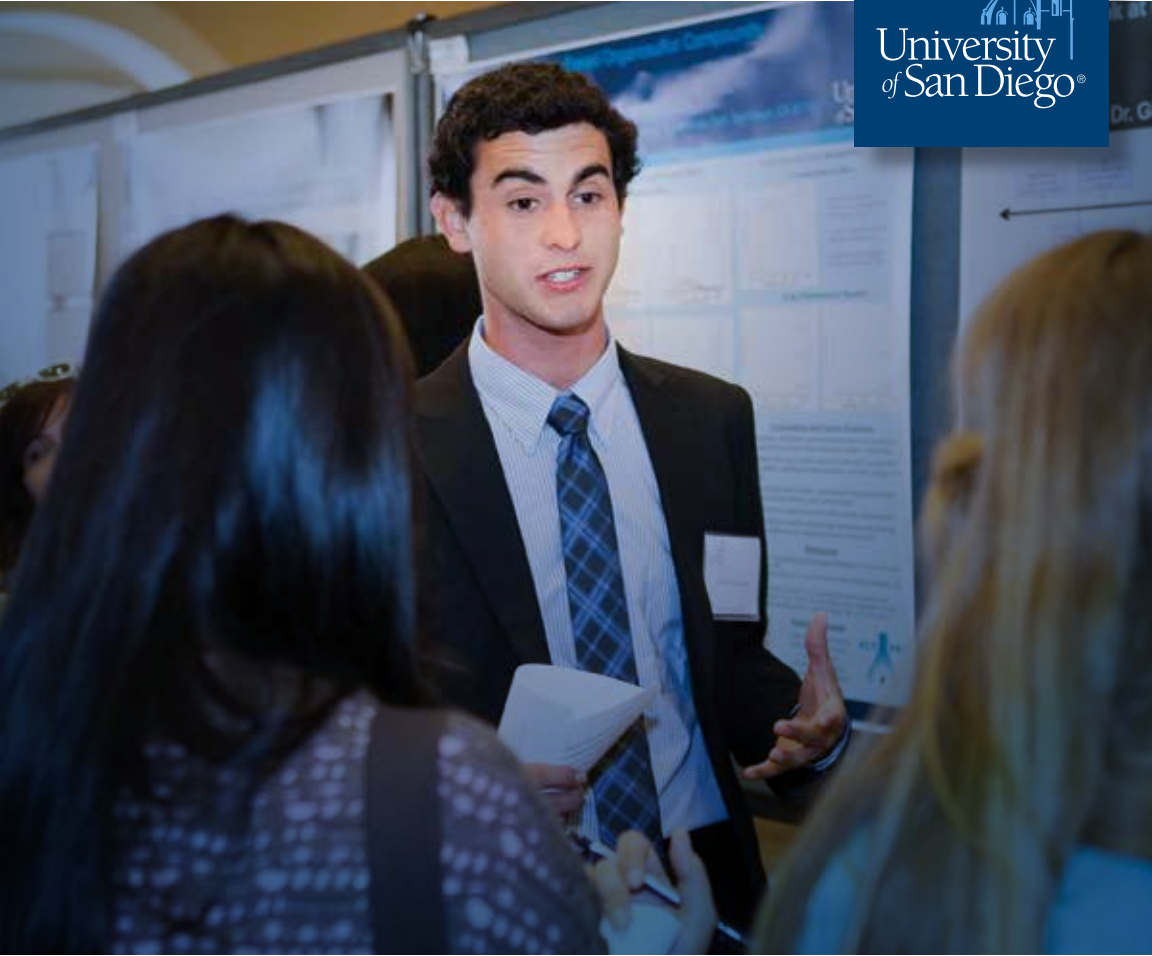


# UNDERGRADUATE RESEARCH CONFERENCE



**APRIL 18, 2013 > 12:15 – 2:15 p.m.**  
**HAHN UNIVERSITY CENTER**

student-faculty  
research  
scholarship  
internship  
creative works  
[www.sandiego.edu/urc](http://www.sandiego.edu/urc)



The Office of Undergraduate Research was established in September 2011 to promote research, scholarship and creative activities across campus. The office aims to ensure that USD undergraduates have the opportunity to engage in these activities both inside and out of the classroom. The Office of Undergraduate Research provides services to both students and faculty, and encourages collaborations across departments and disciplines.

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

# WELCOME

to the 2013 Undergraduate Research Conference!

