the opening of the new Humanities Center and the DH Studio, the project has grown tremendously in 2016-17. The mission of the TPP is the creation and dissemination of digital resources for the study and performance of pre-Shakespearean English plays, including the drama of the circle of Thomas More. These important plays are often neglected because no modern editions are available; over the next decade, the TPP will remedy that situation by preparing them as publishing, teaching, and performance editions on the TPP pilot website, tudorplays.org. The website will also include historical contextualizing materials, such as multimodal articles on Tudor household drama and on the influence of humanist thought on Renaissance drama. The anonymous More Circle play *Gentleness and Nobility* is the TPP’s current project and our pilot play. The research team has developed the first-ever modern English performance edition of this play, and a new teaching edition of the play is in preparation. In 2017, the TPP team will also publish its findings from the first-ever digital authorship-attribution study of the play in collaboration with TPP Technical Director Paul Evans. During 2016-17, under the leadership of TPP Artistic Director Ryan Scrimger (Theatre and Music), the team is also filming four scenes from its new performance text of *Gentleness and Nobility* in a cast and crew comprised entirely of students and alumni with faculty mentorship.

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Tuesday, April 18  
Session II; 1:10-2 p.m.  
UC Forums

## Queen Conch Orientation with Relation to the Current Direction in South Caicos, Turks and Caicos Islands

ANDREA MAST and Jennifer Prairie

The queen conch, *Strombus gigas*, is an extremely important marine species in the Turks and Caicos Islands, specifically South Caicos, for most of their economy relies on its harvest. The queen conch is a marine gastropod that inhabits sand and sea grass planes on the Caicos Bank. Previous studies have shown that queen conch undergo mass migrations in which the individuals are oriented in relation to the current (Stoner et al. 1994, Lipcius et al. 1988, Stoner et al. 1989). However, the individuals not involved in the mass migrations are oriented randomly (Lipcius et al., 1988). This study aims to further understand the orientation of non-migrating queen conch and determine whether this orientation is significantly correlated to the direction of the current. The data will help shed light on conch orientation while not migrating and provide suggestions as to why queen conch would orient themselves a certain way in relation to the current.

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Tuesday, April 18  
Session II; 1:10-2 p.m.  
UC Forums

## Examining Why Cell Phone Conversations May be More Distracting

ALEXIS NACHT, KEELEY COPELAND, Elle Johnsong, Daniel Kurzweil, Ashley Joshi, Arjun Majithia, Emily Lluch, Elizabeth Bader and Veronica Galvan

Overhearing a one-sided (cell phone) conversation while performing another task can impact a bystander's attention and memory. However, the amount of content that the one-sided conversation has may affect the extent to which bystanders are affected. We are testing this hypothesis by examining participants' performance on a verbal task while they overhear one of several types of conversation. Conversations will vary in that they will be either a one-sided (cell phone) or a typical two-sided conversation, and also whether or not one person will convey all the information. We expect that the one-sided conversation with all pertinent information will not be distracting, while the one-sided conversation with missing information will be distracting. We expect that both types of two-sided conversations will be less distracting. These results could be important for office space productivity and other situations where paying attention to a task could be disrupted by surrounding conversations.

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Tuesday, April 18  
Session II; 1:10-2 p.m.  
UC Forums

## The Sorting Hat Comes to USD II

RILEY EVANS, ASHLEY MENDES, CHAISE BROWN, WENXIN QIU, GRACYN OTTEN and Jane Friedman and 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 that are in line with their interests. The USD faculty and staff currently place incoming freshmen into first year preceptorial classes and Living Learning Communities (LLCs) 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. To approach this problem, we created a MATLAB script that sorts all students into their first preference, and then iteratively switches students into a lower preference class to meet constraints such as class size. In preliminary trials, our program increases the percentage of students in their first preference.

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Tuesday, April 18  
Session II; 1:10-2 p.m.  
UC Forums

## An Examination of Coral Reef Restoration Practices in Bonaire and the Broader Importance of Environmental Conservation

BRENDAN SULLIVAN and Michel Boudrias

My senior seminar topic will focus on my internship with the Boston Sea Rovers during the summer of 2015. Their mission statement is to advance the education, conservation, and exploration of the underwater world. I will discuss the importance of such endeavors with a highlighted focus on the time I spent in Bonaire with the Coral Restoration Foundation. The centerpiece of the poster will focus on the CRF initiatives and field world I engaged in, while also connecting such work to the broader importance of restorative practices on reefs given their unprecedented ecological decline.

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Tuesday, April 18  
Session II; 1:10-2 p.m.  
UC Forums

## Learning Environment and High School Graduation Rates: What Really Goes Into Canadian Education?

CAITLIN FOOTE and Alyson Ma

The primary goal of this research is to determine what positively influences the high school graduation rate in Canada. More specifically, this research is aimed at discovering if the learning environment adversely affects the rate of high school graduation across all provinces and territories. Given that spending on education and the allocation of educational services differs across provinces, the goal of this research is to determine which aspects of the learning environment are most effective in contributing to graduation rates. If better learning environments are found to lead to greater high school graduation rates, policy revisions could be made to allocate more money and resources to proven successful educational practices and/or to conduct more research in aiming funding at areas that have not been further explored.

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Tuesday, April 18  
Session II; 1:10-2 p.m.  
UC Forums

## Examining the Role of the Aaron Price Fellows Program in Building Social Capital for Low-Income Students

CATHERINE ZUNIGA-MATA and Dennis Sisco-Taylor

While there are many contributing factors to a student's educational success, social capital has been identified as one of the key factors. Social capital can be defined as access to social networks, the resources those networks hold, and the ability to use those resources for one's benefit. It is important to note that the type of resources that are deemed as valuable and the access a person has to those resources is framed within social hierarchies. This leaves low-income, particularly low-income minority youth, at a disadvantage when it comes to accessing these critical resources of educational and social success. Fortunately, social capital is not static and studies have shown that there are interventions, or support programs, that can help mitigate low-income minority youths' lack of social capital. These programs aim to provide additional resources and support in areas linked to educational success, such as: academic support, community involvement, and access to college-oriented peers and non-parental adult mentors. An example of these programs is the Aaron Price Fellows Program (APF). By examining APF, specifically the resources they provide and the outcomes they produce, my research aims to determine whether these interventions are helping low-income minority youth build social capital in order to identify effective models for intervention programs.

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Tuesday, April 18

Session II; 1:10-2 p.m.

UC Forums

## Reproductive Cycles and Parasitism in the barnacle, *Chthamalus* spp

DANA FLERCHINGER and Nathalie Reyns

The examination of barnacles and their reproductive processes is important as barnacle larval transport has major implications for settlement and transport processes common to many organisms in the rocky intertidal. The research objective of this study is to determine the reproductive stages of barnacles as well as the prevalence of parasitism to provide information about the seasonality and patterns of barnacle reproduction. We collected 100 barnacles in the rocky intertidal daily from June to December 2016. Samples were brought back to the lab for dissection and examination under a microscope to determine the reproductive state of each barnacle as well as the prevalence of parasitism among the samples. Information regarding the reproductive stage and parasitism was then recorded in a spreadsheet and analyzed. The results of this study indicate variability among the timing and frequency of barnacle reproduction. Results also showed a slight correlation with lunar cycles and the percentage of barnacles in reproductive stages.

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Tuesday, April 18

Session II; 1:10-2 p.m.

UC Forums

## New-Age Thinking on Mathematical Design ? University of San Diego Department of Mathematics

DANIELLE LATIMORE and Xiaoye Yang and Satyan Devadoss

This undergraduate Applied Mathematics capstone project explores methods of data collection and feedback surveys, with the larger aim of identifying key parameters for the redesign and construction of the Department of Mathematics space at the University of San Diego. This endeavor involves distributing different platforms of surveys, as well as quantifying and qualifying the program of existing spaces into an index of area, volume, correlations, light, and circulation, among others. Our goals include building physical and digital models to represent the existing space and multiple new interpretations to increase efficiency, enjoyment, and structure. Further, an added component of uniquely inventive mathematical thinking in design will be explored by bringing a currently abstract concept to life ? that of a Mathematical Design Laboratory. This will be a creative space intended to support and encourage the free methods of thinking, inventive tendencies, and research desires of mathematics students at the University of San Diego.

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Tuesday, April 18

Session II; 1:10-2 p.m.

UC Forums

## Mapping Sustainable Community Development: An Eco Endeavor in the Kathmandu Valley, Nepal

ELIZABETH DENGGENIS and Suzanne Walther

The modern humanitarian system developed in part due to the inability and/or unwillingness of states to fulfil their responsibilities to protect and assist their citizens. Unlike governmental organizations, local community organizations rely on their populations to participate in their recovery. Local NGOs have shown that improving trust and common understanding creates the foundation for collective problem solving. This project highlights a local organization that is effectively aiding communities in Nepal. The Kevin Rohan Memorial Eco Foundation (KRMEF) is a community-driven grassroots organization that helps communities alleviate poverty by becoming self-sustaining. In this study, KRMEF serves as a case study on the impact of a local non-governmental organization. This project's objectives were to 1) map the spatial extent of their outreach programs across Nepal and 2) quantify land use at their site, dedicated to these programs. To do so, we collected GPS data and mapped the outreach programs in ArcGIS. Additionally, we obtained aerial imagery of the foundation using a Dji Quadcopter, created a site model using Agisoft Photoscan software, and digitized the land-use in ArcGIS. The outreach is primarily centered

on communities near the foundation, but several programs extend well beyond their village. On site, over half of the land is used for biodynamic gardening, a key focus of the foundation, followed by income-generating programs such as women's empowerment jewelry-making and the Eco-Cafe. Finally, we created a Story Map to share the information. This spatial data can aid the foundation in future planning, fundraising, and outreach efforts.

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Tuesday, April 18

Session II; 1:10-2 p.m.

UC Forums

## Trigger Words: How the Salience of Social Identities Affects Cognitive Dissonance in Rhetorical Discourse Surrounding Gun Legislation

BROOKLYN DIPPO and Mary Brinson

While gun violence is a growing problem in the United States, legislation to fix it seems stagnant. Political conversations across the aisle are becoming increasingly hostile and as issues become polarized there are fewer efforts to compromise. This research seeks to identify the "trigger words" around the gun debate. By better understanding the effects of gun legislation rhetoric on cognitive dissonance, we can reframe the debate in terms of neutral language and start to have a discussion. This research also shows how social identities can affect consumption and processing of media. This study incorporates an online experimental design in order to find support for these assumptions.

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Tuesday, April 18

Session II; 1:10-2 p.m.

UC Forums

## The Justice and Mercy of God: Exodus Compared to Jesus

HAYLEY BENSON and Rico Monge

Since the establishment of the early Christian Church, there has been debate surrounding the apparent differences in character between God in the Old Testament compared to the New Testament, especially relating to judgment and compassion. This argument has caused the Church to defend the orthodox belief regarding God's character as unchanging, even across testaments. This theological research study examines the Christian God's characteristics of justice and mercy as they are displayed in the book of Exodus compared to the person of Jesus in the New Testament. It provides a hermeneutical analysis of God's words and actions in the Moses narrative and Sinaitic Covenant, along with Jesus' words and actions in the Gospels. This study evaluates what connections and reconciliation, if any, may be found between the manifestations of God's justice and mercy in these particular areas of the Old and New Testaments. It exegetically examines the biblical texts in light of their contemporary historical, grammatical, and religious context. Relevant commentaries from various biblical scholars are also consulted for analysis. It is hypothesized that there is a strong congruence between God's justice and mercy in Exodus compared to Jesus' in the Gospels. The analyses suggest that although the justice and mercy exhibited in Jesus' life are not identical to that of God in the Hebrew Bible, they are a continuation and completion of the Mosaic Law established in the book of Exodus.

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Tuesday, April 18

Session II; 1:10-2 p.m.

UC Forums

## Dopaminergic Control of Sleep and Feeding in *Drosophila*

MARGARET DRISCOLL, JADE BOVE, Austin Pavin 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 the regulation of feeding is also adversely affected when DA levels are diminished. The fly brain contains a total of 200 dopaminergic neurons, 130 of which innervate the mushroom body (MB). The MB is an associative learning network important for decision making as well as for the control of sleep in *Drosophila*.



Approximately 2,000 kenyon cells (KCs) make up the lobes of the MB and synapse onto MB output neurons (MBON) in 15 non-overlapping compartments. The 130 DANs project into these compartments, modulating the synaptic strength of these connections. Activation of specific DANs has been demonstrated to significantly reduce sleep in *Drosophila*. 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 MB DANs and MBONs was conducted. We analyzed specific subsets of DAN and ON clusters in order to elucidate dopamine's role in the regulation of feeding and motivational behaviors. The goal of these data is to explore a link between dopamine regulation of motivational behaviors and their implications for sleep regulation.

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Tuesday, April 18

Session II; 1:10-2 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.

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Tuesday, April 18

Session II; 1:10-2 p.m.

UC Forums

## Socioeconomic Factors that Influence Health

JANEL KOZLOSKI and Alyson Ma

Through the course of this semester, I have been analyzing and gathering data based on the socioeconomic factors that influence a person's health. I estimated that negative socioeconomic factors will result in low levels of health. In my project, I formed a regression model with health lifestyle behaviors and economic implements as my variables and concluded that certain behaviors as well as economic factors, such as income and education, play a role in determining our health.

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Tuesday, April 18

Session II; 1:10-2 p.m.

UC Forums

## Income and Spending on Illegal Drugs

JASON PEUGH and Alyson Ma

This paper analyzes the effect of differences in per capita income on marijuana, cocaine, and heroin at the state level. Using data from the US Substance Abuse and Mental Health Service Administration and the US Census Bureau, a regression equation which factors out potentially significant alternative variables is estimated. The relationship between income and illegal drug consumption is used to determine whether each of the three drugs could be classified as a normal or inferior good.

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Tuesday, April 18

Session II; 1:10-2 p.m.

UC Forums

## The Effect of Alcohol Taxes on Drunk Driving

### KAI MORSE and Alyson Ma

In 2015 alcohol related car fatalities accounted for roughly one third of the total highway deaths in the United States. While many states have laws and policies to prevent drunk driving, the rate of fatalities keeps rising year after year. I plan to study the correlation between states alcohol taxes and their alcohol impaired fatality rate. I will use cross-sectional data from all 50 states and D.C. of their 2015 tax rates and total number of alcohol impaired fatalities for all ages and under 21 year olds. I also will include a few variables to capture drunk driving policies that states have to prevent traffic fatalities. Finally, a few demographic variables like states unemployment rate and income per capita will capture the economic conditions of each state. By examining the correlation between states with higher taxes and strict drunk driving laws with their alcohol fatality rates, it creates a strong argument for state policy makers to acknowledge and follow suit.

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Tuesday, April 18

Session II; 1:10-2 p.m.

UC Forums

## The Role of SIKE in Cytoskeletal Rearrangement as Measured by Cell Migration Studies

KARLI WITTENBERG and Jessica Bell

The innate immune system recruits nearby cells in response to viral infection just minutes after detection. This response stimulates the cell to detect, migrate, and then consume the virus by phagocytosis which involves the breakdown, rearrangement, and reassembly of the structural proteins in the cytoskeleton. Between innate immune activation and cytoskeletal rearrangement, there is a small protein called Suppressor of IKK-epsilon (SIKE) that has been shown to interact with the cytoskeleton and is phosphorylated at the onset of a viral infection. However, its function remains unknown. The goal of this project was to perform cellular migration studies to determine if SIKE has any function in the rearrangement of the cytoskeleton. This was done with a chronic myelogenous leukemia (CML) cell line KBM-7 (HAP1) using both wild type (wtHAP1) and a SIKE knockout via CRISPR technology (SIKE\_CR). These migrations were performed in the presence and absence of dsRNA to mimic a viral infection. Studies with dsRNA absence showed that both cell types did not close the wound in the 24-hour imaging period. The SIKE\_CR cell line appeared to be migrating more slowly, with an average percent closure of 25% +/- 2% as compared to the wtHAP1 average percent closure of 35% +/- 5%. This work confirmed that SIKE plays a role in cytoskeleton rearrangement. This study imparts not only a deeper understanding of the linkage between innate immunity and cytoskeletal rearrangement but has additional implications in developmental and cellular metastasis research. Work supported by NIH grant R21AI107447 and USD SURE.

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Tuesday, April 18

Session II; 1:10-2 p.m.

UC Forums

## Child Obesity Rates in Southern States: The Effect of the Obama Presidency

KATELYN ALLENDE and Alyson Ma

One in three children in the United States is overweight or obese. In 2015, 13.9% of high school students were obese. This paper explores the factors and behaviors that influence childhood obesity rates. Longitudinal data is observed in increments of two years from 2009 to 2015, specifically within Southern states. Southern states are the focus region due to repeatedly reported high figures and higher risks. The years studied observe the time Barack Obama was in office to see how his healthcare policies, as well as Michelle Obama's Let's Move campaign, may have impacted childhood obesity. Childhood obesity has vast implications on healthcare and the state of the economy. Studying the possible effects of childhood obesity could reduce medical complications and healthcare costs as well as boost human productivity in the United States economy.

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Tuesday, April 18  
Session II; 1:10-2 p.m.  
UC Forums

## Socio-Economic Factors Determining Adult Literacy and the Effect on the Global Economy

KATHRYN DONOHO and Alyson Ma

Literacy is a crucial skill utilized by society to pursue economic growth and a better standard of living. Identifying the factors that influence literacy will reveal an essential indicator of the variance in human development between countries and the effects on global economy. This discovery has the potential to influence the public opinion on the solutions to improve adult literacy rates at an international level.

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## Design and Implementation of Pit Latrine Assistive Devices in Uganda

MEI-LI HEY, CRAIG WADE, HARRISON SCHMACHTENBERGER, LUKE UTRECHT and Ming Huang

This project includes the planning, designing, and present implementation of a humanitarian engineering project named Simple Seat, Better Lives. The goal of this project is to address the problem concerning the use of pit latrines in Uganda, specifically Lira, by individuals who have been handicapped by landmines. The objective is to design portable, low-cost assistive devices that allow a handicapped individual to use the pit latrine in a safe and sanitary manner. The device must solve physical and socially stigmatic problems for handicapped individuals using a pit-latrine. The devices must be constructed in Uganda, by the landmine survivors themselves. For the production of these devices to take place in Uganda, a main design specification is that the device must utilize local materials and tools for construction. Key performance parameters include that the device must be able to stably support 250 lbs, weigh less than 18 lbs and deploy for use at the pit latrine in less than 10 seconds. The designs serve as mobility assistive devices as well, in order to help users transport themselves easily and effectively to the pit latrines. The project's design constraints include economic, engineering, and social limitations. Our research project has an economic factor as we partner with organizations in Uganda in order to create a sustainable plan to test and distribute our devices. Further research while designing this device will be to explore sociocultural factors as we must design the devices so that they are most effective and culturally acceptable.

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## Lights, Camera, Verdict: The Constitutionality of the Media in the Courtroom

LAUREN HUGO and Andrew Tirrell

Defendants, attorneys, and judges all bring their own personal intentions into the courtroom; when journalists join that conversation, however, the constitutional rights of the accused and the freedom of speech begin to clash. While some research has been done on the effects of the media's involvement in criminal trials, few have examined the progression of the balance between the First and Sixth Amendments. My research attempts to answer the following: Has the Framers' established balance between the First and Sixth Amendments been shifted with the advancements of the media? Is one amendment superior to the other? Has a limit on constitutionality been established through this ongoing debate? Content analysis of important 20th century Supreme Court cases, including *Estes v. Texas* and *Chandler v. Florida*, elevates a normative trend to illustrate the current relationship between the two Amendments and predict where that relationship is headed. I hypothesize that, contrary to the original intentions of the Framers, modern legal experts use a broader interpretation of the First Amendment to hold those rights superior to the rights of the accused. Consequences of this trend, as well as themes that emerge when constitutional limits are imposed, will be posited.

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## Efficacy of MPAs on the TCI Bank Determined by Queen Conch Densities

MACKENZIE CORDAN and Cathy Lockhart

*Lobatus gigas* (Queen Conch) is a marine mollusk found in the warm waters of the Caribbean Archipelago. *L. gigas* is an economically important species to South Caicos, which is the largest exporter of queen conch in the islands. Due to increased demand and overfishing, the stocks of *L. gigas* have been in heavy decline. As a consequence, queen conch has been heavily regulated. In addition to fishing regulations, the queen conch is protected by designated marine protected areas (MPA). These are designed to bolster the population and allow for replenishment of the fishing stock through spillover and larval drift. This study assesses the efficacy of the East Harbour Lobster and Conch Reserve (EHLCR) in protecting the queen conch population, as well as increasing the fisheries stock. This was done by assessing siphonal lengths and conch densities on the Caicos Bank. Median siphonal lengths of 158 mm for inside and 138 mm outside the MPA were found. These results line up with other studies which assert that larger conch size is a tenant of a healthy, fully functioning MPA. It was also found that there were no significant differences between densities of conch inside or outside the reserve. This may be vital for showing the MPA is working effectively as it agrees with previous studies finding that the more effective spillover from the MPA is, the less pronounced the density gradient. The data provided serves to partially answer the initial question of reserve efficacy.

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## Understanding Strandings and Mortality of California Sea Lion (*Zalophus californianus*) Pups in San Diego County

MADILYN PARDINI and Todd Schmitt

Since 2013 Southern California has been experiencing elevated strandings of California sea lion pups. Understanding what is causing these strandings may help researchers better predict when it will happen again and be better prepared to accommodate the increased numbers in rescue centers. The temporal trends of California sea lion pups are evaluated using data from the last ten years including survival rates. A body condition index was also created to evaluate the general health of the stranded pups. The equation used to calculate the body indices is mass/length. Data was collected from SeaWorld San Diego's rescue center and included numbers of strandings, weight, and length measurements. San Diego County showed a major increase in strandings starting in 2013. This increase may be related to warmer waters offshore of San Diego and the subsequent decrease in sardine spawning. Sea lion pups that had higher body condition scores were correlated with a lower rate of mortality. Body condition scores can be used to quickly assess the general health of stranded pups. Comparing the data collected by SeaWorld San Diego to wild population data could further strengthen the results and the use of body condition as an indicator of health.

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## Gender N/A: Identity Disclosure in Activist Spaces and the ? Persona

MARGUERITE NGUYEN LEHMAN and Diane Keeling

Current social justice discourse centralizes identity disclosure as a marker of honesty and vulnerability. Particularly for LGBTQ+ justice issues, identity disclosure is understood to be an accomplishment, whereas obscuring one's identity represents shame, insincerity, and an inability to form authentic relationships. Theories of personae account for obscured or closeted identities through the fourth and null personae; the fourth persona denotes a closeted sexual identity that colludes with the audience to together maintain the illusion of heterosexuality, while the null persona describes a marginalized identity that engages in self-censorship in order to avoid victimization. However, these personae and LGBTQ+ justice discourse do not

account for sexual or gender identities which are incommunicable for either personal or political reasons other than evading marginalization. Identities may defy disclosure not as a means for evasion but for preservation of a politics-based identity that defies taxonomies or to accommodate fluid identities. To accommodate this identity, I describe the ? persona as one that defies conventions of taxonomy and disclosure to preserve undecidability as a resource for agency.

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## Originality and Ambition: Shakespeare, Satan, and the Romantics

MARIE MCDONALD-HULEN and Ivan Ortiz

This project explores the emergence of originality as an aesthetic value in art and literature in the Romantic Period. I will analyze how and why these values shifted from emulation to originality, and why Romantic poets and critics upheld Shakespeare as an example of originality as they developed poetic theory. My research also explores the connection between originality and ambition. I will examine how ambition was treated as a characteristic in literature in the Romantic Period, specifically in regards to the character of Satan in John Milton's Paradise Lost. I also question how the Romantic treatment of ambition relates to connotations of ambition today. In exploring this relationship, I will investigate how the values of the Romantic period are similar or influential to values in aesthetics and in society today.

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## Therapist Cultural Factors Associated with Views on Standardized Assessment

MARY KUCKERTZ, Adriana Rodriguez, Anna Lau, Lauren Brookman-Fraze and Nicole Stadnick

Standardized assessment measures have shown to improve treatment outcomes (Bickman, Kelley, Breda, De Andrade, & Riemer, 2011; Reese, Norsworthy, & Rowlands, 2009), yet utilization among community mental health providers is limited (Ionita & Fitzpatrick, 2014). Specifically, higher rates of standardized assessment usage is linked to more positive therapist attitudes towards evidence based practices (EBPs) (Jensen-Doss et al., 2016). A number of therapist sociodemographic and professional factors have been shown to predict therapist attitudes towards the use of EBPs such as highest degree earned, therapeutic orientation, and clinical experience (Reding, Chorpita, Lau, & Innes-Gomberg, 2014; Jensen-Doss & Hawley, 2010). Despite the potential influence of a therapist's own cultural background on clinical perceptions and decisions, little is known about the importance of cultural factors on therapists' views of standardized assessment. The current study employs hierarchical linear regression models to evaluate the association between therapist cultural factors (their race, generational status, English and native language proficiencies, culture, and acculturation) and therapist perceptions towards the use of standardized assessment. Attitudes are measured via the Attitudes Toward Standardized Assessment Scales-Monitoring and Feedback Scale (Clinical utility and Practicality) (Jensen-Doss et al., 2016) and a third subscale (Confidence). Data were drawn from an online survey completed by 341 mental health providers in Los Angeles County as part of a larger study examining predictors of EBP sustainment within the context of a multiple EBP implementation effort. These findings can inform community mental health services so as to provide insight into ways that a therapist's cultural background may affect their perception of standardized assessment during treatment.

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## SwimLite - A Swim Pacing Device for Competitive Swimmers

MELISSA BEALL, KYLIE EVEN, LILY HOFFMAN and Kathleen Kramer and James Gilb

The SwimLite is a portable performance enhancing training system for swimmers that will provide visual feedback by means of a moving light pulse train set to a desired pace. The pace of the light pulse train will be set by the user either via the LCD touchscreen interface attached to the system or via a Bluetooth connection to a mobile device. The LED strip will be completely waterproof to a rating of IP68 with all other components water resistant to a rating of IP66. The entire system will cost less than \$1000.

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## Examining Correlations Between Sediment Characteristics and Pesticide Concentrations in Tecolote Canyon

NATALIE NYNAS and Ron Kaufmann

Tecolote Creek runs through a developed watershed and has the potential to be impacted by pesticides. Previous sampling has identified both chlordane, an organochlorine compound that was used from the early 1950s through the 1970s, and current-use pesticides like pyrethroids, in Tecolote Creek (Kaufmann, unpublished data). Chlordane was completely banned in the US in 1988 by the EPA due to its toxicity, potential carcinogenicity, environmental persistence, and ability to bioaccumulate (EPA, 2016). Since pyrethroids are less toxic to mammals and birds, they have largely replaced chlordane and other organophosphate pesticides (EPA, 2016). In this study, data were compiled in ArcGIS to map 10 sampling locations in relation to sediment characteristics and pesticide concentrations, to produce a more detailed picture of how pesticide concentrations in the creek bed vary over space and time and to determine sediment conditions where pesticides occur in highest concentrations. Pesticide levels were generally found to be higher in the upper watershed than the lower watershed and higher in summer than in winter. Pesticide concentrations were positively correlated with sediment organic carbon but not with grain size. Seasonal patterns suggest that pesticides may originate in the upper watershed and be transported downstream during winter rainfall events.

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## Study Buddies: A Modern Web Application to Connect Students and Tutors.

QUENTIN FULSHER, ALEX ALVAREZ, MELINDA GRAD, John Glick and Saturnino Garcia

In today's socially networked world, it can be surprisingly difficult for students to find a good tutor and/or learning resources. In most cases quality tutors can only be found through a tutoring company, by responding to fliers, or knowing a friend of a friend. Extra learning materials are even more difficult to find. While online search engines make the task easier, it can still be daunting to find relevant practice problems for an upcoming exam. Our partner, John Glick Scroggins, approached us to help him with an idea to help grow his tutoring company "MathWizJohn's Study Buddies". As a result, we developed "Study Buddies", a web application that can fulfill all the needs of a struggling student in one place. Our goal is to quickly and effectively provide students with supplementary study materials, support video based lessons, and connect students with an exceptional tutor.



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## Instructions Influence on Performance

RAGHAD ALODIBI and Rachel Blaser

The study aimed at examining the effects of instruction on test performance of some college students at the University of San Diego. A simple multiple choice test was distributed to a sample of 40 students selected from the psychology department participant pool. These participants viewed a short video of a TED talk and answered a set of 15 question thereafter. Two groups of students were given different instructions designed to influence their perception of test difficulty. I hypothesize that the instructions given on an exam can greatly influence the performance of the student.

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## The Effect of Politician’s Gender and Sexual Orientation on Voting Behaviors

RITA TAYLOR and Anne Koenig

Women have often been at a disadvantage when it comes to leadership positions because they are perceived as lacking the necessary masculine traits for effective leadership. Though this is improving, studies have shown that female politicians are at a particular disadvantage. Voters often perceive them as lacking the masculine traits deemed necessary for leadership, like competency or agency, as well as the feminine traits that make them likeable, like warmth. The role of traits and stereotypes in leadership positions and politics is of particular interest in regards to gay men and lesbian women. Research has shown that perceived traits of gay men and lesbian women often transgress from traditional gender stereotypes. Gay men are often rated as being high in both warmth and competence, while lesbian women are often rated as being higher in competence than heterosexual women. In politics, where voters value feminine traits like empathy, gay men and lesbian women could actually be at an advantage and be subject to “positive discrimination.” The present study sought to investigate how a politician’s gender and sexual orientation affected a voter’s choice. Participants were given one of four target conditions that described a fictional political candidate. The participants were asked to rate the candidate on different traits and were then asked how likely they would be to vote for this candidate in a local, state, and federal election. Results and conclusions will be discussed.

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## Uncle Sam v. the Marlboro Man: A Study on the Effect of the U.S. Government’s Intervention on Cigarette Consumption

SAMANTHA BAKER and Alyson Ma

Cigarette smoking has a major effect on the health and wellness, as well as the economy as a whole, with an average of 480,000 deaths (1 in 5) from cigarette-related illnesses and over \$300 billion spent yearly on health care for cigarette-related ailments. So the focus of this research will be to see the degree to which governmental intervention has helped reduce consumption, both through taxation and bans on advertising for cigarettes in the media. Through building a regression analysis of consumption of cigarettes as a function of the tax and price per pack in each state, the awareness of risks of illness due to cigarette smoking, race breakdown by state, state GDP, state population, and three dummy variables to account for the various advertising bans, I will be able to tell which is the most important factor in deterring cigarette consumption. The results of this study will then be able to tell the most effective way to reduce cigarette use, whether that be through taxation or further limits on cigarette companies advertising so that cigarette consumption can be reduced even further in the coming years.

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## The Consistency of Maternal Structuring Behavior with Toddlers during Teaching and Compliance Situations

SARAH DEMPSEY-PRIOLEAU and SARAH WEEKS and Adriana Molitor

Evolving conceptualizations of effective parenting styles argue that behaviors that reflect parental structure (vs. ambiguity) should be distinguished from those reflecting parental autonomy support (vs. control) as they are often confused with each other. Yet both appear necessary to facilitate children’s motivation and competence. Moreover, while much research has investigated autonomy supportive parenting, far less is known about parental structuring behavior. For example, some research indicates that parental autonomy support may be influenced not only by parent and child qualities but by situational factors such as pressure. The present study explores whether maternal structuring is consistent across several teaching and compliance tasks with toddlers. Specifically, mothers of 30-month-olds were rated on behaviors previously identified as components of structuring and presently adapted for parental interaction with toddlers: clarity of guidance, informative feedback, rationales, opportunity, resourceful leadership, coordination, and predictability. Analyses examined the correspondence between maternal behaviors across these contexts.

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## Effects of Sleep Deprivation on Decision-Making and Action Selection

SHALIN SHAH, Luke Muskett, Victoria Coleman and Divya Sitaraman

The simplest of organisms are capable of prioritizing among basic adaptive behaviors, such as sleep, courtship, and aggression, which are typically conserved across species. This inherent prioritization suggests that underlying neural mechanisms for each of these behaviors must somehow interact. Furthermore, deficit in any of these areas may affect decision-making within another, adding to the complexity of interactions. This research looks specifically at the interaction of sleep with other behaviors in the fruit fly, *Drosophila melanogaster*. Not only is this organism well-studied and genetically adjustable, but our understanding of the fruit fly’s brain suggests that it represents a simplified version of the human brain. We examine the effects of sleep-deprivation on courtship, testing whether the organism’s tendency for courtship loses its priority. Secondly, this research analyzes the effects of sleep deprivation on decision-making within the complex behavior of oviposition. It is expected that sleep-deprivation does, in fact, affect behavioral prioritization and decision-making negatively, and further research will aim to assess underlying neural pathways.

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## Military Expenditures in High Income Countries

NICK SINZIG and Alyson Ma

This paper analyzes the trends in military expenditures and offers an econometric investigation of their determinants in the top ten defense spending countries. A public choice framework is applied to analyze military expenditures as a percent of GDP and its contributors, ranging from financial indicators, geographical variables, and the form of government. Military expenditures may indeed benefit a domestic economy; however, heavy spending may lead to a negative impact of rival nations.

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## Tourist Viewing Preferences and Valuation of Large Mammals in Serengeti National Park

SHANNON KUZMICK, Cassie Festa, Erica Stanislowski

This study analyzed viewing patterns and tourist valuation of large mammal species in Serengeti National Park. Revealed and stated preference methods were used to understand tourist preferences and views of mammals in the park. Big cats and large mammal species in general were the top two attractions for the park. Tourists allotted the majority of their time and effort game-viewing to carnivores and big cats, spending an average of 12.26 minutes at each sighting. When tourists were asked if they would be willing to pay an extra fee for wildlife conservation, most said yes, with the average willingness at \$162. These findings show the value of large mammals in sustaining tourist attraction in protected areas. Recommendations for park management include efforts focused on diversifying tourist attractions, broadening tourist activity to include under-advertised species through education programs, and instituting an extra entrance fee framework used to further conservation efforts.

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## Tourism as an Agent of Poverty Alleviation

TANIA TOUSSAINT VON BERTRAB and Alysa Ma

The research seeks to discover if tourism can act as an agent of poverty alleviation. By proving that an increase in tourism can lead to a decrease in poverty levels, policy reforms, marketing strategies, and global efforts can be done to use this tool to combat poverty.

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## Drag: Spectacle, Transformance, and the Construction of Gender Utopia

TYLER HENRY and Kristin Moran

The purpose of my research is to investigate drag as a specific form of gender performance that aligns with feminist ideologies and goals in order to provide a more inclusive understanding of gender. A problem with understandings of gender is that gender is often seen as fixed, or when transgressed as a temporal and adopted performances. I am using critical analyses, applying spectacle and transformance theories, to drag as a gender performance with RuPaul's Drag Race as the text to support my analysis. In my research, I argue that performances of drag support feminist understandings, even in its radical form, because it supports the notion that we are all performing drag all of the time due to our coexisting identities as performer and audience, which liberates men and women from the confines of masculinity and femininity.

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## European Union Conditionality: Examining Minority Rights in Romania

LAYNE GARRELTS and Andrew Tirrell

The process of enlargement in the European Union is a key strategy for the EU to exert influence on new member states. The EU acts as an external force on member states. States may respond to the goals set out before them by the EU and may adopt values and goals internally. This process, known as conditionality, gives key insight into the influencing power of the EU. One area in which the EU seeks to assert influence is in the realm of minority rights. This article seeks to measure conditionality in the EU by focusing on minority rights. Using Romania as a case study, I will analyze the degree of influence the EU has in this area and whether or not this influence is enough to bring about changes in Romania's minority protection policies and in the conditions of key minority groups in the country.

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## The Politics of Maternity: Post-Feminism and Native Canadian Feminism in Margaret Atwood's Surfacing

RACHEL LA DUE and Atreyee Phukan

The female body is the subject of a great amount of debate, engaging both feminists who wish to preserve an authentic independent female form and patriarchal forces that seek to govern and impose upon this form. These conversations rely on the assumption that the female body retains intrinsic meaning. For my research, I locate the maternal state of the female body as the assumed site of natural femininity, as well as the site of women's oppression. I focus on Margaret Atwood's novel, "Surfacing," which presses against natural significations of the maternal body through the unnamed narrator's quest for an essential self in the Canadian wilderness. Given the setting of the novel, I identify the ways in which Native Canadian women's maternal bodies have also been "naturalized" and legislated by colonial powers. I argue that in both narrative and syntactical form, Atwood reveals the futility of the narrator's attempt to access a natural feminine state through her maternal body. I will analyze the maternal body Margaret Atwood presents as a trope in "Surfacing?" from two different theoretical traditions: the post-feminist tradition Judith Butler establishes a framework for in "Gender Trouble," and the long-standing feminist traditions upheld by Native Canadian women. I explore the strains between these two traditions, and I contend that both traditions propose a radical rethinking of representational politics in which the category of what is "woman" in social and political practices no longer rests upon a naturalized understanding of the maternal body.

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## Combating the Race Gap in STEM Education for Students of Color

CRASH KETCHAM and Eric Cathcart

Access to STEM education is far from equitable. Research shows higher test scores on average in STEM related subjects for K-8 education in white students than students of color, specifically black and Latino students. There are multiple programs and initiatives to combat this inequality in STEM education, including out-of-school programs and inquiry based field trips. Through my internship with the Ocean Discovery Institute, I was able to implement these methods in communities of color and experience the challenges of teaching science to 3rd grade students.

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### ALISSON MAE MAGSUMBOL and Joseph Provost

Arsenic occurs naturally and is found in either oxidation states of arsenite (As(III)) or arsenate (As(V)), depending on the quantity of dissolved oxygen present in the soil. A few options available for the detection of arsenic include liquid chromatography coupled with fluorescence detection, as well as various field kits. Another option that is available are bacterial biosensors, which are whole cells that can be engineered with wild-type gene induced promoters to detect environmental contaminants. The vector can be further engineered to yield either a fluorescence or a color output, and have different sensitivities for the detection of the environmental contaminants. In this work, we attempted to create a biosensor that had an altered ribosome binding efficiency to output blue coloration in the presence of arsenic ranging 0.05-100 µg/L in potable water and soil. In addition, we examined two established biosensors using beta-galactosidase and green fluorescence protein as the reporters (kind gifts from Dr. Jan Roelof van der Meer). To investigate the utility of each construct, we transformed DH5-alpha and XL10-gold bacteria with each construct and incubated the culture in a variety of time incubations in several arsenic concentrations. Soil was collected and analyzed from areas surrounding Mission Bay, San Diego and Black Mountain, San Diego. Each reported to pose high levels of arsenic. Most sites were near detection limits; however, an increased presence of arsenic was determined for the Black Mountain site. This work shows the potential for biosensors and the ability for inexpensive field analysis of toxic compounds.

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### Smart Pool Monitor

PIERCE SALAMACK, ASHLEY DEWOLFE, JEFFREY KADIS, James Gilb, Kathleen Kramer

The current methods of testing and maintaining pool chemistry levels are inaccurate and ineffective. Pool owners are forced to manually obtain a sample of pool water and perform subjective chemical tests using tests strips or drive to their local pool supply retailer to get their water samples analyzed. Our product is being built with the consumer in mind, saving them time, money, and effort. The Smart Pool Monitoring System is a battery powered device that floats in a pool which will accurately and automatically measure both pH and chlorine levels. This device will contain enough power to last throughout the summer season (3 months) without requiring batteries to be changed. The data obtained will then be transferred to an open data platform that the user can monitor. Once water conditions come close to being out of the acceptable (predetermined) range, the open data platform will alert the user giving them recommendations of required chemicals to balance their water chemistry.

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### New Product Integration

CHRIS MAH and David Weichel

CPC Strategy is a digital marketing company that aids retailers in matching inventory with consumer intent. With the growing clientele at CPC Strategy, the number of clients per Retail Search Manager (RSM) has grown along with it. As the number of clients increases, RSMs become increasingly hampered with the process of adding new products for a specific client to a campaign and ad group in Google AdWords. The New Product Integration tool addresses this obstacle by examining the preexisting structure of campaign and ad group breakouts in Google AdWords and automatically assigning a new product based on similarities with existing products. The New Products Report (NPR) pulls all the products with a creation date within the past two weeks and sends alerts to the respective RSMs. The Product Group Addition (PGA) pulls the Product Partition Report from Google AdWords and the New Products Report from our proprietary FTP. The PGA runs a matching algorithm to select the best fit for each new product based on the respective hierarchy for each campaign for each client. The NPR and PGA use a combination of Python and Ruby scripts to accomplish these tasks.

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### An exploration of Chicano identity: the intersection between politics and culture

ANGELICA LEYVA and Kevin Guerrieri

I plan to combine ideas and approaches from the two general disciplines of my majors at USD: Political Science and Spanish. I will explore the Chicano identity: when the term was first used, what was the original connotation of the term, and what is its connotation now. At the same time I will explore how the acceptance of this identity played a huge role in the formation of the Chicano movement and the formation of united neighborhoods. In order to explore this theme, I will orient my project on various books written by authors who identify themselves as Chicana/o – or were classified as Chicana/o authors, interviews with Chicana@s who have had a role in activities centered on the Chicano activities (examples: Chicano movement, creation and preservation of Chicano Park, art at Chicano Park, Chicano themed shops, Chicano businesses), watch and analyze movies and songs that refer to the Chicano. I want to explore Chicano Park with a more critical and analytical view, to explore how the park and surrounding area has grown and receive national attention, and I also want to investigate other places they have the same or similar sense of place and identity.

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### Next-Generation Public Transportation Ticket Vending Machine for Cubic

EMILY MCCUE, IAN LITUCHY, ANA LOPEZ, MATT STOCKTON and Michael Hilton, Wes Ice, Katie Busch-Sorensen, Thomas Busch-Sorensen, James Gilb and Kathleen Kramer

Cubic Transportation Systems has requested the initial groundwork for a next-generation ticket vending machine in a project that will update the existing machines with internal wireless communications and renewable energy. A peer-to-peer network of several RF-enabled ZigBee components including a keypad, receipt printer, and coin acceptor has been configured. A printed circuit board will interface these components and be compatible with the existing Cubic machines. One goal of this project is to achieve enough data to eliminate the need for many of the current wires between major modules. Solar energy will be used to maximize the collection of energy from the ticket vending machine's environment. Harvested solar power will be stored in a battery then distributed using switch regulators. Together, these updates will create a powerful and innovative ticket vending machine.



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## Heads-Up Display: Creating a Transparent Speedometer on a Windshield

JOSHUA ALLEN, KELSEY GOELZ, PAINE HARRIS, James Gilb, and Kathleen Kramer

This heads-up display will place typical automobile dashboard information onto a transparent screen projecting onto a windshield. The device will sit on the dashboard in front of the driver and will connect to the car's computer and battery through the on-board diagnostics port. The car's computer provides the pertinent dashboard information while the battery will power the device. The information will be shown on a transparent display called a combiner that is attached to an LCD screen. The display of the device will be visible in variable weather conditions. Additionally, it will provide accurate real-time information on its display.