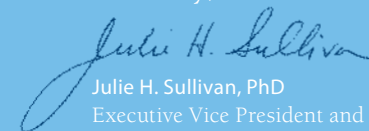
Today we celebrate the 23rd year of an undergraduate research conference at the University of San Diego. While the name of the conference has changed over the years (most recently it was known as Creative Collaborations), its purpose remains unchanged and its scope continues to grow.

The conference showcases the vibrant research, scholarship, internships and creative activities of USD's undergraduate students in partnerships with faculty mentors from disciplines across the campus. Students present their work through poster presentations, interactive exhibits, and, new this year, the Visual Arts Exhibition. Visual arts students will display their art in the University Center Exhibit Hall. The Visual Arts Exhibition will remain in the Exhibit Hall through April 28.

Many of the students who participate in the Undergraduate Research Conference also publish their work in academic journals and present their projects at national, international and regional conferences. These projects often lead to graduate school acceptances and prestigious scholarship awards. The high-quality work you see reflects the outstanding mentoring abilities of USD faculty, as well as the intellectual curiosity of our undergraduate students.

We continue to be impressed with the yearly increase in faculty-student scholarly collaborations. We would like to thank our faculty members who mentor, teach and model scholarly excellence for our students and thus make the Undergraduate Research Conference possible. We encourage you to visit the various presentations and exhibits and talk with our students about their ongoing research and creative activities.

Sincerely,

  
Julie H. Sullivan, PhD  
Executive Vice President and Provost

  
Thomas Herrinton, PhD  
Interim Director, Office of Undergraduate Research



## Schedule

### Welcome

12:10 p.m. Julie H. Sullivan, PhD  
Executive Vice President and Provost  
Front of the Hahn University Center

### Student Presentations

- 12:15 – 1:15 p.m. **First Session**  
Interactive Exhibits: Hahn University Center, Front and Foyer  
Visual Arts Exhibition: Hahn University Center, Exhibit Hall  
Poster Presentations (Odd Numbered): Hahn University Center, Forums
- 1:15 – 2:15 p.m. **Second Session**  
Interactive Exhibits: Hahn University Center, Front and Foyer  
Visual Arts Exhibition: Hahn University Center, Exhibit Hall  
Poster Presentations (Even Numbered): Hahn University Center, Forums





## First Session Interactive Exhibits

12:15 – 1:15 p.m.

### The Polyhedral Atlas

Ryan Barney, Jacob Bruce

Faculty Advisor: Daniel Lopez-Perez

Department of Art, Architecture + Art History

UC Foyer West Alcove

This ongoing research project analyzes thirty space frame prototypes designed by R. Buckminster Fuller, Robert Le Ricolais, Konrad Wachsmann, and others. Each case was modeled and analyzed according to spatial affects, tessellation, and polyhedral aggregation. This project was furthered by typological experimentations with flexibility. Using the original prototypes as case studies, this project sought to embrace the flexibility of these polygons and polyhedrons, producing complex variation, deformation, and transformation. This project is currently under development.

### An Analysis of the Benefits of Open Source Applications of the Arduino

Ross Johnson

Faculty Advisor: Thomas Schubert

Department of Engineering

UC Foyer East Alcove

The Arduino microcontroller boards facilitate convenient use of prototyping programmable platforms. These boards allow users to interact with hardware using a mixture of Java and C/C++ based programming languages. Using an open-source development environment in the Arduino 1.03 software serves the community at large by providing users with free access to a large database of examples. This usage helps extend and redistribute principles that allow constant improvement on current designs as the community continuously analyzes this source code. The Arduino microcontroller is a powerful tool when applied to various electrical engineering applications such as programming a robot to autonomously navigate a maze. This project will consist of an Arduino-based data acquisition system measuring the current GPS coordinates, temperature, and carbon dioxide levels on an accessible laptop. Such continuous data-logging can be beneficial to scientists when gathering data about the temperature, and fluctuating carbon dioxide levels throughout the day.

## ViaSat Automated Acquisition System

Jacob Rogers, Kyle Burns, Andrew Tran, Kevan McConlogue

Faculty Advisor: John Glick  
Department of Computer Science  
UC West Well (outside)

Professionals working in the field can often find themselves needing a way to communicate with the outside world, as some job sites are too remote to be covered by traditional cellular networks. Therefore, a more reliable method is necessary. Portable satellite receivers are capable of receiving and sending signals from almost anywhere in the world. However, the current models offered by ViaSat rely on manual signal acquisition and have no locking mechanism in place to stabilize the receiver. We will install precision stepper motors and a lightweight computer system to acquire the satellite signal and lock onto it. The system will use a signal-detecting algorithm to zero in on the strongest signal. Three data points will be taken and be used to find an area with the probability of containing the strongest signal. This process will be repeated until the signal is determined to be higher than a predetermined tolerance.