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## Bleached, Permed, and Relaxed: An examination of beauty standards in relation to the black female body

CHELSEA MCLIN and Carlton Floyd

In Jamaica and the United States, the beauty industry banks on the insecurities of black women to fit a model of white beauty through perms, relaxers, skin bleaching products, etc. There has been a rise in movements that promote acceptance of the traits black women are born with. To see these traits as beautiful, however, black women must take on the difficult task of resisting standards of beauty that do not reflect them. This research project focuses on the effects of these beauty standards on black women, specifically black girls, in Jamaica and the United States. Through close readings of literature, observations, and reader response, I seek to answer the following questions: 1) how do black women respond to societal expectations of beauty, and 2) how does society respond to black women?

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## Effects of High Environmental Ammonia and Acetazolamide Exposure Towards the Mechanism of Na<sup>+</sup> Uptake within Native Rio Negro Tetras

ASHLEY MITCHELL, VINEZA REDUTA and Richard Gonzalez

We examined ionoregulatory characteristics of four species of characiform fish [(Rosy tetras (*Hyphessobrycon rosaceus*), Serpae tetras (*Hyphessobrycon eques*), Emperor tetras (*Nematobrycon palmeri*) and Penguin tetras (*Thayeria obliqua*)] native to the Rio Negro, an extremely ion-poor, acidic tributary of the Amazon River, to gain insight into the mechanisms of ion regulation possessed by Rio Negro fish. When exposing the fish to 1 mmol L<sup>-1</sup> NH<sub>4</sub>Cl<sup>-</sup> (high external ammonia [HEA]), the Emperor tetras increased in JNa influx by 30%, suggesting an association between Na<sup>+</sup> uptake and ammonia excretion. Rosy and Serpae displayed no significance in sodium uptake. The lack of inhibition by HEA indicates that Na<sup>+</sup> uptake is not dependent on ammonia excretion through a Na<sup>+</sup>/NH<sub>4</sub><sup>+</sup> exchange complex. On the other hand, Na<sup>+</sup> intake in Penguin tetras decreased by 50% when exposed to the same HEA, suggesting an inhibitory response to HEA. As for acetazolamide, it is a carbonic anhydrase inhibitor used to assess whether Na<sup>+</sup> uptake is driven by the H<sup>+</sup> ions generated from the enzyme. When exposing the fish to this drug, the Serpae tetras showed a 50% decrease of Na<sup>+</sup> uptake, suggesting that Na<sup>+</sup> uptake relies on the supply of H<sup>+</sup> ions from carbonic anhydrase function. Penguins, Rosys, and Emperors showed no significant response to the inhibitory drug. Thus, the ionoregulatory mechanisms are similar to those of Rio Negro species, suggesting a loose correlation between sodium uptake and ammonia excretion and shedding further light onto the novel mechanism of these characiform fish species.

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Tuesday, April 18

Session II; 1:10-2 p.m.

UC Forums

## Effects of Hydrographic Conditions on Phytoplankton Communities in Mission Bay, San Diego

CRISTINA CLARK and Ron Kaufmann

Mission Bay, San Diego, is home to numerous species of phytoplankton. The abundance and diversity of phytoplankton in Mission Bay, a seasonally variable estuary, are known to vary with distance from the mouth of the bay, becoming more abundant and less diverse with increasing distance from the mouth. Dinoflagellates are dominant near the mouth (front bay), while diatoms prevail in the eastern portion of the bay (back bay). Hydrographic conditions (temperature, salinity, etc.) also can affect phytoplankton abundance and diversity. The critical ecological role of phytoplankton as primary producers emphasizes the importance of understanding the factors that influence their dynamics. This study examines how hydrographic conditions correlate with changes in phytoplankton abundance and diversity in Mission Bay over hourly time scales, and how these parameters and relationships vary throughout the bay. Chlorophyll and phytoplankton samples were collected every other hour over a 24 hour period at three locations, in the front, middle, and back bay. The results of this project should provide important insights into the relationship between hydrographic factors and phytoplankton abundance and composition in Mission Bay.

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Tuesday, April 18

Session II; 1:10-2 p.m.

UC Forums

## Ebisu: An Innovative User-Input Solution.

USEF GHOUTH, BRITTANY BARNES, and Eric Jiang

Ebisu is a Machine Learning Algorithm that aims to recognize and categorize wearable device data, such as accelerometer data, into gestures. These gestures open up a new avenue in user-machine interaction, allowing customers to have a form-fitting experience with their technology. Ebisu will detect and categorize multi-dimensional data into both pre-learned gestures and new ones, giving it the ability to learn user-specific commands and interaction. To pair along with the Ebisu software, we are also designing a physical wearable prototype that will transmit data to a host device for processing.

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Tuesday, April 18

Session II; 1:10-2 p.m.

UC Forums

## Front Sight Focus: The Rifle, And How It Changed The Battlefield

CHRISTOPHER REIMANN and Kathryn Statler

This paper will examine three historically and technologically distinct rifles (the smoothbore musket, the breach-loading rifle, and the bolt-action rifle) through the lens of three major “world wars” fought in by European powers (the Napoleonic Wars, the Second Anglo-Afghan War, and the Great War) and how the various specifications and capabilities of these weapons – their overall lethality and effectiveness on the battlefield, so to speak – influenced the evolution and philosophy of battlefield tactics. This area of history is not a mainstream field of historical study due to its level of specificity and its oftentimes graphic content. Additionally, this area of history – especially with regards to firearms – is becoming increasingly politicized, which could cause some historians to stay away from this area of history in an effort to avoid any controversy that these studies may cultivate. The increasingly politicized and controversial nature of guns does not necessarily make the topic “untouchable” in the academic sphere and this paper hopes to remind people of that; this is possibly another reason as to why this area of historical study is less populated than others. In addition to its goal of filling a historiographical void, this paper aims to demystify the world of firearms and their application by revealing that the history behind the finest weapons of ages past is rich, complex, and worthy of further investigation.

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Tuesday, April 18

Session II; 1:10-2 p.m.

UC Forums

## The Relationship Between Consumer Waste Disposal Efficiency and Average Household Income

DAVID RUDOKAS and Alyson Ma

As attention towards the environment and how to practice sustainable habits increases, it is important to determine efficient and effective policy in order to promote healthy environmental habits. The purpose of this research project is to study the correlation between demographic variables and the recycling rate in order to determine how to implement the most effective policies and legislation. I plan on focusing my study on the state of California and using data acquired at the county level in order to refine my study. The data will come from the California department of Recycling and the US Census Bureau, and I will use Stata in order to test correlations and run regressions on the data. The goal of this study is to prove that income has a negative correlation with the recycling rate, while also studying the effects of specific demographic variables such as age and educational attainment. I will also analyze the impact of recycling based programs such as curbside recycling and market based incentives.

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Tuesday, April 18

Session II; 1:10-2 p.m.

UC Forums

## Contributing Factors to First-Year Students' Initial Sense of Belonging at the University of San Diego

SARAH SHOTTS and Lisa Nunn

A significant amount of research emphasizes the importance of obtaining a sense of belonging for success in an academic setting, as it leads to increased academic self-efficacy, greater class participation, and overall better retention and persistence (Freeman, Anderman, & Jensen, 2007; O'Keeffe, 2013; Strayhorn, 2012). However, much less research focuses on concrete factors that contribute to this sense of belonging on university campuses. This research project adds to that, and evaluates how seven factors uniquely affect first-year students' initial sense of belonging at the University of San Diego: friendship groups, confidence in academic abilities, comfort in living environment, involvement in extracurricular activities, financial aid satisfaction, race, and first-generation status. The dependent variable is measured by a student's self-identified sense of belonging, as it was self-reported in response to the phrase "I feel like I belong at USD" on a five point Likert scale. The data analyzed in this project is from the "USD Transition Survey," a 34-item questionnaire administered by the Center for Student Success at the University of San Diego in September of Fall 2016 that was sent via email to first-year students during their third week at the university. The results of this project will not only offer deeper insight into factors that are related to a first-year student's initial sense of belonging at a small, liberal arts university, but also illuminate how effectively the University of San Diego has fostered the formation of that individual, initial sense of belonging among first-year students.

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Tuesday, April 18

Session II; 1:10-2 p.m.

UC Forums

## Blue Lives in the Line of Fire: Police Militarization & Safe Neighborhoods

WILLIAM VAZQUEZ and Michael Gonzalez

I will be examining the history of police militarization in the United States and how it has evolved over time and how it was played a role in our lives. A lot of my paper will be interviewing current and former police officers, specifically in Los Angeles and asking them how police militarization is necessary to keep neighborhoods safer and to keep them safe I will also examine how the term "police militarization" has a very negative connotation and I will try to offer some better words such as professionalization or preparedness.

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Tuesday, April 18th, 2017

Session I; 12:10-1:00PM

UC Forums

## Capillary Wave Dynamics in Fluid-Fluid Phase Separated Solutions

WILLIAM HELMER, Ryan McGorty

Both fluid-fluid phase separation and surface waves are commonly seen in nature; surface waves are exemplified by the ripples along the surface of a pond on a breezy day while an emulsion such as an oil-water mixture is a good example of fluid-fluid solution. Thermal fluctuations at the surface or interface of a fluid cause capillary waves. The dynamics of these thermal capillary waves are dominated by the effects of surface tension. By varying the volume fractions of colloid and polymer in our fluid-fluid phase separated suspension the interface surface tension can be varied. This allows examination of capillary characteristics such as capillary decay time. To examine the interface, we utilize Differential Dynamic Microscopy, a Fourier analysis correlation technique.

## Day Two, Session I, Interactive Exhibits



Thursday, April 20  
Session I; 12:10-1 p.m.  
La Gran Terraza Patio

### Instructions: Ignore the Narrative Voice

JONATHAN HALL and April Wilder

Drawing primarily from the work *Slaughterhouse 5* by Kurt Vonnegut, this piece is an explorative response, particularly in regards to death and trauma reconciliation. The project deals with a limited scope of the Meta potential of a written work. However, the audience proper is not to be addressed directly, with the text not wishing to go quite so far. "Instructions" will, nonetheless, be a piece that is, to all extents, highly aware of itself. As such, one of, if not the principal character included, Mr. Charles, is to be aware that he is in a story. Yet he considers himself to be a real person, thinking all other elements are faux and still remaining ignorant of the audience. This allows for a hybrid between third person limited and third person omniscient perspectives that is equally challenging and exhilarating to produce. As far as a rough narrative goes, Mr. Charles will be faced with a death, and the following arc will detail the negotiation between his standing belief that the dead individual is not real, and yet so visceral and tangible in the finality that this death presents. So through following Mr. Charles and his world, acknowledgement of a condition, no matter how dire or wondrous, is to liberate the individual, granting pure agency to act and alter upon the very forces, now only shades and husks, that once held one down in muck, mire, and sweat.



## Day Two, Session I, Poster Presentations

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Thursday, April 20  
Session I; 12:10-1 p.m.  
UC Forums

### Computationally Modeled Drug Resistance in *P. falciparum* Enzyme PfDHFR-TS

ADAM EAKIN and Joachim Latzer

Resistance has developed to almost all common antimalarial medications. Because of the lack of understanding of the specific mutations that occur to cause drug resistance, no drug has been developed to bond to both the wild type and likely future mutants of Malaria. A common target for antimalarial drugs is *P. falciparum* dihydrofolate reductase-thymidylate synthase (PfDHFR-TS) because of its role in catalyzing the thymidylate cycle, which is involved in dTMP production and DNA synthesis. Ideally, through better understanding the specific changes that stop drugs from being effective, drugs could be designed that would be able to maintain effectiveness despite these mutations in PfDHFR-TS or similar drug targets. In this work, AMBER molecular dynamics simulations are used to study a large variety of mutations as well as the specific changes in energy necessary for a drug to change from being effective to ineffective. The binding energy calculations were carried out for each individual mutant using the MMTSB toolset in AMBER 14. None of the mutants studied in this paper showed resistance to the WRA drug following a single amino acid mutation in the binding pocket, but many showed a decreased binding affinity for the drug when compared to the wild-type enzyme. Further mutations on these mutants could illuminate possible paths to drug resistance.

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Thursday, April 20  
Session I; 12:10-1 p.m.  
UC Forums

### The Affordable Care Act and its Impact on Health Insurance Coverage and Health Outcomes

AIDAN KENNEDY and Alyson Ma

Recently, President Donald Trump signed an executive order with the intention of repealing the Affordable Care Act. Before legislative action is taken, it is critical that the effects of the Affordable Care Act are considered and scrutinized in detail. Various aspects of the legislation may prove as valuable tools in promoting access and equity in our healthcare system. I intend to measure the Affordable Care Act's impact on insurance coverage and health outcomes using a difference-in-differences regression model.

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Thursday, April 20  
Session I; 12:10-1 p.m.  
UC Forums

### Does the Economy Drive Demand for Commercial Real Estate? An International Comparison

ALENA KAYE and Alyson Ma

The commercial real estate market has been the subject of a considerable amount of research. Due to a lack of information, many of these studies have limited time frames, causing a leveling bias and an underestimation of the volatile commercial real estate market. Moreover, none of these studies are recent and thus cannot accurately reflect the current state of the commercial real estate market. Using data from 15 countries over the past 10 years, this paper seeks to understand the impact that key macroeconomic indicators have on commercial real estate values and rents. By increasing the period of time studied and expanding the number of countries included in the research, this study aims to not only do away with the leveling effect that was prevalent in prior studies, but also take into account that the commercial real estate market is a global market.

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Thursday, April 20  
Session I; 12:10-1 p.m.  
UC Forums

### Palmitoylation of the Sodium Hydrogen Exchanger Isoform 1

EMILY PITTSCH, Alex Holland and Joseph Provost

The sodium hydrogen exchanger isoform 1 (NHE1) regulates intracellular pH and directs protein motility as an anchor for proteins at the leading edge of migrating cells. NHE1 has three putative palmitoylation cysteine targets in its cytoplasmic tail. Palmitoylation, a reversible, post-translational fatty acid modification of cysteine residues, alters cellular location and function of many proteins. 2-bromopalmitate (2BP) catalyzes palmitoylation and irreversibly inhibits the protein acyltransferases. Using a live-dead assay, we found that up to 50  $\mu$ M 2BP had a minimal (8.5  $\pm$  2.5 % SEM) effect on cell viability and was not significantly different than the control palmitate at all concentrations. A 25% reduction in NHE1 palmitoylation was observed after the addition of 15  $\mu$ M 2BP over 18 hours of incubation. Incubation of 15  $\mu$ M 2BP in lung fibroblasts expressing human NHE1 (PSN) abrogated cell proliferation in low serum (0.5% FBS) conditions and reduced proliferation four fold in the presence of 10% FBS. Interestingly cells incubated with 2BP show a diminished adhesive ability on glass, but no adhesion inhibition occurred on plastic in complete media. LPA-induced stress fiber formation was decreased in cells treated with 2BP compared to vehicle control. Finally, we show the impact of 2BP on intracellular pH indicating a role of palmitoylation on NHE1 function. Together this work shows a novel and yet undiscovered regulation of an important protein involved in intracellular pH homeostasis and directed cell motility.

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Thursday, April 20  
Session I; 12:10-1 p.m.  
UC Forums

### The Study of Metal Organic Frameworks and Polymer Interactions in Matrix Membranes

ALEXI ODEGARD and Lauren Benz

Membrane technology can be used for gas separation, distillation, and filtration, all of which have great potential in areas such as environmental protection, water shortages, and energy consumption. Mixed matrix membranes (MMMs) are popular in membrane research due to their ability to combine standard membrane features, while offering better solutions in terms of performance, pollution levels, permeability and longevity. Mixed matrix membranes composed of polyvinylidene fluoride (PVDF) and zeolite imidazolate framework 8 (ZIF-8) were explored in this study. The effects of various PVDF polymorphs on membrane properties were analyzed by characterizing the interactions occurring between PVDF and ZIF-8 in a MMM. Infrared Spectroscopy (IR spectroscopy) data, Differential Scanning Calorimetry (DSC) data, as well as scanning electron microscopy (SEM) images were collected to determine features of the physical interactions within the membrane. We probed the effects of particle size, PVDF crystallization structure, and ratios of PVDF to ZIF-8 on the interactions between polymer and MOF. The characterization of these interactions could allow for more complex mixed matrix membrane designs.

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Thursday, April 20

Session I; 12:10-1 p.m.

UC Forums

## A Consideration of Mexican Immigration Policy Reform: How U.S. and Mexican Macroeconomic and Microeconomic Conditions Influence and Shape Migration Behavior

ALIX NAUGLER and Stephen Conroy

The nationalistic rhetoric adopted by the newly-elected presidents' administration along with the public's climaxing anti-immigrant hysteria has forced Mexican immigration intervention to the top of the U.S. agenda. Misconceptions regarding the role Mexican people play in stealing jobs, threatening cultural, political, and ethnic traditions, and straining public welfare, educational, and healthcare resources have promoted a division and spurred a fear among the American people. This politically-fabricated "schizophrenia" has ceased the political and economic collaboration between the two nations and unilaterally militarized the U.S.-Mexico border. In this evaluation of the U.S. government's immigration policies and the resulting migratory flows across the U.S-Mexico border, it is evident that new policy measures need to be implemented to reflect these nuanced trends which stand contrary to conventional wisdom. This research examines how various macro- and micro-level indicators have shaped and influenced Mexican migration behavior in the long- and short-term and how these conditions should be reflected in future Mexican immigration policy initiatives.

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Thursday, April 20

Session I; 12:10-1 p.m.

UC Forums

## I Am That I Am

BRIAN LYNCH and Joel Gruber

Demonstrating the eternity of God as omnipotent and omnipresent is a daunting task that has been undertaken by many Philosophers and thus far achieved by none. The difficulty in performing this task stems from the sheer scale and inconceivability of God as Infinite Being. And yet, we still describe this alleged God with words and personage that attempt to describe its qualities objectively. As a human being, one is limited in perception of the Infinite by the finite boundaries of our lifespan. Rudolf Otto discusses the "inexpressible" or "ineffable" quality of the Holy and he relates that it "completely eludes apprehension in terms of concepts" (1963). In this project, I discuss the possibility of more inclusive methodology that would describe the finite dimensions of God with respect to one's own experience and would provide a more expansive and intuitive moral insight. Theological and philosophical debates over the existence of God have had a seemingly endless and inconclusive character, and authors disagree upon the premises of each others' concepts. Ongoing debates over God's existence or qualities arise from the futility of attempting to express the nature of a Being whose alleged infinity precludes objective description. Could subjective definitions of God's Being in fact elude the same problems commonly invited when objectively debating the existence of God?

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Thursday, April 20

Session I; 12:10-1 p.m.

UC Forums

## Filter Bubbles and Political Activism: A Content Anslsysis of Facebook during the 2016 Election

MONICA GRUENINGER, Kendall Cichanowicz, Patrick Downing, Lilyana Espinoza, Julie Lai, Jared Miller-Sclar, Dominique

Rougheau, Alexandria Young, Kira Housman, Taylor Morway and Mary Brinson

62% of people admit to using Facebook for news. This can be problematic for political knowledge and democracy. In the recent presidential election, people tended to selectively expose themselves to media and online conversations that aligned with their existing beliefs. In addition to this, Facebook algorithms showed people stories and posts that fit their beliefs and likes. This filter bubble phenomenon possibly impacted the election. This study employs a content analysis of social media to help us better understand this problem.

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Thursday, April 20

Session I; 12:10-1 p.m.

UC Forums

## Binding Determinants between Sodium Hydrogen Exchanger 1 and Calcineurin Homologous Protein isoforms 1 and 2

CHELSEA MARSHALL 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 determinates on NHE1 for each CHP isoforms, we will mutatae 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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Thursday, April 20

Session I; 12:10-1 p.m.

UC Forums

## Womanhood and Ungendering in Octavia Butler's Wild Seed

CHRISTINA RONTELL and Marcelle Maese-Cohen

This thesis is committed to award-winning science fiction author Octavia Butler's novel Wild Seed, the first in a series of novels about the rise of a race of psychic humans and their battle with a microbial alien invasion. Published in 1980, Wild Seed details the origin story of this psychic race, how they were brought together and bred by a being who consumes minds and possesses bodies, and how one woman, having an ability that "shapeshifting" only begins to describe, defies his vision and control. My work focuses on this woman, named Anyanwu. My writing explores gender, race, identity, and the relationship between these and Anyanwu's psychic ability, body, and behavior. Specifically, my work is guided by Hortense J. Spillers' idea of "ungendering." My purpose is to answer the question, "What is ungendering?" and understand Anyanwu as a model of womanhood.

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Thursday, April 20

Session I; 12:10-1 p.m.

UC Forums

## CATMAN: CubeSat Approach to Mobile Ad Hoc Networking

MICHAEL DOYLE, Chris Hodge, Kanan Choquette, Quinn Pratt, Setareh Lotfi and Kathleen Kramer and James Gilb

This project focuses on presenting and verifying the construction and operation of a mobile ad hoc networking module relevant to the CubeSat community. This module will initialize and maintain a deformable network of CubeSats by acquiring and distributing data amongst the mesh participants. This maintenance will rely on radiofrequency communication in the 2.4 GHz range to share salient information. The data being distributed amongst nodes includes battery life, GPS, accelerometer, magnetometer and gyroscope readings, as well as number of nodes and overall topology. This type of mobile electronic-sensing network could be used for various aerospace applications such as the formation of a synthetic aperture or extend the range of existing space-network systems. It will also adhere to the published CubeSat form factor of a 1U CubeSat and will be outfitted with realistic power and mechanical peripherals. Thus far there is a methodology to programmatically acquire data from each of the aforementioned sensors. Additionally, there is a physical model of the CubeSat; the team is in the stage of system integration. Ultimately this module will be a proof-of-concept device that exhibits a mesh network through four CubeSats on the scale of one-mile radius per node.

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Thursday, April 20

Session I; 12:10-1 p.m.

UC Forums

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

CIERA VILLEGAS 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 in 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 the size and concentration of the particles, the probability that they will stick together, the species composition and physiological state of phytoplankton, and the 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 over 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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Thursday, April 20

Session I; 12:10-1 p.m.

UC Forums

## Preferential Treatment: a Study on U.S. Policy Towards Refugees

DANTE ENRIQUEZ and James Williams

President Donald Trump has made it clear that the current administration will drastically reduce the number of refugees admitted into the United States. Further comments by President Trump have implied that the United States will give preferential status to Christian refugees who are minorities in their state, leading many people opposing President Trump to claim that he is preferring the Christian religion over others and thus violating the First Amendment of the U.S. Constitution. The current political climate has led me to ask if there has been or currently is a significant difference in U.S. policy towards certain groups of refugees, focusing on Somali, Sudanese, and Syrian refugees. My research consists of examining U.S. policy towards refugee resettlement from 1975 to the present, including laws, executive orders, and official statements made by policy-makers in the United States. I also examine scholarly work to determine if the academic community has seen a significant difference in the acceptance of different refugee communities. Finally, I interviewed thirty individuals in the San Diego refugee community to better understand their individual experiences and determine if there is at least a perceived difference in how U.S. policies affected the specific groups. There is a perceived difference in U.S. policy towards certain groups of refugees, primarily due to the rhetoric of the President, that then effects the number of refugees allowed in. I have found that the rhetoric is influenced by the lobbying of interest groups, some of which lobby from the background of a specific religion.



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Thursday, April 20

Session I; 12:10-1 p.m.

UC Forums

## U.S. Foreign Policy: The Asian Pivot and Policy Towards the South China Sea

DAVID SHANNON and Vidya Nadkarni

My topic is to examine the current United States policy towards China, specifically in the South China Sea, and what course of action the United States should take in the future. Although the South China Sea might seem relatively insignificant to the overall foreign policy of the United States, it is an important testing ground for how much the Chinese are willing to push and how much the United States is willing to push back. One of Obama's core goals was to invoke a pivot away from European and Middle Eastern focus and place the focus on the Pacific, and the nations that reside in and around this area, termed the "Asian Pivot." With the fall of the Soviet Union many historians, political scientists, and those that study international relations have been struggling to define the new world order without the bipolar power view that came during the Cold War. With the rise of China, the South China Sea will be the next turning point in the global power structure. How the United States approaches this topic will set a clear and potentially dangerous precedent for how American and Chinese relations, specifically the balance of power, will unfold in the twenty-first century.

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Thursday, April 20

Session I; 12:10-1 p.m.

UC Forums

## Is Being Wicked the Same as Having Wickedness? A Dialogue on Human Nature between Wicked, Frankenstein, and Rousseau's Second Discourse

EMILY BEZOLD and Ivan Ortiz

This thesis revolves around the characters of Elphaba, from the musical Wicked, and the Monster, from Mary Shelley's Frankenstein. In the comparison of these two verdant characters I seek to analyze their psychological development, starting from their conceptions, to their final moments in their respective stories. I will focus on the parallels between their relations with their fathers, other social connects they may or may not make, and their interaction within the wider social-political world of their stories. In this I seek to explain how Elphaba and the Monster come to represent two different types of man, according to Jean Jacque Rousseau's Second Discourse, or A Discourse on the Inequality Among Men. Further, I seek to analyze the different types of man they come to represent as a larger criticism on the societies and times of the periods in which both stories were first published. Some of the anxieties and issues these characters represent within their time periods include: women's rights, the marginalized and outcasted in society, racism and colonization, and problems with technology and progress.

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Thursday, April 20

Session I; 12:10-1 p.m.

UC Forums

## "But then we'll be, as Masons free, to think, and speak, and reason": Women and American Freemasonry, 1778-1850

EMMA DOOLITTLE and Evelyn Kirkley

Freemasonry is one of the longest enduring secret societies in existence, promoting the values of brotherhood, philanthropy, and filial piety. Separate from the home as a space for the domestic refinement of virtue, early American Masonic lodges in the late eighteenth and mid-nineteenth centuries functioned as social and intellectual bodies, offering companionship and the propagation of knowledge for men. Though many scholars acknowledge that the exclusion of women played an important role in the expansion and evolution of the fraternity in the United States, neither the rationales justifying female exclusion nor the implications of such arguments on Freemasonry's organizational development have been explored in depth. Examining guidebooks and periodicals written by Freemasons as well as published works by prominent American women advocating for their right to learn and discussing Enlightenment ideals through membership in Masonic lodges, this study

highlights the intersection of this debate with larger questions surrounding the appropriate roles for women and men in a rapidly industrializing world. Analysis of this data illuminates the failures of "separate spheres," a theory that argues social interactions during this time period were rigidly separated into the male public space and female private arena of the home, as a conceptual tool.

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Thursday, April 20

Session I; 12:10-1 p.m.

UC Forums

## Athletes Taking the Lead on Conversations of Racial Inequality

FIONA J. MURPHY and David Sullivan

This paper explores how athletes use their high-profile status as subjects of media coverage to affect the national conversation about racial inequality in America. While sports is often viewed as a social realm in which politics has no place, the unique relationship sports icons have with sports fans may make star athletes especially potent figures among those who challenge the dominant social order. This paper uses media coverage of the University of Missouri football team's "strike" and quarterback Colin Kaepernick's protest during the national anthem before NFL games as case studies with dirt theory as a theoretical framework to examine how the sports hero and anti-hero are ideological constructs.

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Thursday, April 20

Session I; 12:10-1 p.m.

UC Forums

## Suppressor of IKK epsilon (SIKE) links the cytoskeleton to innate immune signaling pathways

HALIE SONNENSCHN, FRANK SLYKAS, 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, the TANK binding kinase 1 (TBK1) serves as a catalytic hub to initiate host defenses. The 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 did not confirm the SIKE:actin interaction. The SIKE:tubulin and SIKE:alpha-actinin interaction were detected by RcIPs. The SIKE:tubulin interaction appeared enhanced upon stimulation with dsRNA, a mimic of viral infection. This enhancement was not observed in the SIKE:alpha-actinin interaction. Whether the SIKE:tubulin and SIKE:alpha-actinin interaction were direct or indirect could not be determined by RcIPs. In vitro immunoprecipitation assays mapped direct interactions between SIKE:tubulin and SIKE:alpha-actinin. Assays employed purified cytoskeletal proteins and full-length (residues 1-207) of a 6x-His-tagged SIKE construct. The SIKE:tubulin In vitro immunoprecipitations utilized monomeric tubulin. A SIKE:lysozyme In vitro immunoprecipitation was used to control for non-specific binding to SIKE. 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.

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UC Forums

## Computational Analysis of CHP-NHE Protein-Protein Interaction

Isaac Bell, Joachim Latzer and Joseph Provost

The Sodium Hydrogen Exchanger (NHE1) is an ATP independent membrane transporter that exchanges an intracellular proton for an extracellular sodium ion. NHE1 plays a critical role interacting with proteins on the leading edge of migrating proteins controlling directed cell motility. Regulation of NHE1 is complex. Two NHE1 binding proteins whose roles are not fully clear are the calcineurin homologous protein isoforms 1 and 2 (CHP1 and CHP2). Because CHP2 is primarily expressed in gut and transformed tumor cells, the interaction between CHP and NHE is a potential anticancer target. In order to quantify the interaction between the CHP1-NHE and the CHP2-NHE Circular Dichroism (CD) wavelength scan of each protein was determined to identify the helical nature of the protein; CHP1 with 51.60% helical structure, CHP2 with a 49.74% helical structure, and NHE1 with a 40.91% helical structure in the CBD. We determine the Van 't Hoff enthalpy and entropy of unfolding to estimate the binding constant of protein interaction for CHP1-NHE1 and CHP2-NHE1. From the experimental data collected, the theoretical temperature at which each construct denatures; for both the CHP2-NHE construct and CHP1-NHE construct were inputed into a Large-scale Atomic/Molecular Massively Parallel Simulator (LAMMPS). Results from the LAMMPS. In order to generate specific interactions in the binding and unbinding in each of the two CHP isoforms and NHE. This work will help predict the binding mechanism of CHP-NHE1 interaction to identify potential therapeutic targets blocking CHP2 but not CHP1 from NHE1.

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UC Forums

## The Synthesis of Novel Metal Complexes Formed from Dipyrromethene Ligands

NICK DICHRISTOFANO, JESSICA POLAK and Mitchell Malachowski

Organic moieties called dipyrromethenes have become increasingly popular as donors to metal ions. We have synthesized a series of new organic molecules where we have combined the dipyrromethene portion to various organic moieties such as naphthalenes and biphenyls. Through the electron sharing between these organic molecules and metal centers, the organic molecules have been complexed to metal ions such as cobalt and copper. These complexes will be characterized by a combination of elemental analysis, UV-vis spectroscopy, and X-ray crystallography. The ability of the complexes to form more complicated supramolecular arrays will be determined with possible applications of metal frameworks being used in hydrogen storage in fuel cells. Additional complexes will be synthesized and analyzed based on these results.

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UC Forums

## More Than Just Money: : A Comprehensive Excavation and Examination of Roman Empire Era Coins [27 B.C.E. - 476 C.E.]

JOHN WARREN and Ryan Abrecht

This research involves Roman era coins, used mainly for political propaganda from 27 B.C.E. to 476 C.E. The goal is to show that although coins may appear as insignificant, small-denomination economic means, they have traditionally served a variety of purposes since antiquity. Twenty coins will be analyzed and discussed throughout this research and backed with secondary sources from experts in the field. The central question is: why was it important for Emperors to convey political messages on these coins? Was it because coins were items used everyday by the common citizen? Or because of the sheer quantities and vast circulation radius throughout the Roman Empire? Because coins were a major political, social, and economic aspect of everyday life in the Roman Empire, there were clearly political propaganda ambitions of the reigning administrative entity, which can be observed through images, Latin expressions, and inscriptions found on coins of antiquity.

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UC Forums

## The Effects of Uniform Color on Sports Performance in the NCAA National Basketball Tournament

JULIANA LUCENA, Nergis Akkaya, and Nadav Goldschmied

Uniform color may enhance sports performance and the probability of winning (Hill & Barton, 2005). The current investigation aimed to study the effect of uniform color on basketball game outcome. Scores from 220 NCAA National Basketball Tournament games (2012-2016 seasons) played all in neutral locations were analyzed using a series of chi-square tests. The higher-ranked teams always wore white uniforms while the lower ranked teams wore either red, blue, or black uniforms. The results showed that non-white uniform color had no significant effect on underdog teams winning games. Additionally, neither a big nor small difference in ranking between the teams produced a significant effect on game outcome.

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UC Forums

## The Effects of Density Gradients on Zooplankton Swimming Behavior

KATHRYN GHIORSO and Jennifer Prairie

Zooplankton play an important role in marine ecosystems as the primary grazers of phytoplankton, resulting in the transport of carbon to higher trophic levels. Copepods, the most common type of multicellular zooplankton in the ocean, feed on phytoplankton at the surface and produce waste at depth. This daily vertical movement through the water column often requires them to move through density gradients, or pycnoclines. To understand the functional role of zooplankton, it is critical to study their swimming behavior, which may be directly affected by many environmental factors including pycnoclines. This experiment seeks to assess and quantify the effects of these density gradients on copepod vertical movement and swimming behavior. Copepods were collected in situ and starved for 24 hours before being used for foraging experiments. Copepods were placed in a tank either with or without a density gradient. Two cameras were positioned perpendicularly to the tank to allow for 3D observation of copepod swimming tracks. Image analysis using Matlab quantified the swimming velocity, turning rate, and vertical distribution of the copepods for each different treatment. Here, we will present preliminary results demonstrating how copepod swimming behavior characteristics and distributions are affected by the presence or absence of a density gradient. Through gaining a comprehensive understanding of copepod vertical movement and swimming behavior in varying pycnoclines, we hope to better understand zooplankton's role as primary grazers and carbon transporters within the marine ecosystem.

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UC Forums

## Regulatory and Human Health Analysis of the Libby Amphiboles, Libby, Montana

KAYLEE LOOPER and Eric Cathcart

Vermiculite is a commonly used in construction, gardening, and packaging mineral that often contains Asbestiform minerals and structures. However, Vermiculite is not a regulated Asbestiform mineral. This study examines the properties, forms, and health effects of asbestiforming minerals found in the Libby, Montana Vermiculite deposits. Additionally, this study identifies the different regulations of asbestos and their importance for maintaining public health. Multiple studies regarding the health effects of the Libby, Montana deposits have been conducted and although these minerals are shown to result in asbestos-related diseases (e.g. asbestosis and mesothelioma), there are no policies in place to regulate the use of such minerals. The town of Libby, Montana has faced significant health impacts due to the mining of vermiculite. This study attempts to analyze how regulatory requirements are used to mitigate and monitor the use and effects of asbestos, in order to understand how this knowledge could be implemented for other hazardous materials.

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UC Forums

## San Diego Office of the Public Defender: The Investigative Internship Program

KARSEN MELGARD, KENDALL WEAVER and Nadav Goldschmied

The San Diego Office of the Public Defender offers undergraduate students a chance to learn about and gain insight on the law through their Investigative Internship Program. The program is designed to place students at various offices throughout San Diego depending on the areas of defense law that the students are most interested in, such as low-profile misdemeanor crimes or higher profile felonies. The Office of the Alternate Public Defender and the Multiple Conflicts Office typically handle high-profile cases, which provide their interns with a unique, exciting, and invaluable experience working with attorneys, investigators, and clients. Interns within the program are responsible for the gathering and consolidating of information related to open cases, aiding attorneys in obtaining court records, attending hearings, assisting investigators in interviewing witnesses, providing feedback and insight during round table meetings, answering phone calls from clients, inmates, witnesses, and attorneys, collecting important and relevant documents, and developing legal memos. Through participating in these tasks, interns gain first-hand experience from their contributions to open cases from a file in the office to a hearing in the courthouse and enhance their understanding of the criminal justice system as a whole.

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UC Forums

## Morphological, Geographic, and Ecological Correlates of Population Structure in the Western Milkvetch Seed Beetle

KINANA MCDANIEL and Geoffrey Morse

The total species diversity of insects has been estimated at over one quarter of the entire global macroscopic species diversity. Phytophagous (plant-feeding) insects have been used to study determinants of the evolutionary and ecological history of population differentiation leading to speciation in an ongoing effort to understand the drivers of biodiversification. Speciation is often attributed to association with a host plant in phytophagous insects, driving divergence when defensive barriers of physical or biochemical toxicity develop in a host plant to discourage insects, followed by the development of resistance in the insect and subsequent accumulation of genetic differences between populations. Alternatively, a widespread species may experience isolation effects through decreased contact over distance or through separation of populations by physical barriers in the landscape. The decreased ability of different populations to interbreed allows genetic differences to accumulate over time so that two populations can evolve into different species. A study of the Western Milkvetch Seed Beetle takes into consideration both of these mechanisms by reconstructing the phylogeny and population genetics of this species, found in association with numerous host plants and distributed across a wide range of known geographic boundaries of the Intermountain West. Mitochondrial DNA sequence data suggests a surprising amount of genetic diversity within this species, strongly supporting a case for cryptic speciation, supporting a magnifying role between host plant association and geography.

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UC Forums

## Is Basal Metabolic Rate in Eared Grebes Due to the Metabolic Intensity of Critical Tissues?

LEIGH SEWALL, STEPHANIE LOW, JONINA CAPINO, and Hugh Ellis

The Eared Grebe (*Podiceps nigricollis*), is a diving waterfowl found throughout Western North America (Cullen et al., 1999). Eared Grebes spend roughly 9-10 months of the year flightless during long sedentary periods, which are punctuated by long-distance migrations. 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 changes (Ellis and Jehl, 2003 and unpublished). We suspect that it is the metabolic intensity of these important organs, rather than their 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 therefore it is important in aerobic metabolism and an indicator of a tissue's maximal oxidative capacity (Vezina and Williams, 2005). PK, which catalyzes the final reaction step in the glycolytic pathway to yield pyruvate, a molecule that can function in aerobic and anaerobic respiration, can be used as an indicator of glycolytic activity within the cellular tissues (Bishop et al., 1995; Berg et al., 2002). We measured enzyme activity spectrophotometrically and quantitatively analyzed the results. CS and PK both appear to be upregulated in pectoral tissues, while CS is upregulated in the heart and PK is upregulated in the gastrocnemius prior to departure for migration. Further research will continue to focus on the trends presented by CS and PK, as well as examining the trends in activity observed in other critical metabolic enzymes.

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UC Forums

## Neighbors in the Midst of Abduction: An Assessment of United States- Mexico Diplomatic Relations

LUCERO CHAVEZ and Emily Edmonds-Poli

Extradition treaties are an effective tool used by foreign governments to ensure that the transfer and prosecution of private citizens are lawful whilst keeping the integrity of national sovereignty intact. Given the ever-changing contexts in which extradition is enforced, amending these treaties is an ongoing process between the United States and other nations in order to foster greater international cooperation and the effective accomplishment of domestic and foreign policy goals against crime. Nevertheless, despite the existing extradition treaties, the United States has committed violations that have rendered its position in those treaties questionable. Perhaps the most explicit demonstrations of the United States' non-compliance in treaties are trans-border abductions, which fall beyond the existing discourse on extradition treaties. "Abduction" in the general sense refers to irregular means of capturing fugitives, such as simply entering a foreign country and essentially kidnapping individuals. I am looking primarily at the role of the United States in its violations of extradition treaties with Mexico, which seems incongruent with the extensive cooperation between the two countries. I will investigate these changes by looking into how diplomatic relations between the United States and Mexico have or have not changed as a result of extradition violations. Ultimately, I also hope to apply my findings at an international level and assess what these violations mean for other violations of the U.S.



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UC Forums

## The Effect of Integration: A Study of Diversity on Economic Indicators

LUKE SCHLEIER and Alan Gin

This paper examines the effect of diversity, measured by the dissimilarity index, on different economic indicators including median income and median home prices. This work aims to show that there is a positive economic impact on the economy due to integrating and creating more diverse communities. Previous work shows that there is a positive impact of diversity on economic indicators such as wages, rent, and production but previous studies do not look at the effect on income, house prices, and unemployment. This study looks at cities across the United States in 2010 using census data and measures the effect of diversity on economic indicators using different forms of ordinary least squares regressions. The paper finds different economic indicators are affected by changes in the level of diversity in the area.

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UC Forums

## Arming America ? The Solution or the Problem?

MASON MANMANO and Alyson Ma

The purpose of this research is to determine the effectiveness of gun control policy on reducing violent crime. In order to measure this, the model will be accounting for pertinent socioeconomic factors coupled with an index created by the Open Society Institute's Center on Crime, Communities and Culture that essentially measures how strict or lenient gun control laws are in a particular state. There have been many studies in the past that have attempted to explain this same question, but there were severe issues with their model that delegitimized the interpretation of their empirical findings. This is where the gap in the current research lies and why the findings of this model have the potential to create major implications in the future of gun control legislation. By identifying the strengths and shortcomings of the lawmaking process' ability to create legislation that effectively prevents violent crime, one can urge their democratically-elected representatives to take these results into account.

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UC Forums

## The Academic Progress Rating: An Analysis of Academic Resource Spending on Student Athletes

MATTHEW JACOBS and Alyson Ma

This paper will discover the effects of athletic department spending, as well as other factors, on the academic performance of student athletes. It will test these independent variables on a new way to track academic performance of student athletes, the Academic Progress Rating (APR), which was introduced in 2003. The results are expected to show an increase of APR in relation to spending and other institutional level factors. This study will illuminate whether the NCAA's new way to track student athletes is more accurate than past policies as well as how specific institutional influences assist or retract from student athlete success in Division I Athletics.

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UC Forums

## In the Spirit of the Games?: Olympic Values and Their Effect on the Host-Nation Selection Process

MEGAN GOODMAN and Emily Edmonds Poli

This research looks at the role of political values in the host nation selection process of the Olympic Games at all summer and winter bids from 2008 to 2022. The International Olympic Committee claims to act as the Supreme Authority of the Olympic Movement to bring forth cooperation, communication, and collaboration between all parties of the Olympic family. In successful host nation bids, however, the values outlined in the Olympic Charter do not always complement the values supported by the host nation. What guides the International Olympic Committee to its decisions is a space in the literature of sports politics that should be filled, especially in terms of political ideologies of the represented nations and organizations. Through process tracing, the relationship of the words used and the consistency and support of said Olympic values will be examined in conjunction with the political ideologies of a host nation at the time of selection. Data will include all nations involved in the candidature process from 2008 to 2022, official candidature documents from the International Olympic Committee showing reasoning and rationale for selection, and any hidden agendas of political ideology under the rhetoric of the International Olympic Committee documents, as well as other qualitative information. This thesis hopes to provide evidence for whether the Olympics are capable of and have achieved the lofty aims of of the Olympic Movement through the decisions and actions of the International Olympic Committee.

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## Light-Dependent Endolysosomal Defects in a Photoreceptor Model of Alzheimer's Disease

MICHELLE SYDNEY SMITH and Adam Haberman

Alzheimer's Disease (AD) is a neurodegenerative disease that causes progressive neuronal dysfunction and death. AD pathology has been linked to the accumulation of amyloid and tau proteins. We have expressed amyloid-beta-42 in photoreceptors to analyze cellular defects caused by amyloid accumulation. We find that exposure to light increases neurodegeneration in amyloid-expressing photoreceptors. Light exposure normally induces endocytosis and lysosomal degradation of rhodopsin, but rhodopsin accumulates in intracellular puncta in amyloid-expressing photoreceptors exposed to light. We propose that photoreceptors are especially sensitive to endolysosomal defects when exposed to light due to bulk endocytosis of rhodopsin. This characteristic of photoreceptors is relevant to understanding the more than 100 research articles that have used photoreceptors to study models of neurodegenerative disease. To test this theory, we blocked the formation of rhodopsin by raising flies without Vitamin A, which dramatically rescued photoreceptor degeneration. We are currently preparing to block the formation of action potentials in amyloid-expressing photoreceptors by co-expressing an inward-rectifying potassium channel; this will differentiate between degeneration caused by rhodopsin endocytosis and that caused by neuronal activity. We are also characterizing the endolysosomal defect in amyloid-expressing photoreceptors to better understand the mechanism that leads to protein accumulation. To identify the organelles containing rhodopsin accumulations, we are performing colocalization studies using antibodies for endosomes, lysosomes, and autophagosomes.