## Open Source 3D Printer

Kristian Wittman, Nicholas Perez, Justin Snelling, Elphbert Laforteza, Denver Pascua

Faculty Advisor: David Malicky  
Department of Engineering  
UC East Well (outside)

The Engineering Department of the University of San Diego owns two 3D printers. These printers are used both to educate students as well as to manufacture parts and prototypes for projects. One printer is expensive to operate, while the other is difficult to maintain. The department desires a new printer which is low cost, easy to operate, and performs similarly to or better than existing printers. Our senior design project takes these factors into account and aims to build an affordable machine that can print plastic parts with the speed and accuracy comparable to the two printers. To do this, we will modify an existing open source design created by the “RepRap” community. Improvements to the existing design will consist of a conveyor belt to facilitate multi-job production, an enclosure to protect the printed part from external conditions, a more stable structure to withstand operational vibrations and stresses, and an improved extruder design.





## Second Session Interactive Exhibits 1:15 – 2:15 p.m.

### Explorations of the Chican@ Experience Through Art

Carly Newman

Faculty Advisor: Alberto Pulido, Derrick Cartwright  
Department of Ethnic Studies  
UC Foyer West Alcove

My research project is a Chicano art display. I am in contact with various students who are artists and who work in the areas of Chicano art. I am utilizing Raul Villa's notion of "Barrio-Logos" and implementing his concepts of "Barriology" and "Barrioization." The main focus of the project is to explore the Chicano artistic aesthetic here on the USD campus. With this project I hope to expose the campus to the importance of inclusion and diversity through art.

### Untitled Space

Noe Olivas

Faculty Advisor: Allison Wiese  
Department of Art, Architecture + Art History  
Parking Space, Front of UC

The past year I have been working diligently with my team to transform a working utility vehicle – a 1967 Chevy step-van P30 – into a slick art institution. The vehicle will serve as an alternative and unconventional, yet utilitarian, space, which will not only allow artists to exhibit their own art, but will also enable them to display their art around the city. The project, Untitled Space, finds inspiration across a menu of high and low art traditions that have fueled my recent work, such as Mexican-American car club low-riders; rat-rod and custom car culture in Southern California; the avant-garde conceptual sculpture of contemporary artists like David Hammons and the street art movement of the last 25 years. These influences have formed my aesthetic language, and are conveyed through both the vehicle's exterior and interior. The project is not yet completed; the exterior and interior are still in progress. Currently, the vehicle is in the process of receiving air-bag suspension. The purpose of the air-bag suspension is to lower the vehicle for easier access, as well as to reference the Southern California low-rider culture. The materials of the air-bag suspension were funded by the Fall 2012 A.S. grant. The conversion of the interior is on hold until all the mechanical labor is completed, as we are working with grease and do not want to stain the new interior. Once the mechanical labor is complete, the interior will be outfitted with all the trappings of a contemporary art institution: hardwood floor, white walls and a miniature track-lighting system.

## Hip-Hop's Normalization: A Case Study of Transforming Deviant Identity

Maya Sullivan

Faculty Advisor: Julia Cantzler

Department of Sociology

UC Foyer East Alcove

As hip-hop emerged in America, its flashy bling, booty-bouncing girls, and thug attitude shocked and horrified the masses. Criticized for promoting violence, misogyny and a whole slew of other immoral behaviors, hip-hop culture was labeled as deviant. In reaction to this deviant identity, hip-hop artists attempted to minimize their stigma. In defense of their culture, hip-hop artists have employed techniques that include "Condemning the Condemners," "Defense of Necessity," and "Appeal to Higher Loyalties." In contemporary society, the popularity of celebrity rappers, hits on the radio, and the entrepreneurship of the hip-hop industry implies the success of these micro-level techniques; hip-hop has appealed to America's values and norms and has undergone the process of normalization in mainstream culture. This case study applies the theoretical framework of social deviance to the techniques of stigma management of hip-hop artists and gives new understanding to the process of transforming deviant identity.