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UC Forums

## Effects of Renewable Energy on Economic Growth

MORGAN WHITE and Alyson Ma

My research explores how renewable energy affects economic growth in countries with varying levels of income. I hope to demonstrate that countries that have grown economically help to influence developing countries to implement these important projects. By proving this, countries can improve their carbon emissions, reduce reliance on foreign exports of energy, and drive growth economically.

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UC Forums

## Interaction of Multiple Memory Systems in the Rat

NICOLE REITZ, JON VINCZE, SAMANTHA CALAC, and Jena Hales

Multiple memory systems work in the brain to successfully form declarative and non-declarative long-term memories. Although the hippocampus is critical for declarative memory formation, hippocampal-lesioned rats are often still able to learn and reach control levels of performance over time on typically hippocampal-dependent tasks, including the Morris watermaze (Morris & Frey, 1997; Hales et al., 2014). In order to examine how hippocampal-lesioned rats can still learn spatial memory tasks, we developed a paradigm using the continuous alternating T-maze task. We hypothesize that hippocampal-lesioned rats are gradually learning spatial memory tests using the striatum, the structure engaged in procedural learning. We designed our study to probe two possibilities: 1) the striatum is compensating for the loss of the hippocampus or 2) the striatum is always involved in learning at a steady rate, but is masked by the more efficient hippocampal-learning system. We will examine these possibilities by analyzing c-Fos expression in the hippocampus, striatum, and anterior cingulate cortex to pinpoint which structures the rats are using to complete this task. Additionally, we will analyze c-Fos expression using both manual and automated techniques. First, we will count the c-Fos expressing cells manually in order to gain a base count. Second, we will implement an automated method using ImageJ, a public-domain image processing program developed by the NIH. By comparing the manual cell count to our automated method, we can start to remove the low reproducibility of manually counting cells and establish objective standardization in order to expand the capacity of these quantifications.

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## “Mom and dad don’t get it.”- Investigating the Meme-Based, Visual Vernacular of 21st Century Adolescents

OLIVIA GONZALEZ and Susannah Stern

Memes exemplify a complex and powerful emerging media genre that has pervaded online spaces. While memes have begun to receive attention from scholars, little consideration has been paid to the motivations behind Internet users’ participation in the genre. And virtually no attention has focused on youth meme participants. Moreover, given the often-humorous nature of memes, they are commonly disregarded as meaningless sources of entertainment. Therefore, my study seeks to uncover the motivations behind teenagers’ participation in a genre that is often discounted as “mundane” (Shifman & Kampf, 2015). Specifically, it aims to understand why teenagers create, share, and seek out memes in their everyday lives. My analysis is founded upon ongoing research conducted through qualitative interviews with teenagers residing in Southern California. My research thus far leads me to believe that memes are not only a valuable genre of teen media production but also reflect the evolution of modern communication practices. I have found that memes serve as a tool through which adolescents have developed a highly unique and novel form of digitally-mediated communication. Furthermore, teenagers utilize the process of sharing memes as a new means of communication within their interpersonal relationships. With interpersonal relationships

playing “numerous important functions” in adolescent development (Schwartz, 2014), meme sharing serves as a quintessential 21st-century way for friendships to blossom at a time when they matter more developmentally.

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## Synthesis of Starch-Functionalized Dibromomaleimide for Peptide Delivery

PRAVEEN WICKREMASINGHE and Joan Schellinger, Peter M. Iovine

The pragmatic application of peptide therapeutics is a novel field, delegating advantageous characteristics such as high specificity, low toxicity, and relatively high biocompatibility. While peptide-based therapeutics allocate a highly beneficial mode of drug delivery, several debilitations exist, such as the enzymatic degradation of these prospective peptide-based drugs. Studies have shown that covalent attachment of a saccharide will essentially allot an increased circulation half-life, solubility of the peptides, and biocompatibility. Our group has synthesized a neoteric hybrid of biomaterials, which constituted of a starch, a peptide, and a heterofunctionalized small molecule linker containing both dibromomaleimide and azide moieties. Each respective portion of our target molecule will be prepared separately and will be conjugated through both thiol exchange and a click reaction. In previous studies, conjugation of the starch to a tri-peptide as the initial step in the synthesis caused challenges in NMR characterization analysis; the relatively prodigious size of the starch moiety, compared to the tri-peptide, caused the saturation of NMR signals. Because of the aforementioned problem, the successful synthesis of the linker molecule and its respective thiol exchange activity, as well as the starch-linker conjugates, was emulated via fluorine tagging and <sup>19</sup>F NMR analysis. Our prospective work includes the conjugation of a peptide to our starch-linker complex. We hope that final molecule will find utility in the development of peptides as drugs and other drug delivery systems.

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## NMR Structural Study of a DNA Duplex Containing Two Unnatural Base Pairs

WESTON PREISING, ROISIN O’BRIEN, and Tammy Dwyer

DNA is the genetic blueprint responsible for the traits of living organisms. The “genetic alphabet” consists of four molecules called nucleobases, represented by the letters A, T, G, and C strung together in a “strand.” A DNA duplex consists of two “strands” held together such that A is across from T and G across from C, referred to A-T and G-C “base pairs.” Recently, the genetic alphabet or code has been expanded by synthetic biologists in an effort to unveil new insights to the machinery of DNA replication and potentially develop new medicines to cure diseases like HIV. The new unnatural base pair 5SICS-NaM is the first to be stably replicated by a semi-synthetic E. Coli. organism. This project investigates a novel DNA duplex containing two 5SICS-NaM pairs arranged side-by-side and represents the first example of a stable duplex containing more than one unnatural pair, using a technique called NMR spectroscopy. Thus far, NMR chemical shift assignments for this duplex have been largely completed which provide some information as to the structural configuration of the base pairs. Preliminary results indicate that one of the two adjacent 5SICS-NaM pairs is situated within the duplex, whereas the other may have the 5SICS base sterically pushed out of the duplex with its paired 5NaM base stacked quite normally. Further analysis of the data should allow us to propose a more precise structure of the DNA duplex as well as provide insight into the versatility of DNA replication machinery to recognize altered DNA structures.

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UC Forums

## The Effect of Rapid Technological Growth on Income Inequality and Economic Growth

RYAN SALZ and Alyson Ma

Throughout the world, countries differ greatly on their level of income distribution. According to the research on the differences in income inequality, there is a general consensus that income inequality has an inverse relationship with economic growth. I hope to analyze this relationship with more recent data and include technological growth as a key independent variable. I hypothesize that the recent exponential increase in technological growth will partially offset the inverse relationship between income inequality and economic growth.

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UC Forums

## Microscale Force Response and Morphology of Tunable Co-polymerized Cytoskeleton Networks

SHEA RICKETTS, Vikrant Yadav, Jennifer L. Ross and Rae Anderson

The cytoskeleton is largely comprised of actin and microtubules that entangle and crosslink to form complex networks and structures, giving rise to nonlinear multifunctional mechanics in cells. The relative concentrations of semiflexible actin filaments and rigid microtubules tune cytoskeleton function, allowing cells to move and divide while maintaining rigidity and resilience. To elucidate this complex tunability, we create in vitro composites of co-polymerized actin and microtubules with actin:microtubule molar ratios of 0:1-1:0. We use optical tweezers and confocal microscopy to characterize the nonlinear microscale force response and morphology of the composites. We optically drag a microsphere 30 um through varying actin-microtubule networks at 10 um/s and 20 um/s and measure the force the networks exerts to resist the strain and the force relaxation following strain. We use dual-color confocal microscopy to image distinctly-labeled filaments in the networks and characterize the integration of actin and microtubules, network connectivity, and filament rigidity. We find that increasing the fraction of microtubules in networks non-monotonically increases elasticity and stiffness and hinders force relaxation by suppressing network mobility and fluctuations.

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UC Forums

## Changes in Topography of Sea Turtle Nesting Beach

SHELLEY MARTINEZ and Jennifer Prairie

In a four-week study, the change in slope of six different transects was measured on the sea turtle nesting beach of Mayto in Jalisco, Mexico. Once all the data was obtained, some insight was gained on how the topography of the beach might change over time. With added factors such as sea level rise, it is important to understand how those changes might affect the nesting of sea turtles and their ability to thrive, considering all eight species are threatened or endangered. It was found that there was a significant increase in available nesting habitat for sea turtles on the beach in Mayto in 2016 than there was in 2015. In addition to this finding, by taking the IPCC prediction of a sea level rise of 0.6 meters in 100 years, it was concluded that there would be a significant loss in modern available nesting beach habitat by the year 2100. With the continuation of conservation efforts by the staff members at Campamento Tortuguero Mayto and an avoidance of development around the nesting area, the four sea turtle species that nest in Mayto will have a better chance of survival despite the adverse effects of climate change.

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## Phosphorelay Pathway of Bacterium, Rhodospirillum centenum, Impacts Gene Expression Related to Motility and Encystment

SLOANE BOOTERBAUGH and Terry H. Bird

Rhodospirillum centenum is a photosynthetic bacterium that is capable of adapting to numerous environments. If nutrients are present and the bacterium is in a liquid medium it will use a polar flagellum to swim, whereas if it is on a solid medium lateral flagella will be used to propel a type of swarming motility. If nutrients become exhausted, the bacterium will eject its flagella and develop into a dormant cyst. Transitions to motile or cyst cell states are controlled by a phosphorelay signaling pathway, which controls expression of genes required for locomotion or encystment. This pathway includes a putative histidine kinase, Cyd2, that phosphorylates another protein, ChpT. ChpT then transfers the phosphate (and thus activates) the transcription factor, CtrA, to ultimately effect gene expression. CtrA deletion strains have been compared to the wild type to characterize phenotypic differences. We have observed that the ctrA knockout strain exhibits an increased tendency to form cysts that is concomitant with impaired motility. A computer program was used to scan the R. centenum genome to identify potential CtrA binding sites that may be used to influence the expression of nearby genes. We have begun a study that uses qPCR to determine whether these genes exhibit different expression profiles in ctrA mutant and wild type strains.

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UC Forums

## Banning the Burqa

STEPHEN HEMMERSMEIER and Kathryn Statler

There is no doubt that the world has seen many terrorist attacks throughout the world in the last few years, especially in Europe. However, the movement to ban the burqa throughout the world is not a novel idea. Turkey originally banned the burqa in public spaces in 1923. France has also had movements over the last several decades to ban the burqa. France's long colonial history with majority-Muslim countries like Algeria has greatly shaped their interaction with Muslim people living in France. The banning of the burqa has come from France and other countries in the EU under the guise of encouraging public order. The European Court on Human Rights ruled in 2014 that France did have a right to regulate what people wore on the basis of public order. Yet in 2016 when mayors of Southern French towns such as Nice tried to ban the Burkini, the French court ruled that this was a violation of people's rights even though it was still being claimed under public order. Turkey has also rolled back its ban on the burqa in the last several years and only required a few government sectors to continue with the ban. The question that this paper seeks to answer is why does France seek greater restrictions on the burqa when Turkey has rolled back its policies, and do these policies really have an effect on terrorism?

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## Calcineurin Homologous Protein Expression Drives Na<sup>+</sup>/H<sup>+</sup> Exchanger 1 Dependent Tumor Survival Under Serum Deprivation

WAYNE T. COTTLE and Joseph Provost

The Sodium Hydrogen Exchanger Isoform 1 (NHE1) is a transmembrane proton pump vital in maintaining pH homeostasis. During tumor development, cancer cells experience an acidic and serum-deprived microenvironment. To survive, cells must engage regulatory proteins like NHE1 to prevent acidosis. Calcineurin Homologous Proteins 1 and 2 (CHP1/2) are cofactors which upregulate NHE1. CHP1 is an isoform required for basal NHE1 activity and CHP2 further augments NHE1 activity. CHP2 binds to a common CHP binding site but is only shown to be expressed in malignant tissues. Data from our lab suggest that both NHE1 and CHP2 play a significant role in pH homeostasis maintenance under serum deprivation and hypoxia.



Though proton transport is effected by CHP2 expression, it's effect on proton transport kinetics is still unclear. We will measure the rate of pHi recovery after acid load. Recovery measured in serum deprivation and hypoxia will determine the effect of the tumor microenvironment on proton transport kinetics. We will then quantify the expression change of NHE1, CHP1, and CHP2 using qPCR. Serum deprivation in H1299 lung cells had no significant effect on gene expression of NHE1, decreased CHP1 expression by 0.4 fold (n=3), and increased CHP2 expression. CHP2 and NHE expression in paired diseased and adjacent normal tissue is also examined. Understanding the expression levels of NHE1, CHP1, and CHP2 along with their cellular effects will help characterize the mechanism governing nascent tumor survival and will aid in the development of treatment modalities for non-small cell lung cancer.

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Thursday, April 20

Session I; 12:10-1 p.m.

UC Forums

## The Island of Misfit Toys: A Genre Analysis of The Perks of Being a Wallflower

YASAMIN (YASI) AGAHNIA and David Sullivan

This paper explores how popular American films might contribute to public discourse about contemporary social issues while challenging some conventions of the popular Hollywood movie. The most notable convention in this analysis is the expectation of a happy ending. A disruption of this convention would suggest that audiences would have to fill in the film's meaning through lived experience and extra-textual discourses. The Perks of Being a Wallflower, released in 2012, serves as textual material for this analysis. This film addresses, especially for teens and young adults, non-heterosexual identities outside the mainstream of popular media; occurs at a time when the politics of sexual orientation are being played out in matters of public policy (e.g., "Don't Ask, Don't Tell," gay marriage, sexual discrimination hate laws and challenges to them, rights of transgender people, etc.); and ends ambiguously, with the audience left feeling uncertain about what happens to the "outsiders" featured as the story's chief characters. This study applies ritual genre analysis and Burke's dramatic perspective, emphasizing representative anecdote, to examine how The Perks of Being a Wallflower contributes to public discourse by encouraging audiences to consider issues of sexual orientation "outside" of Hollywood conventions of normality.

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Thursday, April 20

Session I; 12:10-1 p.m.

UC Forums

## UniMarket : An e-Market Place for University Students

ERIN MCDONALD, STEN GOLDS, HAYDEN CLEVINGER, KATIE LEVY and Saturnino Garcia

Many university students have very little time and money, which makes buying school necessities, like textbooks, and hiring tutors quite difficult. On the other hand, those same students have those same products but no outlet to communicate and share them in a safe and easy channel. UniMarket provides a forum for students at a university to allow for the sale of products like textbooks, tutoring, event tickets, study guides, furniture, and more. UniMarket will provide the ease-of-use of existing services such as Craigslist and OfferUp but will improve safety by limiting the community to those with a valid university email account. Once connected to UniMarket, you will see all posts made by users with your same email domain name. There will be a feed of posts which you can browse by category, or filter using a search bar. Posting will be as simple as taking some pictures, writing a description, and setting your price. Each account will have a space to manage your posts, saved posts, alerts about saved searches, and to message other users. Our product will encompass Web, iPhone, and Android platforms so you're able to use it on all your devices!

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Thursday, April 20

Session I; 12:10-1 p.m.

UC Forums

## Project Pulse: Event Detection using Live Data

ALEX CAMERON, ELIJAH GRADY, STRATUMPOINT INC, and Saturnino Garcia

People today are generating more recordable data than ever before. With the increasing popularity of social media, wearable technologies, and the ever-growing amount of apps on the Apple Store and Google Play, the potential amount of useful and analyzable data sources is growing rapidly. Many of these data sources are non-traditional and remain untapped, and the aim of our project is to find a way to utilize and learn from this plentiful data. The goal of Project Pulse is to collect and analyze non-traditional data sources in order to detect specific worldwide events. Working with Stratum Point Inc., we developed a proprietary algorithm for collecting, processing, analyzing, and contextualizing the data generated from these sources. This algorithm was implemented into a standalone program that provides functionality by itself, or that can be used as a library for other applications.

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Thursday, April 20

Session I; 12:10-1 p.m.

UC Forums

## The Unnecessary Ultimatum: an Examination of the Atomic Bombings and the Surrender of Imperial Japan

COLE KUCERA and Kathryn Statler

Few historical topics garner more attention, and evoke more fervent emotions, than the discussion about deploying nuclear bombs against Japan in World War II. The objective of this paper is to sidestep the mire of morality and delve deeply into the facts surrounding the decision to drop the bombs, and the end of World War II in the Pacific. Primary goals in the atomic portion of the paper include: challenging the assumption that the atomic bombs led to the surrender of the Japanese Empire by reassessing the evidence and validity surrounding that claim and investigating ulterior motives for utilizing nuclear bombs against Japan. Furthermore, the sections about war in the Pacific theater involve analyzing the state of war in the Pacific from the summer of 1944 to the summer of 1945, revealing how the United States, the Soviet Union, and the Japanese Empire planned on closing the war, and discussing what really led to the end of World War Two if the atomic bombs failed to achieve that objective. It is this author's assertion that the primary accounts of leaders involved, statistics, and military reports all confirm the theory that the atomic bombs did not induce Japan's capitulation. Instead, the Soviet declaration of war against the Japanese caused them to concede. Additionally, this paper argues that, regardless of moral justifications, the atomic bombs were certainly unjustifiable militarily.

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Thursday, April 20

Session I; 12:10-1 p.m.

UC Forums

## The Role of Student Financial Aid on Economic Crime on College Campuses

GREGORY DREYFUS, Tim Berend and Candice Price

Student debt is proliferating throughout society. Our study seeks to understand the impact that student debt has on economic crime at college campuses. Using data acquired from students at the University of San Diego, along with numerous of statistical methods, the role of debt in the decision to commit an economically motivated crime is examined. This study aims to discover if students with large amounts of debt view economic crime as a solution. The decision to commit crime is based not only on cost-benefit analysis, but also on the perceived risk of being caught and the expected punishments if caught. Personal risk tolerance, financial status and demographic background are key motivators. The hypothesized effect is a positive relationship between student debt and economic crime. Along the way, we gain insight into the challenges of collecting primary data; surveying methods and data collection have become one of the largest barriers in new research fields. Therefore, the study also looks at the difficulties in collecting new data.

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Session I; 12:10-1 p.m.

UC Forums

## Computational Modeling of Superdegeneracy

MICHAEL POYATT and Daniel Sheehan

Recent study in statistical mechanics has shown new behavior regarding particles in systems with high degeneracy, called superdegeneracy. These particles have a greater probability of naturally congregating at higher energy levels. This is unlike normal degeneracy in, for example, a hydrogen atom where the electron has a small number of places it can exist in the S, P, D and F orbitals (their degeneracy). This limited number of places is not enough to outweigh the Boltzmann factor and the electron will likely remain in the lowest energy level at room temperature. In superdegeneracy, there are enough states in which the particle can exist at higher energies to balance out the Boltzmann factor. Based on the probabilistic nature of this theory it is important to simulate particles randomly moving through systems, tweaking parameters to see at what point the degeneracy becomes significant enough for the particles to congregate at higher energy levels. We have created a computational model that allows us to simulate such a system, with the results of these simulations possibly providing further justification to the new concept of superdegeneracy

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Thursday, April 20

Session I; 12:10-1 p.m.

UC Forums

## Progress towards the development of novel nucleic acid-based therapeutics.

ANDREW SMITH, Yonatan Kebede, Gaston Moorhead, Daniel Ghebreigziabher, Raymond Huang and Anthony Bell

The objective of this study is to evaluate the viability of using intramolecular four-way junctions (4WJs) as therapeutic inhibitors against the DNA-binding cytokine, High Mobility Group B1 (HMGB1). Reports suggest HMGB1 should be considered a lupus biomarker because the protein is linked with several key stages of pathogenesis. The strategy to use 4WJs to target HMGB1 is grounded in classic in vitro studies that show HMGB1 binds to cruciform/bent DNA with a very high affinity. Our initial studies focus on investigating the nuclease stability of 4WJs. Three 4WJs are currently being evaluated; two 4WJs referred to as i-J1 and J4 are composed of natural DNA with thymine-thymine end caps. The final 4WJ referred to as tDNA is composed DNA with thiol linkages vs. phosphate bonds. The presence of end caps in i-J1 and J4 are intended to enhance nuclease stability by preventing favorable contacts with nucleases and end fraying. The thiol linkages in tDNA are known to enhance stability because these bonds are not recognized by nucleases. Nuclease digestion assays are conducted at 20oand 37oC using nucleases that digest double-stranded DNA (i.e. DNase I, Exo, and Exo III) and single-stranded DNA (i.e. Exo V and T5 Exo). Our preliminary reports show that as expected the presence of thymine end-caps and thiol linkages enhance the relative nuclease resistance of intramolecular 4WJs vs. unmodified DNA 4WJs.

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Session I; 12:10-1 p.m.

UC Forums

LAUREN ROBERTS and Jane Friedman

This research subject begins with the Four Color Conjecture which dates back to 1852 and has been the focus of research for many mathematicians. The Four Color Conjecture is a graph theory problem that proposes that every map can be colored using only four colors with no two of the same colors adjacent. The quest for a counterexample to the conjecture is what lead to the definition of the snark graph; and although the conjecture was finally proven in 1976, research into snark graphs concerning their properties has remained active. A snark is defined as a 3-regular, bridgeless graph, that is cyclically 4-edge connected, in which the smallest cycle length (girth) is at least 5, and is not 3-edge colorable. This project further explores what is known and unknown about snarks by using their history and by analyzing their properties using graph theory. Aside from their simple definition, snark graphs are an important focus of research because their properties and structure are still widely unknown. Snarks are also encountered in other important and difficult problems in graph theory.

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Session I; 12:10-1 p.m.

UC Forums

## Climate Change's Impact On Fisheries Management

KATHERINE MACDOUGALL and Michel Boudrais

Climate change is threatening humans and the marine environment, in order to maintain sustainable marine ecosystems dramatic changes must be made when it comes to fisheries management and practices. This presentation will briefly explain background information on the causes of climate change. From there I will discuss the effects that climate change is having on the ocean and marine environments. These effects are things such as; warming ocean temperatures, change in marine species distributions, decrease in biodiversity of marine species, and coral bleaching. In addition to the effects on the marine environment I will touch upon the effects the changes in the environment have on fisheries. Furthermore I will discuss various methodologies of fisheries management and how these systems affect the marine environment. I will discuss changes in thought that must be addressed in order to maintain sustainable fisheries management in the face of climate change.

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Session I; 12:10-1 p.m.

UC Forums

## Hearing Variability in Pinnipeds

ALEXANDRIA BOKHART and Drew Talley

Behavioral psychophysics is a useful method for describing the variability of hearing among individuals in marine mammal populations, specifically Pinnipeds. Through assessment of the variability of hearing within Pinnipeds further understanding of basic biology and assessment of the effect of anthropogenic noise will be obtained. In this study, a literature review was conducted on three scientific papers to assess the hearing variability within Pinnipeds based on sex, age and species.

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Session I; 12:10-1 p.m.

UC Forums

## Octopamine regulation of sleep and arousal

ELEANOR BAUER, BRIDGET FITZGERALD, Divya Sitaraman

The Drosophila mushroom body (MB) is an associative learning network that is important for the control of sleep. We have recently identified particular intrinsic MB Kenyon cell (KC) classes that regulate sleep through synaptic activation of particular MB output neurons (MBONs) whose axons convey sleep control signals out of the MB to downstream target regions. Specifically, we found that sleep-promoting KCs increase sleep by preferentially activating cholinergic sleep-promoting MBONs, while wake-promoting KCs decrease sleep by preferentially activating glutamatergic wake-promoting MBONs. Further, we have identified specific neuromodulatory neurons that innervate the sleep and wake microcircuits and likely underlie the persistence of sleep and wake states. Here we use a combination of genetic and physiological approaches to identify two distinct classes of the wake-promoting neurons that release Octopamine, a biogenic amine homologous to norepinephrine in humans. These studies will reveal the precise nature of connectivity and sleep regulation by Octopamine and provide a framework for the design of analogous experiments in understanding how norepinephrine controls sleep in genetically tractable vertebrate model systems such as zebrafish and mice.

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Session I; 12:10-1 p.m.

UC Forums

## Wound Inducible Transcript 3.0 (WIT3) is a minimally stable, helical protein

MARIAM DAWOOD and Jessica Bell

Early wound contraction is facilitated by cell migration and is essential to the healing process. Cytoskeleton proteins provide the underlying scaffold for this migratory system. WIT3 is a 253 amino acid protein that functions in fibroblast cell migration and initiates rapid wound closure. Sequence analysis and model prediction suggest WIT3 contains helical structure that may contribute to WIT3's oligomerization. WIT3 shares ~50% sequence identity with an innate immune protein of unknown function, Suppressor of IKKepsilon (SIKE), that also associates with cytoskeletal proteins. We hypothesize that SIKE and WIT3 will have similar biochemical and biophysical characteristics that contribute to a shared function. To characterize WIT3, recombinant expression systems and conditions were explored. WIT3 expressed optimally from an N-terminal 6xHis tag expression vector at 37°C in LB supplemented with 1% glucose induced for 4-6 h. WIT3 formed inclusion bodies. Optimal purification conditions separated insoluble WIT3 from soluble proteins followed by cobalt-based immobilized metal affinity chromatography under denaturing conditions. WIT3 was refolded while immobilized on the resin using a 6M – 0 M GuHCl gradient. Purity of WIT3 was assessed via SDS-PAGE analysis. Secondary structure analysis by circular dichroism indicated a primarily helical protein, similar to SIKE. Thermal melt data yielded a T<sub>m</sub> of 37°C, suggesting a minimally stable protein and a lower T<sub>m</sub> than SIKE. The initial comparison suggests that WIT3 and SIKE share similar helical structure but different structural stability. By comparing WIT3 and SIKE structure and function, these data provide a link between innate immune detection and the cell's defensive response.

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Session I; 12:10-1 p.m.

UC Forums

## Assessing Anthropogenic Impacts on Coral Reefs in the Bocas del Toro Archipelago

KATHERINE HENRY and Aileen Maldonado

Coral reefs support more species per unit area than any other marine environment, including about 4,000 species of fish, 800 species of hard corals and hundreds of other species (“Importance of Coral Reefs”, 2008). These invaluable reef communities all over the world are under great threat from anthropogenic effects and stressors (Seemann et. al, 2013). Ocean acidification, rising ocean temperatures, increasingly turbid waters, and eutrophication are creating an inhospitable environment for coral reefs to function and survive (Hoegh-Guldberg, 1999).

The Bastimentos National Marine Park in Bocas del Toro, Panama is designed to protect and improve the coral reefs found in this pristine environment. The success of this Marine Protected Area (henceforth referred to as MPA) has not been studied previously and so the effectiveness of the MPA is not confirmed. This study assesses water quality metrics (pH, turbidity, and bioindicators) in reefs within the MPA to those reefs near anthropogenic outputs in the Bocas del Toro archipelago.

This study showed that water quality was significantly more favorable for sensitive coral at reefs inside the MPA as compared to those outside the MPA. The water clarity was much more favorable to sensitive coral species and the coral reef composition reflected species that require pristine water conditions (*Acropora palmata* and *Acropora cervicornis*) inside the MPA compared to outside. Follow up studies are necessary to monitor the performance of the MPAs coral reefs to determine the success of the MPA.

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Session I; 12:10-1 p.m.

UC Forums

## A Purposeful Life: Patterns, Perceptions and Profiles

MICHAEL GIRARD and Cid Martinez

One pattern classically preventing blind people from attaining a quality life results from a historic perception that it is too challenging for blind people to live self-sufficiently. This is based upon the classic perception that all forms of social interactions stem from having eyesight, thus creating a sociology of survival, asserting that all forms of existence orient from an individual's amount of eyesight. Another view supports the idea of a “minimalistic approach” whereby proposing that only a minimal investment of resources by governmental institutions is perceived as adequate, given blind people are traditionally profiled as producing minimal results. While these have worked traditionally in tandem, a current perspective suggests many barriers preventing blind people from succeeding stems from resistance created by institutions designed to promote their aspirations for a quality life.

To examine this complex issue effectively, this treatise explores several questions. Does a typology of blind people exist? If such exists, then how might they affect the opportunities for other blind people's success? How have classic occupations for blind people complicated the promotion of more contemporary ones? Finally, to what tangible measures do institutions serving blind people adequately promote their educational and career goals? Through taking a closer look, this study examines the perceptions, profiles, and patterns affecting the pursuits of blind people to acquire, a purposeful life.

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Session I; 12:10-1 p.m.

UC Forums

## How Stable is Maternal Autonomy Support Across Toddler Learning Situations?

REBECCA SIMPSON and Adriana Molitor

Autonomy supportive parenting promotes children's initiative and self-direction while minimizing attempts to control children through directives and power assertion. Past research shows that parental autonomy support is important in getting young children to willingly cooperate with parental requests. It also predicts enhanced achievement in grade-school children. While the benefits of autonomy support have been established, less is known about predictors of autonomy supportive behavior. Few studies have examined how consistent parents are in exhibiting autonomy support. Moreover, some research suggests that it is influenced not only by parent qualities or child characteristics but also situational factors. The present study examines the consistency of maternal autonomy support across two teaching situations. Specifically, mothers were rated on a range of behaviors reflecting autonomy support and control while helping their 30-month-olds learn two relatively unfamiliar tasks: board lacing and a multi-dimensional shape puzzle. Analyses examine the correspondence between maternal behaviors across these contexts.

## Day Two, Session I, Interactive Exhibits

Thursday, April 20  
Session II; 1:10-2 p.m.  
VA/Exhibit Hall

### Sportsianity

JOSEPH JAKUBOWSKY and Atreyee Phukan

In many ways football and Christianity play a huge role in defining one another as well as in the life of an athlete. In a world that is sadly consumed by individualism, team sports such as football teaches an athlete to be a “servant” and to help others on and off the field. The recently retired and future hall of famer Steve Smith from the Baltimore Ravens represents the ideal meaning of being a servant Christian athlete. Smith and his organization go to the cities of his childhood neighborhood and wash the feet of children who are less fortunate. In this essay, I combine my personal experiences as a Christian athlete at USD with research to argue that religion brings a person closer to their identity as an athlete as well as to their faith. Whereas many people argue that football takes a person away from the principles and virtues of their religion, I believe that it (specifically, Christianity) can be seen as essential tool for the development, unity, and peaceful co-existence between an athlete and their community.

## Day Two, Session II, Poster Presentations

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Thursday, April 20  
Session II; 1:10-2 p.m.  
UC Forums

### How does Arsenic enriched soil influence the growth of Miner’s Lettuce

HANNAH MENELAWS and Bethany O’Shea

Claytonia Perfoliata, otherwise known as Miner’s Lettuce, was discovered to be growing naturally in soil at the site of Black Mountain, an old mine known to be highly contaminated with arsenic (As). This study served to examine the influence of arsenic enriched soil on the plant’s overall growth. The study was conducted in a controlled environment using samples of soil (200g) collected from various points along a plotted grid near the entrance of Black Mountain. This study used soil pots with varying As concentrations, which were determined through the use of an XRF machine: a control (14ppm), A3 (297ppm), B1 (339ppm), C3 (34.4ppm), D2 (26.4ppm), As tailings (1.34%ppm). The development of the plants was measured over a one month time period via their leaf width, leaf length, stem height and plant abundance. The plants growing in soil that was moderately contaminated with As (C3 and D2) saw the most substantial growth, indicating the plants ability to adapt and acquire tolerance to an environment that has been enriched with As.

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Thursday, April 20  
Session II; 1:10-2 p.m.  
UC Forums

### Conscious Capitalism: Do Conscious Businesses Outperform the Market and Create Superior Stakeholder Value

AKRIA BANNAI and Tara Salinas

Growing public discontent in the United States with the attitudes and values of corporate America has led to mass protests and increased buyer discretion. Consumers are increasingly making buying choices based on their perception of how companies positively or negatively impact society. To address the changing needs of consumers, John Mackey, Whole Foods Market co-founder and CEO, and Rajendra Sisodia, Professor of Global Business at Babson College, write in Conscious Capitalism: Liberating the Heroic Spirit of Capitalism that a more holistic approach to business can help businesses sustain competitive advantages and create market-beating long-term value. Namely, that businesses which subscribe to and integrate the core tenets of Conscious Capitalism into their business philosophy outperform non-conscious competitors in creating stakeholder value. To examine this claim, this paper first defines Conscious Capitalism as it relates to similar concepts around social or environmental responsibility and develops criteria for determining if a business is “conscious.” Next, it compares Southwest Airlines, a conscious company, and JetBlue Airways using a stakeholder analysis framework to determine the relative value created by each company. Finally, it examines the financial performance of conscious companies against industry peers and the overall market using relevant key performance indicators and a portfolio analysis. If these claims are true with respect to the performance of conscious companies, the business case for Conscious Capitalism gains credibility and its future adoption within the broader market will revolutionize standard business operation and strategy models. Companies will operate to fulfill their respective stated higher purpose, creating outstanding stakeholder value and elevating society in the process.



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Thursday, April 20

Session II; 1:10-2 p.m.

UC Forums

## Accessing Higher Education Post-Civil Rights Movement

ALEXA LAYNE and Atreyee Phukan

As of 2013, higher education in the United States is comprised of over 7,000 postsecondary institutions, which, according to the U.S. Department of Education, receive federal student aid under Title IV of the Higher Education Amendments of 1992. In this project, I will focus on public and private two- and four-year nonprofit institutions, which are the most sought after degree-granting colleges. I employ the term “access” as it is used in the field of education, which typically refers to the ways in which educational institutions and policies ensure that all students have equal and equitable opportunities to take full advantage of their education. However, I argue that when the race/ethnicity and socioeconomic status of a student are taken into consideration, the aforementioned equitable opportunities seem to vanish. Universities now display more diversity than has been shown in the past, yet that does not mean that the playing field is equal for all minorities. Between whites and minorities, a relatively equal amount are enrolling in college after high school, yet not an equal amount are graduating with degrees. Some believe that the reasoning behind this is that minorities are not prepared for the university setting and do not feel as if they fit in. Therefore, it may be the case that the equal access legislation could prove detrimental to the students they intend to serve.

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Thursday, April 20

Session II; 1:10-2 p.m.

UC Forums

## Isolation and Characterization of Arsenic-Resistant Bacteria found in Contaminated Soil at Black Mountain Mine

ALEXANDRIA MORGAN, STEPHANIE KATZ and Terry Bird

Black Mountain mine in east San Diego County, California was the site of heavy arsenic mining in the early 20th century. The mining was short lived, but the soil became extremely contaminated with arsenic and remains so today. Primary literature reports that some bacteria can grow in arsenic-contaminated soils because of their resistance to the toxicity (Pepi, Volterrani et al., 2007). We wished to identify and characterize the arsenic-resistant bacteria growing in the soil in and around the Black Mountain mine. We expected to find arsenic-resistant bacteria due to the evolutionary pressure of an arsenic-contaminated environment. We isolated resistant species from the soil by plating dilutions on R2A medium supplemented with arsenate and then sequenced their 16S rRNA genes. The DNA sequences were used to identify species using a nucleotide BLAST program. With this information, we constructed a phylogenetic tree to examine the evolutionary relationships between these different arsenic-resistant bacteria.

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Thursday, April 20

Session II; 1:10-2 p.m.

UC Forums

## Profitability and Performance of Sustainable Lab Space

ALEXIS DACHS and John Demas

The purpose of this research project is to determine performance and profitability of sustainable lab spaces. As the biotech industry rapidly grows, it is important to evaluate whether or not improving the energy efficiency of lab spaces has an economic gain and if they are a more sought out pieces of real estate because they are sustainable. This study assesses this topic through a series of interviews with the tenants, owners, and facility managers of current lab spaces in San Diego. The analysis reveals that while upgrading to energy-saving technology in a lab space does save money, many biotech companies are not interested in applying for their building to become LEED certified. This is largely due to two reasons. The first reason is because LEED-certified commercial buildings have expected higher rental premiums even though they continue to have higher vacancy rates than non-LEED certified buildings. The second reason is the majority of new equipment used for lab

spaces already have numerous regulations that force systems, like HVAC, to be energy efficient. Due to this, many biomedical companies that move into new lab spaces are not willing to use further resources, such as time, money, and manpower, to become LEED certified because they know that the majority of their equipment is already energy efficient. This research suggests that energy efficiency is an expected feature in lab spaces and because of this, LEED-certified lab spaces do not have significantly greater real estate performance or profitability than a non-certified commercial lab.

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Thursday, April 20

Session II; 1:10-2 p.m.

UC Forums

## “The Grocery Bar”: Exploring Millennials’ Culinary Habits

ALYSSA CHERNY and Maria Kniazeva

The Grocery Bar is an unconventional marriage of a traditional grocery store and a revamped “night out” experience. It is a novel, dual-purpose establishment geared toward millennials - college students and young professionals. The premise of the project is to make cooking less daunting and eating more experiential. The Grocery Bar will become a social hub -- a place that welcomes health- and fun-oriented millennials. This transformational space, from a day-time grocery store to a bar in the evening, fills a vacant niche in the food industry. My project idea draws from primary and secondary research. Seventy self-reported, online surveys reveal the strong need for this new concept of grocery store, revitalizing culinary and social opportunities for millennials.

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Thursday, April 20

Session II; 1:10-2 p.m.

UC Forums

## Russian Foreign Policy and Energy Security: The Putin Era

CHIARA SUTTON and Vidya Nadkarni

In recent years, a more aggressive Russian foreign policy has troubled many Americans regarding Russian intentions on the world stage and serves as an impetus to try to predict future Russian behavior. It is necessary, if trying to predict a state’s behavior, to study the relationships among factors that state considers to be in its national interest in order to identify consistencies and inconsistencies in policy over time. One of these relationships of recent relevance is that between Russian foreign policy more generally and Russian energy policy during the Putin period, especially when considering recent deals like the natural gas pipeline through Turkey built in 2016. Using the Russian relationship with Ukraine, this paper examines whether Russia has deployed its energy policy as a tool to achieve its foreign policy interests.

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Thursday, April 20

Session II; 1:10-2 p.m.

UC Forums

## Italian Unification and the Rise of the Mafia

CHRISTINA MCLAUGHLIN and Loredana di Martino

The period surrounding Unification and the birth of the Italian nation had a lasting impact on the mafia in Southern Italy and gave it the social and political influence still felt today. Before looking at how the mafia achieved the power that it did, it is essential to define what “mafia” is and how it came to be understood. For in many cases, misunderstood. I will examine how the word “mafia” developed to define the secret societies so prevalent across Southern Italy from the mid-nineteenth century through today. I will look at the etymology of the word, and how it was used by its members as well as by outsiders trying to understand the functioning of these organized criminal groups. I will also analyze the myths that surrounded the mafia, specifically in the times leading up to Italian Unification and the immediate post-Unification period (1840-1900). The two mafia groups that I will be analyzing are Cosa Nostra in Sicily and Camorra in Naples. Each of these groups has their own rituals, traditions, and specific circumstances of origination. Yet both gained significant power beginning with Italian Unification, and managed to deeply infiltrate social life, politics, and justice. One of the biggest contributing factors was the failure of Unification in democratizing Italian society. I will use Antonio Gramsci’s theory about the Risorgimento as a “failed”

social revolution¾that did not include or change the conditions of the peasant class¾to show how the newly formed Italian state allowed the mafia take-over of the old aristocratic landowning class, while stopping the agrarian cooperative movements that were trying to fight the feudal structure in which the mafia had originated and thrived.

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Thursday, April 20

Session II; 1:10-2 p.m.

UC Forums

## An Interdisciplinary Analysis of Climate Change Education Programs and Applicability to Climate Education Partners

CHRIS WAITE and Michel Boudrais

Climate change is a complex science that many find difficult to understand or relate to due to the order at which it influences atmospheric and ecological changes. The Climate Education Partners are an education group working on San Diego's Climate Action Plan to prepare the city for current and future climate issues such as drought, floods, and health issues. Various multilateral education efforts are being taken by numerous organizations and firms to increase educational opportunities, inspire integrative learning, discuss social and behavioral responses to climate change, and allow for decision makers to forward effective and informed ameliorative policy. Research was conducted to analyze numerous international, national, and regional organizations currently engaged in climate science education. An organization's science and communication content was of the utmost importance; curricula were consistently analyzed and reviewed to observe whether or not content was successful in creating and maintaining climate awareness as well as capacity for decision makers to engage in ameliorative policy. Results indeed found that with a well-balanced, structured curriculum and a combination of science, communication, and behavioral content, education efforts were either more engaged in or taken up by decision makers. This research dives deeper to better understand the content that these organizations discuss in their education programs. This research also provides potential organizations that the Climate Education Partners could choose to partner with in order to enhance their education efforts. Certain groups or organizations require more effective structure and increased participation of decision makers before partnering could be suggested. In order to truly understand the effectiveness of these education programs, more data and actual review of national or regional policy and maintenance is key.

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Session II; 1:10-2 p.m.

UC Forums

## Where Do We Go From Here? University of San Diego Climate Action Plan

CLAIRE FLYNN, Michael Catanzaro, Scott Anders, and Michel Boudrias

The University of San Diego Climate Action Plan (CAP), approved Fall 2016, will have major effects on the infrastructure of USD's campus and reduce greenhouse gas emissions. This research sought to analyze and predict the implementation strategies for the CAP as well as measurement techniques and engagement opportunities. Through literature review and analysis of the CAP document, this research found that campus and community engagement, cross-collaboration between camps departments, and structured analysis will be essential to the success of the CAP at USD. Additionally, the research looks at the effects and benefits that CAP will have on USD students. Overall, the research sets guidelines and recommendations for implementation of the University of San Diego Climate Action Plan.

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## Analysis of Hypertrophy and Hyperplasia in *Arctoscion nobilis* (White Sea Bass)

DARIUS TENORIO and Sue Lowery

A better understanding of muscle growth responses to environmental changes is absolutely needed in the industry of aquaculture. Learning more about the growth plasticity of fish muscle response patterns to differing swim speeds help to understand the molecular interworkings of fish while also contributing to aquaculture restocking and growth programs alike. This muscular growth is categorized by either hypertrophy, where existing fish muscle fibers continuously expand, or hyperplasia, where a fish muscle continuously recruits new muscle fibers. In this field, growth response research has provided contradicting conclusions and thus continued research is required. Dr. Susan Lowery, through the Hubbs-SeaWorld Research Institute, provided the experimentally raised White Sea Bass fish for this analysis. Through Image J software, I was able to analyze fish muscle fibers at a micron/unit level, which gave us a precise and accurate way to infer hypertrophy versus hyperplasia. From our preliminary results of red and white muscle fiber analysis at a medium and fast swim speed, we see a broad range in muscle fiber size and changes in plasticity between white and red fish muscle growth at these speeds. In addition, we were able to see increases in hypertrophy and hyperplasia depending on the fish. From this preliminary data, we hope to advance our knowledge about these mechanisms through continued measurements and analysis in the future.