## First Session Visual Arts Exhibition

12:15 – 1:15 p.m.

### Withered Reflections

Kristen Crowe

Faculty Advisor: Duncan McCosker  
Department of Art, Architecture + Art History  
UC Exhibit Hall

My photographs reveal reflections of a past time in a particular place. The Sawtooth Valley, in central Idaho is littered with dilapidated structures, tell-tale signs of its history. The abandoned cabins and barns that I photograph against a white, snow-covered backdrop capture the essence of these withered dwellings that have been left for time and man to overtake and erase. The images highlight these places that are now passed by without a second glance. The history of the region is rich due to the mining era in the region. It is my desire to remind my viewers that little snippets of our past history are all around us, lonely and forgotten. There is immense beauty in these simple structures. Through my large prints, I wish to transport my viewers to this forgotten place. Hopefully they will walk away and perhaps look a little closer the next time they see an abandoned home or barn and reflect on its potential history.

### You Turn Me On

Virginia da Rosa

Faculty Advisor: Allison Wiese  
Department of Art, Architecture + Art History  
UC Exhibit Hall

Intimacy is a daily occurrence, whether it is with something we touch everyday or the people we interact with. My work investigates engagement with our surroundings and the people in our lives through language and commonplace materials. By bringing a tactile quality to my work, as a result of using everyday materials that our hands come in contact with, interacts with the idea of a physical intimacy, which allows something private to become public. In this project a familiar light switch invites others to participate with the sculpture, the possible reactions that happen once one is turned on mimics what can happen in our daily lives when we choose to engage with others.

### Beguiled

Avery Downs

Faculty Advisor: Bill Kelly, John Halaka  
Department of Art, Architecture + Art History  
UC Exhibit Hall

The evenly matched fight between my brain's left and right side has led me to pursue business along with art, resulting in art that embodies both organic and analytic qualities. My work is about reintegrating wonder into our lives by bringing light to the curiosities of natural found objects that may have otherwise been discarded or overlooked. It suggests that once humans take the effort to delve into the intricacies and perplexities of the things around us, we gain a greater sense of self and our place in the world. Much of my inspiration has come from curiosity cabinets of the 16th and





17th centuries. Overseas explorers returned from the New World with “never been seen” objects to show off in the homes of the wealthy and royal. Entire rooms and hallways were designated to marvel at these unique treasures from abroad. God-made natural wonders and man-made artworks were displayed side by side, both as reminders to appreciate the beauty found in the unknown.

## Untitled

Olivia Igoe

Faculty Advisor: Allison Wiese

Department of Art, Architecture + Art History

UC Exhibit Hall

The experience of the unfamiliar can illuminate the beauty of the unbeautiful. It demands a moral judgment and self-reflection. The desert life, people on the fringe of society, abandoned spaces and places that remain crippled on their plots captivate me. They are an enigma to me. I envy and adore them. They don't have to be anything. They don't have to conform. They just live. My camera beckons me back to the deserts of Eastern California, in particular, the areas surrounding Slab City and the Salton Sea. These people and places that I have become enamored with are undefinable. They're displaced, yet they seem to be content. They don't feel the need to define their existence. The forsaken and deteriorating spaces are tragic and yet, they hold a beauty that I find reflected in the people living amongst these similarly ephemeral forms.

## WONDERLAND

Cathy Nguyen

Faculty Advisor: Saba Oskoui

Department of Art, Architecture + Art History

UC Exhibit Hall

W O N D E R L A N D is an illustrative design of the classic 1865 novel, “Alice's Adventures in Wonderland” by Lewis Carroll. The story follows a girl named Alice in her encounters with a fantasy world filled with logic, paradoxes, and darkness. This 3-part series chronologically depicts Alice's journey, following her fall down a precarious rabbit hole, her walk through Wonderland's mysterious forest, and finally, her confrontation with the daunting Queen of Hearts. My design approach strives to capture a contemporary view of Alice's journey through abstraction, contrast, and typographical exploration. Abstraction and contrast aim to provide an alternative and bold perspective of the story, while typographical exploration of forms found on playing cards provide texture and reinforcement of the story's elements. This approach aims to convey the dark essence of the classic story in a new way, signifying its wide interpretation and timelessness.