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## Selective Plane Illumination Differential Dynamic Microscopy with Adaptive Optics

DEVYNN WULSTEIN and Ryan McGorty

We measured the dynamics of colloidal particles and DNA molecules using differential dynamic microscopy (DDM) on images captured through selective-plane illumination microscopy (SPIM). Combining DDM, a digital Fourier microscopy method, and SPIM, an optical sectioning microscopy technique, we can analyze the dynamics of concentrated suspensions. Further, selective-plane illumination differential dynamic microscopy (SPIDDM) exploits the spatial variations of the Gaussian light-sheet to obtain diffusion data over a wide range of spatial frequencies. Presented work focuses on in vitro measurements of colloids, DNA molecules, and cytoskeleton networks. However, given SPIM's compatibility with living samples, SPIDDM could efficiently extract dynamics within living organisms. We are currently adding adaptive optics into our light-sheet microscope with a deformable mirror. We discussed using adaptive optics for multiple purposes. The mirror corrects optical aberrations due to the sample holder and the sample. We are also using adaptive optics to optimize the three-dimensional point spread function for DDM measurements. Using the deformable mirror to purposefully introduce known aberrations could allow for a more precise measurement of colloidal or molecular dynamics in three-dimensions.

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## Cities in Late Antiquity: Comparing Classical Urban Ideals to a Medieval European and Medieval Arab City

EMILY BOLENDER and Ryan Abrecht

The waning of the Roman Empire's power in the fourth and fifth centuries signalled the dawning of a new age in both Europe and the East. Significant cultural changes, such as the rise of Christianity and Islam, created an environment where the purpose and organization of cities had to adapt or the city would fail. The Roman city Trier illustrates the classical ideal of the city, or urbs. Medieval Florence, though formerly Roman, underwent many periods of occupation and transition in the post-Roman world and exemplifies a medieval Italian city-state. In the east, the Abbasid capital Samarra reveals how the Arab caliphate conceptualized central power, and how power functions in an urban setting. By comparing the archaeology and

primary and secondary sources related to these three cities, we can get a better understanding of urbanism in late antiquity, and how shifting power, cultural practices, and social ideals can affect the organization and purpose of urban spaces.

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## Trends in Venture Capital Investments and Exit Strategies

**ERICK GORODEZKY and Dennis Zocco**

With only less than 4,000 of the millions of businesses in the US being public, there are large investment opportunities in the less-regulated private markets. By looking at trends in venture capital, entrepreneurs can gain insight into the industries they should funnel their innovative ideas, while investors can see where to insert their funds. From looking back at the growth of past companies to examining the strategies of unicorns today, the vast changes that increased information has led to in private equity markets can be detected. The average company valuations have been highly affected by the technological advancements that allow for more open information. Increased pressure from investors to get returns on their investments has caused a trend of additional Mergers and Acquisition over the Initial Public Offering alternative. With more investor money pouring into private companies, the startup community is being promoted and able to grow. As the venture capital industry continues to grow the market inefficiencies that investors can use to their advantage may be diminished. The various trends, related to venture capital industry, investing, exit strategy, and business strategy, have led to a rapidly changing private equity landscape.

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## Evaluation of the Role of Damage Associated Molecular Pattern (DAMP): HMGB1 in Macrophage Differentiation

**GASTON MOORHEAD, Andrew Smith, Yonatan Kebede, Daniel Ghebreigziabher, Raymond Huang and Anthony Bell**

High Mobility Group B1 (HMGB1) was originally classified as a highly abundant architectural nuclear protein that modulates chromatin remodeling. In this capacity, HMGB1 binds bent/cruciform DNA such as four-way junctions (4WJs) to facilitate the binding of transcription factors. It is now clear that HMGB1 also functions as a Damage Associated Molecular Pattern (DAMP) in the extracellular matrix (ECM). In the ECM, HMGB1 binds to immune receptors to initiate the recruitment and activation of macrophages. The abundance of HMGB1 can pose a problem because the unintended release of HMGB1 is often linked with autoimmune dysfunction and autoimmune disorders such as Systemic Lupus Erythematosus. A recent study shows that HMGB1 has the capacity to skew differentiation of M2 type macrophages towards M1 type phenotypes (Schaper et al.). In other words, HMGB1 converts “repair” macrophages (M2 type) to “destroy” macrophages (M1 type). The increased population of M1 macrophages poses two major problems because these cells: i) cause damage (inflammation) of local healthy tissue and ii) phagocytize apoptotic cells improperly. With respect to the latter, improperly phagocytized cells undergo secondary necrosis and release DNA, histones, and other proteins including HMGB1 into the ECM. The presence of DNA, histones, etc. in the ECM act as “auto-antigens” that are mistakenly presented by immune cells that generate antibodies against these cell components (Urbonaviciute). We hypothesize that 4WJ can be used as probes to discover critical binding interactions between HMGB1 and macrophages that control the conversion from M2 to M1. The rationale for selecting 4WJs as probes is based on studies that show that HMGB1 bind to 4WJ with extremely high affinity (Pohler) (Ugrinova) (Seeman) (Poon).

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## Cost of College Education and its Effect On Graduation Rates

**HUNTER LEVY and Alyson Ma**

My project will be delving in to the costs of college education across countries and time to look at the effects that the cost of said education has on its students. Do higher costs equate to higher graduation rates? Higher scores? Higher paying jobs? I will use data from the World Bank as well as the OECD to capture the essence of college and attempt to come to some conclusions about the cost of education in our current world.

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## Black Transnational Solidarities: Intersections of the Cold War, the Civil Rights Movement, and Anti-Colonial Movements in Africa

**JESSE FROST and Kathryn Statler and Cecily Heisser**

The Cold War was a time of heightened tensions around the globe. The ideological bifurcation between the Capitalist and the Communist world created a sense of anxiety not only from the imminent threat of the other side, but of the possibilities of dissidents within one's own ideological camp. This internalized fear within the United States can be seen through the rhetorical and literal targeting of leftist organizations and their members. Specifically, from the late 1950s through the early 1970s, the unease and suspicion of Communism within the United States became intertwined with the Civil Rights Movement. Civil Rights struggles for equal rights and social justice were twisted by Communist-fearing white Americans, linking racism and the Red Scare together in such a way that targeted African American activists as being communist in order to delegitimize and derail the entirety of the movement. Concurrently, the overt racism that African Americans experienced daily in American society forged both ideological and literal bonds between Black Americans and African nations and people fighting and resisting their colonial metropolises.

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## Lysosomal Function in the 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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## Solving Violent Crime Problems with Sports

JORDAN LATCHFORD and Alyson Ma

Many people have the notion that mass media leads to increased violence. Research is limited on the progressive effects of sports events on crime. My research will examine how sports games affect crime in multiple cities throughout the United States. The implications of this study will determine whether crime is recreational and opportunistic or done out of necessity.

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## Luminescent Properties of Lanthanum-Based Nanocrystals with Indole-X-Carboxylic Acid Energy Antenna

FORDYCE JUSTINE and James Bolender

Lanthanide-based nanocrystals were synthesized with terbium and europium as dopants in a LnF<sub>3</sub> lattice in a pH 8.0 with the intent of enhancing their luminescent properties. These nanocrystals used an amine-phosphate capping group to inhibit the crystal growth. By converting this amine to an amide using two coupling agents, N-(3-Dimethylaminopropyl)-N'-ethylcarbodiimide hydrochloride (EDC) and N-Hydroxysuccinimide (NHS), with an indole-X-carboxylic acids (where X = 6, 5, 3, or 2), these carboxylic acids can act as an energy antenna and transfer UV energy (290 to 320 nm) to the luminescent terbium and europium ions. Emission and excitation spectra were collected for all samples and compared to determine difference in the various indole carboxylic acid energy transfer. In addition to expected terbium and europium emission, the coupling chemistry changed the fluorescence spectra of the indole-carboxylic acids, emitting blue fluorescence under long-wave UV irradiation. This indicates that the coupling chemistry is changing the electronic energy level structures of the indole-carboxylic acids.

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## Campaigning for Likes: A Look at Rational and Emotional Social Media Marketing in the 2016 Presidential Election

KATHRYN MOSER and Justine Rapp

November 8, 2016 marked a moment in history that few who lived it will forget. Many were shocked around the world when Donald Trump bested Hillary Clinton to win the title of President of America. To tell this story and explain its causes, several facets need to be explored. This project takes an in-depth look into one aspect of the election: social media. Both candidates utilized Facebook to interact and connect with audiences online. Through an in-depth content analysis of Hillary Clinton and Donald Trump's respective official Facebook pages and posts in the three months leading up to the presidential election, the types of advertising techniques utilized by both candidates will be explored. Past analyses of both political campaigns and traditional advertising shed light on how marketers and politicians alike appeal to their audiences through promotional, rational, and emotional means. Political campaigns have been shown to utilize emotional advertising most commonly, appealing to the fears and hopes of their voters; Lyndon B. Johnson's Daisy campaign ad most famously represents an appeal to fear. Though much research has been done to unveil how promotional, rational, and emotional appeals work most effectively in advertising, varying conclusions have been made. By comparing the two candidates' appeals, this research intends to give a greater understanding of which appeals each candidate utilized most commonly, and subsequently how these three appeals work to engage audiences online.

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## Crime and a High Minimum Wage

KEEGAN MCMILLAN and Alyson Ma

Minimum wage rates have increased at a relatively rapid pace in recent years and will continue to rise in the near future. Little research has been done recently regarding particularly high minimum wage rates and their relation to crime. With this in mind, the purpose of this research is to analyze the effect of a high minimum wage on crime rates. As the wage floor rises significantly, we expect to see increased rates of criminal activity involving monetary gain. The results, if significant, will have implications on wage policy at the local, state, and federal level.

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## The Identity Development and Negotiation of Asian-Americans: A Pop Culture Direction

KEVIN DO and Leeva Chung

This project explores the development and negotiation of identity among Asian-Americans born in the United States. The research in psychology on identity development has been rooted in Erickson's (1980) stages of Psycho-social Development and serves as a foundation within identity formation and development. In communication, Ting-Toomey's (1999) Identity Negotiation Theory accentuates the importance that identity serves as the underpinning for intercultural communication processes. This literature review utilizes an interdisciplinary approach to explore how Asian Americans born in the United States develop and negotiate their identity. While various social scientists have studied identity development and negotiation, very few have accounted for the role of popular culture. Because popular culture is controlled by the dominant group and imposes Eurocentric viewpoints, it is essential to see how it plays a role in an Asian-American's socialization in the larger culture since pop culture has the ability to blur cultural boundaries. Overall, this literature review will serve as the foundation for future research on the impact of media/pop-culture on the development and negotiation of an Asian-American's identity.

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## Community Composition of Organisms Living within the Invasive Bryozoan Zoobotryon verticillatum in Mission Bay, San Diego

KRISTEN GARCIA and Michel Boudrias

Invasive species are a cause for concern because of their potential to cause significant damage and changes to an environment. The bryozoan Zoobotryon verticillatum is invasive in Mission Bay and has been known to quickly colonize on docks and hard substrates. Thus, it is often considered a threat to the area. There has been recent evidence, however, that Z. verticillatum serves as a substantial habitat for a large number of indigenous species in Mission Bay. The purpose of this study is to determine the abundance and community composition of the organisms living within Z. verticillatum in Mission Bay. Colonies of Z. verticillatum were collected from the southern side of the South Shores dock for four consecutive weeks in October 2016. The wet weight and volume of each colony was measured, and then each sample was preserved in ethanol. Organisms were filtered out from the colonies and were both counted and identified under a microscope to determine abundance and community composition. The study found a large abundance and diversity of organisms living within each Z. verticillatum colony. The two most abundant organisms in each colony were copepods and amphipods. In addition, a portion of the copepods and amphipods observed were carrying eggs, suggesting that Z. verticillatum may also serve as breeding grounds to several species.



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## Religious Belief and Moral Conflict in the 21st Century: A Philosophical Investigation of the Nexus Between Religion, Morality and Ethical Conflict.

LIA C. FIOR and Brian Clack

Religious belief is a problematic concept in philosophy. This paper does not aim to reach a conclusion regarding the existence, or non-existence, of God; rather, it explores naturalistic accounts of why and how one comes to believe in the logically dubitable notion of God. Through the analysis of the works of Ludwig Feuerbach, Karl Marx, and Sigmund Freud, I suggest that religion has developed out of a mixture of the following: alienated human projectionism, a calculated result of the coercive practices of oppressive economic/ideological systems; and the result of wish-driven intellectual faculties misguided by the demands of human wishes. In light of the concerns raised by these philosophers with respect to the potential issues arising from religious belief, and with the assistance of the Euthyphro Dilemma postulated by Plato long ago, I focus on elucidating the connection, or lack thereof, between morality and religion. While Kierkegaard argues against universal ethics and in support of a justified teleological suspension of the ethical, I suggest that the issues he discusses translate practically into the religiously inspired terrorism and exclusionism we have witnessed throughout the past few decades of moral history. Thus, I investigate some of the practical implications of treating religious beliefs as equivalent to other forms of belief, which typically require more evidence for their support. Insofar as monotheistic religious beliefs are not shared by all individuals alike, I argue in favor of a more universal and secular morality such as the one developed by David Hume.

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## Neural basis of ovipositional preference in *Drosophila melanogaster*

LUKE MUSKETT, Shalin Shah 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 an organism's 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 is 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 preferences 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. We have developed a novel assay design to test the oviposition preference and will present data showing a role for conserved neurotransmitters like dopamine, serotonin, and octopamine in this behavioral assay.

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## The Effects of e-Commerce on the Vacancy Rates of Retail Space

MARY ANN LEE and Alyson Ma

With the emergence of online shopping and the increasing growth of e-commerce sales, the future of commercial real estate, with respect to retail spaces, becomes an important area of focus. As establishments within the retail industry diminish throughout the years, a growing concern over space re-allocation, vacancy rates, and commercial real estate market values may change the way in which firms choose to operate their business. This study aims to investigate the current state of the retail industry, specifically within the real estate market, as it seeks to quantify the effect of e-commerce on the vacancy rate of retail spaces in the United States.

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## Gender Wage Gap by College: An Examination of the Political and Social Influences on Gender Ideology in a College Environment

MATTHEW SMITH and Alyson Ma

Previous studies have proven that the endorsement of a more traditional gender ideology is associated with a higher chance of women earning a lower wage compared to men. This study will attempt to analyze the political and social environment where a college is located and use the more prominent political view as a determining variable in a linear regression on the wage gaps of varying colleges.

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## Factors Influencing U.S. Income Inequality

MATTHEW PINHEIRO and Alyson Ma

The purpose of this research is to analyze the factors that contribute to income inequality in the United States. Understanding the nature of income dispersion in the United States can offer insight on potential issues that could effect future economic growth. Increased research on this topic will provide evidence for or against potential governmental reforms affecting income for millions of the working population. Levels of income inequality affect important social factors that contribute to the well being of individuals and the populace as well as economic incentives for entrepreneurs to capitalize on market conditions and increase productivity and quality of life for Americans.

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## Identification of pIgR in Zebrafish

MEGHAN MCKENNA AND MEAGAN SHERRINGTON and Valerie Hohman

This project aims to determine the expression of the polymeric immunoglobulin receptor (pIgR) in developing and adult zebrafish. While this antibody transport protein plays an integral role in mucosal immunity, little is known regarding its expression within developing and adult fish. Using RNA probes and whole mount in situ hybridizations, the messenger RNA coding for the pIgR protein will be detected at various stages in zebrafish development to determine the stage of development that pIgR is initially expressed. Additionally, the location of mRNA coding for pIgR within specific tissue in both developing and adult fish will be determined. This study will help us better understand the development of the immune system in fish, which may help in the creation of more effective vaccines for use in aquaculture.

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## The Bright Future of Nuclear Power in the United States: Considering Causes of Variation at the State Level

MOLLY HUMPHREYS and Randy Willoughby

In the next 25 years, the Department of Energy has predicted that global energy and electricity generation will increase 56% and 93%, respectively. For this reason, nuclear power is compelling to study due to the wide variation of nuclear power industries worldwide. For instance, some countries, like China, are expanding their industry, while others, like Germany are abandoning their industry all together. However, this research is specific to exploring the existing variation of nuclear power in the United States at the state level and seeks to consider the future of the nuclear power industry as a whole in the United States. There are a number of variables that affect this industry, such as competing energy sources, safety, and both federal and local policy. This study will explore these factors, among others, in relation to the nuclear power industry in selected states with varying attitudes and actions toward nuclear power. This includes expanding the industry or abandoning it all together, thus looking to the future of the nuclear power industry in the United States.

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## The Impacts of Ocean Acidification on the Diversity and Mean Sizes of Pteropods

Gonzalo Crivelli, Andy Sia

Increases in anthropogenic carbon dioxide levels have resulted in an increase in surface ocean carbon dioxide levels, driving pH levels down in the water column. This phenomenon, known as ocean acidification, is harmful to many organisms, including pteropods, which form their shells out of calcium carbonate. Ocean acidification reduces the amount of available calcium carbonate for pteropods. This study examined the diversity and mean sizes of pteropods in relation to pH, off the east coast of the North Island of New Zealand. The goal was to determine if the diversity and mean sizes of pteropods correlate with the relative pH of the sampled regions. Based on the results of previous-related studies, we hypothesized that there was a correlation between the diversity and mean sizes of pteropods and pH values. A lower pH led to lower diversity and smaller sizes, and a higher pH led to higher diversity and bigger sizes. Pteropod samples were collected in the nighttime from a meter net towed at a speed of two knots. The meter net was towed down to a depth of 200m. The pteropods were then separated out from the other contents of the tow and placed in sciv files filled with ethanol. Next, the pteropods were observed under a microscope to determine species type, and measured with a caliper to determine mean length and width. pH values were gathered using a spectrophotometer. Our results demonstrated a correlation between pteropod diversity and relative pH, with more pteropods found in less acidic waters and fewer pteropods found in more acidic waters. However, the correlation became less clear when comparing mean length and width to relative pH. Ultimately, because of various constraints, we were hesitant to accept or reject our hypothesis based on current results. Further research needs to be conducted on the subject matter before a decisive judgment can be formed.

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## The Effects of the H90 and E256 Mutations in the Interface on the Structure, Stability, and Activity of gMDH

NINA MARIE GARCIA and Jessica Bell

Interfaces are regions in a protein that form through interactions between subunits of a single protein. The interface's role in communicating activation or inhibition makes it critical for an organism's survival but has not yet been fully understood. Glyoxysomal malate dehydrogenase (gMDH) is a homodimeric enzyme with a single interface thought to participate in the regulation of gMDH. gMDH, which catalyzes the production of oxaloacetate in the glyoxylate cycle, is allosterically regulated by citrate. Citrate binds to a single subunit of gMDH but inhibits both active sites, indicating that the inhibitory effect must be passed through the interface. Understanding the role of the interface in regulation is central to understanding how gMDH catalyzes its reaction and its regulation. The interface contains electrostatic interactions, among others, between amino acid residues. To probe the role of individual sidechains at the interface, this project aims to disrupt favorable interactions by site-directed mutagenesis and determine the effects on stability, activity, and regulation. H90 and E256 appear to form a pH-dependent interaction across the interface. We have constructed, expressed, and purified two mutants, H90Q and E256Q. Size exclusion chromatography showed that neither mutation disrupted the dimeric state. Circular dichroism showed that WT, H90Q, and E256Q share identical secondary structures. The thermal melts demonstrate that the E256Q mutant is less stable than the H90Q and WT proteins. Kinetic assays showed that the WT, H90Q, and E256Q mutants differ in kinetic properties. Thus, the results suggest that the residues are critical for the enzyme's activity and stability.

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## Water you drinking?: Nitrate Contamination of Drinking Water in the San Joaquin Valley

SIMONE BATISTE, PERLA CRUZ, RICARDO CABRERO, GASTON MOORHEAD, MADELINE NELSON and Jane Friedman, Kevin Pelaez, Candice Price and Amanda Ruiz

Our work is based on the paper Social disparities in Nitrate-Contaminated Drinking Water in California's San Joaquin Valley by Balazs et al., which studies disproportionate exposure to contaminants through drinking water in low-income and minority communities. We reexamine the nitrate contaminant levels based on more recent data to determine if there has been any change in water quality. We will examine levels of arsenic-contamination in the water in California's San Joaquin Valley.

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## Burn Forest Burn: Effects of Controlled Burning on Forest Soils

QUINN TAYLOR and Meghan Midgley

In eastern deciduous forests, controlled burning is a common management technique used to control invasive understory plants and promote oak regeneration. However, little is known about how burning impacts soils. Studying these effects will aid in better understanding how burning is affecting the forest as a whole. We evaluated soil biogeochemical responses to controlled burning in forest plots with varying abundance of two types of trees: trees associated with either arbuscular mycorrhizal fungi or ectomycorrhizal fungi. We addressed two main questions: (1) does soil biogeochemistry change with controlled burning? (2) does tree mycorrhizal association mediate the effects of annual burning on soils? We found that burned areas have higher pH, carbon, nitrogen, and organic matter, and decreased acid phosphatase activity. Tree mycorrhizal association was not found to impact soil factors or to mediate the effects of burning. We predict an increase in phosphorous in burned areas, which may cause an increase in phosphorous-rich plants. Burning increases light available on the forest

floor and increases organic matter, carbon, and nitrogen, which may benefit oak regeneration. However, increased understory herbaceous plants in the burned areas are likely shading out many of the oak seedlings. These results should be considered when predicting the benefits of controlled burns. Funding was provided by the Center for Tree Science at the Morton Arboretum.

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## The Impact of Water Chemistry and Lake Characteristics on the Morphology of Damselfly Larvae

RUTH HOOVER and Kate Boersma

Humans affect aquatic habitats by altering their chemistry, nutrient content, and temperature. Studies have recorded impacts of these anthropogenic changes on the physiology and behavior of aquatic organisms, but less is known about how changes in water chemistry affect their morphology. To address this need, we examined the effects of physical, chemical, and biological changes in the aquatic environment on gill morphology in larval damselflies (*Ischnura*) collected from 19 lakes throughout California. We used linear modeling approaches to determine which of a suite of 60 environmental predictors affected gill surface area (lamellae). Specifically, we hypothesized that increasing water temperatures and hypoxic conditions would be associated with damselfly larvae with larger lamellae. We found that turbidity was positively correlated with lamellae size but that temperature and dissolved oxygen were not important predictors. As damselfly larvae with larger lamellae are easier prey for fish, this could impact aquatic food webs. Construction can cause increased turbidity. As the human population continues to grow, it is important to look at how anthropogenic changes affect aquatic organisms, especially aquatic insects as they are an important part of many aquatic food webs.

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## With Dignity: Observations of an Effective Transfer of Design and Building Instructions of an Assistive Latrine Aid Device for Landmine Survivors in Rural Uganda

HANNON BAILEY, Margaret Arach Orech, and Frank Jacobitz

Observations of an effective transfer of design and building instructions of an assistive latrine aid device are provided. Landmine survivors, along with other handicapped and elderly individuals, have difficulty using pit latrine toilets, and this project aims to help restore safety, independence, and dignity to their lives. The need for such an assistive device was identified by the Uganda Landmine Survivors Association (ULSA). Starting in early 2015, a group of students and faculty from the University of San Diego worked with ULSA to design and build prototypes of assistive latrine aid devices. These prototypes were evaluated in January 2016 in Uganda based on stability, manufacturability, and cost. This contribution pertains to the development of a sustainable model for constructing these devices in rural Uganda along with an effective transfer of design and building instructions to Ave Maria vocational school in January 2017. It explains the approach taken to most effectively identify possible recipients for vocational training support, the integration of the device design and construction into their vocational training, the need for community and family involvement during the training process, and reasonable expectations for both equipment and technical understanding of carpentry. It was observed that the successful implementation of a sustainable engineering project is best accomplished by directly interacting with the target population, utilizing local resources and skills, and incorporating community contacts to increase channels of communication across cultures.

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## Mobility and Conformational Dynamics of Large DNA Diffusing Through Cytoskeletal Networks

KATHRYN REGAN, Shea Ricketts and Rae Anderson

The high concentrations of proteins crowding cells greatly influence intracellular DNA dynamics. These crowders, ranging from small mobile proteins to large cytoskeletal filaments such as semiflexible actin and rigid microtubules, can hinder diffusion and induce conformational changes in DNA. The rigidity, mobility, and concentration of crowders all play a role in DNA transport, yet previous studies have mainly focused on the effect of small mobile crowders on transport. At the same time the rigid cytoskeleton has been identified as a key factor suppressing viral transfection and gene delivery. Here, we use fluorescence microscopy and custom single-molecule conformational tracking algorithms to measure center-of-mass transport and time-varying conformational sizes and shapes of single 115 kbp DNA molecules diffusing in networks of actin filaments and microtubules. We determine the dependence of protein concentration (11.4  $\mu$ M) and rigidity (actin vs microtubules) on DNA dynamics. Corresponding measurements with monomeric actin and tubulin identify the roles that network rigidity versus excluded volume play in transport. Initial results show that crowding by microtubules induces anomalous transport and larger, slower conformational fluctuations of DNA.

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## The Effects of Nucleotides on the Conformational Flexibility and Stability of Glutamate Dehydrogenase

SIRENA TRAN and Jessica Bell

Glutamate Dehydrogenase (GDH) catalyzes the reversible oxidative deamination of glutamate using NAD(P)<sup>+</sup>(H) and is involved in various metabolic pathways and energy cycles. GDH can be allosterically regulated by various nucleotides (ADP, GTP) as well as showing cofactor cooperativity. Previous work shows NADH binds to both the active site and a second regulatory (inhibitory) site while NADPH binds only to the active site. We hypothesize that changes in stability/flexibility correlate with inhibition and activation. To explore the allosteric mode for GDH, we have used Fluorescence based Thermal Shift Assays (FbTSA), Circular Dichroism (CD) and Thermal melts (T<sub>m</sub>) and Limited Proteolysis using immobilized trypsin and tandem mass spectrometry (LP) to explore the stability (global and localized) of the protein in the presence or absence of various combinations of nucleotides. CD and T<sub>m</sub> studies indicate that while the overall structure of the protein is not changed by pH, the stability changes dramatically over the pH range 6-8.5 with a pK<sub>a</sub> of 7.4. Below the pK<sub>a</sub> FbTSA experiments show that ADP and NADH binding to its regulatory site stabilize the protein significantly while NAD(P)H binding to the active site, or GTP binding destabilize the protein. The presence of glutamate has little effect. At pH 8 ADP and GTP have similar effects, while with NADH and NADPH destabilizes the protein. To determine localized regions of the protein responsible for these effects, we are using LP experiments and mapping regions of flexibility changes on the overall 3 dimensional structure of the protein.

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## The Faces of Denial in Dystopian Fiction

STEPHANIE MAZZUCA and David Sullivan

As the world slips into further social and environmental decline, the question of how society will be forced to adapt is being answered by an increasingly popular genre: the dystopian text. This study utilizes a ritual genre analysis to assess various dystopian characteristics of contemporary works, focusing on Ernest Cline's best-selling novel Ready Player One in four areas: its dual setting, style and structure, character development, and narrative themes. Specifically, this thesis addresses how Ready Player One's characters escape their dismal environment in favor of a utopian virtual reality and how the storyline is actually a critical reflection of society's denial of impending problems. The citizens in this novel are enslaved by their own addiction to a "video game" while simultaneously denying their responsibility for the welfare of the actual world.

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## The Effects of Early Digital Media Exposure on Development

SUSANNAH JENNINGS and Mike Williams

In today's technologically-driven society, digital media has become a centerpiece in the lives of most Americans, including children. The average child spends just over three hours per day consuming media, including TV, computer, mobile devices and tablets, and video games, while average time spent reading amounts to less than 20 minutes per day. Furthermore, infants under the age of two spend an alarming average of almost one hour per day exposed to digital media screens. The time spent only increases as children get older, and the implications of such behaviors are being increasingly reported to be associated with behavioral, health, and emotional problems appearing later in teenaged and young adult years. The purpose of my study is to examine the possible detrimental effects that early over-exposure to digital media has on the development of children. Using current research studies on infant brain development, the ways that media can interfere with healthy development progression, and longitudinal data, I will attempt to pinpoint the result of exposing young children to substantial amounts of TV and other screen time during their critical developmental stages. I conclude that media over-exposure at a young age will result in significantly higher rates of behavioral problems, poor health habits, and a lack of emotional attachment. In a world where digital media is here to stay and will likely only become more prevalent, the implications of this situation are critical to address.

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## The Innovative Power of Immigrants

WILLIAM CEN LAM and Alyson Ma

The purpose of this study is to discover the relationship between immigration and innovation in the United States by measuring patent per capita. The research demonstrates that immigrants patent at the double the native rate, due to their disproportionately holding of science and engineering degrees. The paper tries to measure the change in the skilled immigrant share since the 1940 distribution across states of immigrants from various source regions and the subsequent national increase in skilled immigration from these areas.

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## The Original Agent Carter: Women in the Special Operations Executive

CAMERON CARLOMAGNO and Kathryn Statler

When someone pictures what a spy looks like, the first image that usually comes to mind is James Bond—tall, mysterious, suave, and male. What is usually not associated with this image, however, is the woman who walks down the street carrying a purse and seemingly enjoying the day; yet she is the perfect candidate because she is deemed innocuous by society. This woman was the exact person that the Special Operations Executive (S.O.E) was looking for to help the resistance movements around Europe, during World War II—a secret organization established to collaborate with resistance groups across Europe and divert enemy military advances. Nevertheless, the women that would join this British spy network have not been remembered in standard history textbooks. They were, however, recognized in Marvel's fictional character Agent Peggy Carter—a woman who was recruited by the S.O.E for her brilliance in code breaking. The historical questions this research examines are what role did the women of the S.O.E play in fighting in and ending World War II in Europe, and more importantly whether modern popular culture representations, specifically Marvel's Agent Carter, are accurate.

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## Does Priming Have an Effect On Ego-Depletion?

Zaki Alabdullah, Imani Payton, Yifeng Du and Rebekah Wanic

The ego-depletion perspective on self-control argues that self-control is a limited resource. Therefore, when self-control has been exercised on a prior task, less will be available for future tasks (Muraven, Tice, & Baumeister, 1998). The aim of the present research is to evaluate whether the introduction of a priming stimulus might serve to counteract the effects of ego-depletion and improve self-control. Participants were randomly assigned to be exposed to a healthy eating prime or not and then completed an ego-depletion task. Self-control was then assessed with two methods, via self-report and behaviorally by looking at participants' food choice. Because previous research has also suggested that women display more self-control than men (Chubb, Fertman, & Ross, 1997), gender differences were assessed. The results indicated that priming had a significant effect on food choice but not self-reported self-control. There was also no evidence for a gender difference on either measure. We conclude that priming can work help override the effects of ego-depletion, but more research is warranted. Suggestions for future research are discussed.



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## Indigenous Contact with Cabrillo: Early Interactions Between the Kumeyaay and the Spanish Explorers

ANDRES MEZA, KATHERINE SPENCER and Tavio Del Rio, Iris Engstrand and Colin Fisher

Our research will help promote the indigenous presence by revamping the interpretive plan of 2009. The Interpretive plan is from 2009, so it has been seven years since its publication. I would assume that this project was stalled somewhere along the way or lost under paperwork, but although the description is a little vague I think that a commemorative work or memorial type project would help to bring the Kumeyaay community into Cabrillo and make connections between Cabrillo and other aspects of San Diego's history and culture. Making these connections would help achieve some of the objects set forth by the National Park Service's Call to Action for the second century of the NPS. One objective in the call to action stated, "We will fully represent our nation's ethnically and culturally diverse communities. To achieve the promise of democracy, we will create and deliver activities, programs, and services that honor, examine, and interpret America's complex heritage." I believe that one of the ways to more fully represent San Diego's diverse community would be to involve the Kumeyaay more, as they are the bases of civilization in San Diego. In addition, making more personal connections to the people involved in the history of Cabrillo would help to diversify the monument and allow people to make more personal connections with the history of the monument. Furthermore, through our research we will depict how the first interactions between the Kumeyaay and the Spanish explorers might have looked.

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## Mathematical Methods of Phylogenetics

SOPHIA RAGLIONE, LIA HEBERT, and Satyan Devadoss

Phylogenetics is a way of studying relationships through building genetic trees. By studying these phylogenetic trees, we can process large data sets to see complex relationships in a visual way. Many mathematical methods produce different trees with different accuracies and applications. We are studying distance, character, and probabilistic methods and how to best apply them to particular data sets. Using the program Phylip, we wrote code to analyze data sets we have collected from local breweries. This code converts matrices to proper input files for the program which is important in helping to process large data sets. We applied neighbor-joining, parsimony, and UPGMA methods to generate different trees and analyzed their accuracy by bootstrapping the data. By proper application of various methods, we can more accurately understand complex relationships generated by large amounts of data.

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## Effects of temperature on embryos and young larvae of Atlantic silverside

MEGAN M. DOTTERWEICH and Christopher Chambers

Rising global temperatures could have profound effects on marine fishes. The Atlantic silverside, *Menidia menidia*, is a key prey species in the food web of coastal habitats of the NW Atlantic. Spawning in late spring to mid-summer, its early life-stages (ELS) experience a wide range of varying thermal habitats. As an ectotherm, we expect many of its vital rates to vary directly with temperature, but the functional form of responses of silverside ELS to the full range of thermal habitats has yet to be conducted. We used an apparatus to experimentally examine the thermal responses of silverside ELS over 40 unique constant temperatures and a series of oscillating ones. Parent fish were collected from the Sandy Hook Bay (NJ) and strip-spawned in the laboratory. Eggs were incubated until hatching in either constant or daily fluctuating temperatures mimicking tidal inundation. Silverside embryos survived across a wide thermal range (12 to 32°C) with decreasing survival at the warmer end

of this range. Embryonic period duration decreased exponentially with increasing temperature (range >36 d at 12°C to 4.5 d at 32°C). Larvae survived without food for an average of 6 d which was independent of incubation temperature. Larval size at hatching decreased with temperature. Although *M. menidia* are tolerant to a broad range of temperatures, even slight shifts within the viable range could result in fitness and population consequences as a result of smaller sizes at hatching, related limitation in prey diversity, and greater risk to predation.

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## Pseudoku – Automatic Generation of Vertices

EUGENE PROKOPENKO and Jane Friedman

Sudoku is a logic-based, combinatorial number-placement puzzle. In Sudoku, the player must fill in remaining numbers so that the rows, columns, and inner boxes add up to a certain number. For this project we have developed a computer program for a game called Pseudoku, which is similar to Sudoku, but with slightly different rules. The main function of the program is the auto-generation and filtration of shape vertices. The Pseudoku program will be used to gather data for an inductive mathematical proof that is being constructed by Professor Jane Friedman. The data is in the form of vertices for matrices of various dimensions. The program displays an  $N^2$  by  $N^2$  matrix, divided into  $N^2$  small matrices, each consisting of  $N$  rows and  $N$  columns. The  $N^2$  by  $N^2$  matrix represents a shape. Each point on the shape is determined by filling in values in the matrix according to specific rules. The shape's outer bounds are defined by a set of special points called vertices. These vertices are determined by creating a system of linear equations from integers in the matrix space and then solving the equations. If the system has only one unique solution, then this point is a vertex. The program will allow for an efficient gathering of data in a user-friendly way.

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## Do Black Lives Matter in Spain?

JANE HENDERSON and JESUS MARTINEZ SAUCEDO and Rebecca Ingram

The (EU)ropeanization of Spain in 1986 has led to Spain's implementation of drastically brutal methods to control the influx of "illegal" immigrants trying to enter Spanish territory. From 1996 to 2006, the number of immigrants in Spain grew from 500,000 to more than 5 million. This research project analyzes how discourses of racism, xenophobia, and otherness permeate government policies created in response to this dynamic, physical structures erected to impede the arrival of immigrants into Spanish territory, and other forms of cultural production. As one specific example, an 8.4 km border fence surrounding the Spanish enclave of Ceuta was constructed in 1993. This border fence was built as physical barrier to stop smuggling and "illegal" immigration. Another example of the contentious nature of Spain's racialized policies is its lack to recognize the lives of its black inhabitants. Is the nature of 21st century Spanish national identity inclusivist, exclusivist, or assimilationist? Utilizing Gloria Anzaldua's conceptualization of the borderlands and Du Bois' "problem of the color line" this presentation will analyze how racism and its power structures are relevant to Spain's ongoing debate of integrating immigrants in its national identity.

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## Spread Em! An iPhone Application to Analyze NBA Point Spreads

John Graybill and Saturnino Garcia

The sports betting market is valued between 700 billion and 1 trillion dollars throughout the world. Wagers are placed legally through casinos, legally online, or illegally through bookies; however, all of these places have a common point spread for a single game. These values are calculated by experts and can vary up until the game begins. Changes in point spreads should come from new information that could affect the game, or from the quantities of wagers placed on each side. The goal of this project is to construct an iPhone application to gather meaningful information on point spreads and betting markets, specifically for NBA games. Spread Em! will allow users to submit predictions of point spreads for a given NBA game, compare their predictive abilities with others, and compare their predictions to the official point spreads of Las Vegas. With enough users the application should help identify how accurate point spreads really are, how good of predictors fans can be, if changes in point spreads can be identified ahead of time, and if a predictive model can be built for more accurate spreads. As gaining users will be one of the largest hurdles in this project, there will be a competition held over the course of the NBA playoffs, rewarding our best predictor with a cash prize.

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## Teaching Volcanic Eruptions through the Eight Intelligences in an ELL Classroom: Abstract

KRISTINA KIMSEY, Courtney Cooper and Danielle Michaelis-Castillo

Through Action Research, we explored how incorporating the eight intelligences, along with contemporary art and socio-constructivist learning practices, could impact the understanding and material retention regarding volcanic eruptions of fifth graders in an English Language Learner (ELL) classroom. We predicted that, through incorporating all of Gardner's intelligences and Yenawine's Visual Thinking Strategies (VTS), we would be able to engage students in a more effective way where more learning retention, open speaking, and collaborating would occur. The main activity in this two-day project involved small groups of students making physical representations of a specific stage in one of two types of volcanic eruptions (effusive and explosive eruptions), and then later creating a comic square utilizing pictures of their creations to describe their eruption stage. These comic squares then made up larger comic strips that illustrated the process of the two types of volcanic eruptions. Students collaborated within their groups to create a presentation of their part to the class. They were assessed based on how well they explained what the connection of their created model as well as how well they were able to explain in writing for the comic square. Throughout the process, they were engaged, collaborative, and creative, and the results of the project suggested that the strategies employed were effective and beneficial. Students spoke out freely, volunteered ideas, and were excited about their final products.

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## DROUGHT INDUCED DISPERSAL IN DIVING BEETLES IN THE WESTERN UNITED STATES

PATRICK CARROLL and Kate Boersma

Drought causes many physical changes to aquatic habitats, including increasing temperatures and decreasing water levels, which can threaten aquatic invertebrate communities. Some aquatic invertebrates, such as diving beetles, can disperse via flight to relocate or discover new bodies of water. Despite observations of aquatic beetles flying during drought, little is known about what actually triggers this dispersal. We examined how decreasing water level and increasing temperature affect diving beetle dispersal, with a laboratory experiment in incubators. We collected diving beetles in San Diego County, CA, USA and used dispersal traps to measure dispersal in response to varying temperature and water levels. At the end of the three-week experiment, we identified beetles to species and examined the relationship between dispersal, physical cues, and species-specific dispersal tendencies. We found that both water level and temperature positively affected dispersal; however, there was no interactive effect. Our results suggest that drought will lead to higher dispersal for aquatic beetles. With drought becoming more prevalent, drought-induced dispersal could have significant effects on the communities structure making understanding this phenomena vital.

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## The Effect of Conductivity on Community Composition

ABIGAIL MARTIN, Charolette Cassidy and Kate Boersma

Drought increases conductivity levels in freshwater bodies, but few studies have examined the effects of these changes on aquatic macroinvertebrate communities. Dispersal is a drought defense mechanism that also has the potential to greatly influence these ecosystems. Our research aims to study the effects of conductivity on dispersal, including trends in the timing and direction of dispersal, in aquatic invertebrates. We predicted increased conductivity would cause greater rates of dispersal in aquatic macroinvertebrate communities and that dispersal would occur earlier in communities exposed to higher conductivity treatments. We found that high levels of conductivity do indeed increase rates of dispersal in freshwater invertebrate communities. However, conductivity did not appear to effect the timing of dispersal. Our results give us new insights into the relationship and allow us to tentatively conclude that conductivity plays a role in aquatic insect dispersal.

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## Race, Space & Education's Place: Education or Incarceration

TIASHA ROGERS and Thomas Reifer

Juvenile delinquency is critically mediated by the intersection of race, space and education's place. This paper explores the centrality of race, space and education's central place in creating/reproducing juvenile delinquency, or fostering agency-laden education in areas of spatially and racially concentrated neighborhood disadvantage. My main focus is the extent to which education creates/reproduces juvenile delinquency or fosters agency among young people. My goals is to explore how juvenile delinquency can be decreased through improving educational systems in these communities. To this end, I explore the literature on juvenile delinquency, questions of agency and social struggles over education.

## UC Forums Does increased turbidity significantly affect predator evasion behavior by *Fundulus parvipinnis* and *Poecilia latipinna*

JACOB BARRETT and Steven Searcy

Turbidity, a measure of “cloudiness” of water, is caused by particles in the water column that scatter light, and it is a factor known to affect nearly every aspect of aquatic fauna interactions. Highly turbid waters can be detrimental for organisms that rely on vision by increasing risk of mortality and reducing foraging success, ultimately limiting growth rates. Although coastal environments naturally fluctuate in turbidity levels, anthropogenic factors that increase turbidity levels are a significant concern for ecosystem health. To attempt to study the impacts increased turbidity may have on local estuarine species, I performed an experiment in the lab to test the following predictions: (1) increased turbidity would decrease the detection distance of each species in response to a simulated avian predator, (2) increased turbidity would decrease the evasion distance of each species in response to the simulated predator, and (3) increased turbidity would decrease the evasion speed of both species in response to the simulated predator. The experiment was carried out on two local estuarine fish species, the California killifish (*Fundulus parvipinnis*) and the sailfin molly (*Poecilia latipinna*). The results of this experiment validated the predictions: increased turbidity decreased the detection distance, evasion distance and evasion speed of the two fish species in response to a simulated avian predator. This study shows that increased turbidity as a result of anthropogenic activity is a significant concern for local species, and the impact of turbidity on Southern California ecosystems is a topic worth investigating further.

## Raise Your Voice: Social, Environmental and Educational Concerns, a Case Study of Adult Students in Pilcopata, Peru

SHIREEN KARIMI and Katie MacDonald

Students of higher education in the rural community of Pilcopata, Peru participated in a study to determine what they perceived to be largest environmental and social concerns, as well as the largest obstacles facing their daily lives as students. Indigenous methodologies and PAR (participatory action research) were used whilst conducting research and methods of data collection involved: photovoice, focus groups, as well as semi-structured interviews. Significant environmental concerns included: trash in the streets, and contaminated water. The most pressing social concerns included: alcoholism and a lack of sexual education amongst the student population. Finally, the largest obstacles to daily life for students included: unorganized and unreliable teachers, as well as the difficulty of juggling both classes and work. The possible solutions to these concerns were largely centered around the involvement of several organizations in town and the idea that these organizations must be willing to work with each other in order to create change.

## 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 2017 recipients of the Outstanding Undergraduate Research Mentor Award, Dr. Joseph Provost (Department of Chemistry and Biochemistry, College of Arts and Sciences) and Dr. Jennifer Prairie (Department of Environmental and Ocean Sciences, 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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