## Untitled

Natalie Weese

Faculty Advisor: Allison Wiese

Department of Art, Architecture + Art History

UC Exhibit Hall

Through the absence of color I am able to change the perception of a memory. When any person creates work that reflects who they are they are choosing to publicly share their ideas, giving others the opportunity to experience their point of view. As difficult as it is for me to expose myself artistically and allow my work to be publicly observed, I have found a way to reveal myself through furniture. The process I use to modify my pieces has allowed me to reveal my place in a memory, and each altered piece of furniture can be viewed as a self-portrait. The transformation of these pieces has allowed me to express who I am, and share a part of my story.



## Disconnected

Mary Biedekarken

Faculty Advisor: John Halaka

Department of Art, Architecture + Art History

My paintings are “easy-to-read” metaphors for complex philosophical positions which challenge the concept of shared human experience. In my work I try to establish a discordant mood of emotional disconnection by using images and colors that are aesthetically pleasing and yet somewhat distressing at the same time. My pictorial spaces are fractured by irrational light and distortions of perspective, scale, and edges. The people or objects in my paintings are distinctly disconnected from one another and from the viewer. Through these means I try to show how our experiences and our identities are continually fluid and unique to ourselves; that shared experience is not a real possibility and is, in fact, a myth.

## Trees On Strout

Hannah Day

Faculty Advisor: John Halaka

Department of Art, Architecture + Art History

The images presented are from a project I completed about a year and a half ago, which took the form of an illustrated children’s book. The story encompasses 14 illustrations in total. This exhibition presents a selection of three to five of these images. The story, titled “Trees On Strout,” is set in the not-so-distant future and follows a family as they travel to visit the last trees on Earth, housed on a small island off the coast of Maine, which has been repossessed from its previous owners and is now operated as a tourist attraction. The young boy of the family has never seen a tree and does not know what they are. Instead of explaining the botanical nature of a tree, each family member shares a personal memory of trees from his or her past to illustrate to their son/nephew/grandson the grandeur of these beings--a divulgence which leads to many difficult questions.

## Nevermore

Christopher Hincke

Faculty Advisor: John Halaka

Department of Art, Architecture + Art History

Nevermore is a symbolic self-portrait that calls upon my Irish heritage. It is a visual allusion to the Irish legend of King Sweeney who was transformed into a bird, living in thorns and eating only watercress until his ultimate redemption at the end of his life. I chose this story as a symbol of the isolated life I used to live, however the title implies I have also redeemed myself. The bird chosen is the raven, symbolizing intelligence and also playing with the title in reference to the poem “The Raven” by Edgar Allen Poe. The literary reference in this piece symbolizes my love of reading. The octagonal design with the assemblage-like frame symbolizes my desire to stand apart from the norm, i.e. conventional rectangular canvases.

## Bliss

Jacob Leyrer

Faculty Advisor: John Halaka

Department of Art, Architecture + Art History

In my paintings, I look to capture a moment in time and develop the piece from my own point of view. I find enjoyment in the process of making a piece as I find it difficult to ever call a painting “complete.” In the words of cartoonist Scott Adams, “creativity is allowing yourself to make mistakes. Art is knowing which ones to keep.” This piece is of a young, beautiful woman frozen in a moment of bliss. As she glances back at her lover, she becomes unaware of the dangers ahead and the truth about the moment she never thought would end.

## Untitled

Joseph Seiler

Faculty Advisor: Bill Kelly

Department of Art, Architecture + Art History

UC Exhibit Hall

Failing is an integral part of life. From failure we guide ourselves, it teaches us much more than our successes, it is an essential part of process. For there to be growth, something must die, somewhere along the way something must be left behind. Growth and decay complement themselves. Perfection is fleeting. In my work there should be no preconceived image or ideal, the work arises from the first mark that is made, and every mark added after that either works for it or against it. It becomes a give and take, a dance or a battle, continuously building until one is finally satisfied. It is hard to know when one is done. In a fast movement of the arm and hand, energy is released; an image is left on the surface. Through the laborious process of the woodcut, that image is felt.

## Hunted Series

Andrea Trobradovic

Faculty Advisor: Andrew Cross

Department of Art, Architecture + Art History

This photographic series addresses an array of issues regarding femininity, strength, and human nature. The works create a fantasy world in which men are predators and women the prey; a world which differs little from the reality in which we live. Women are often “hunted” by men; they are objectified, dehumanized, and reduced to uniform, vulnerable prey constantly living under the threat of falling victim to a ruthless hunter. The series humors this metaphorical predator-prey relationship presenting hunted women as strong, powerful creatures prepared to defend themselves. The images remind us that humans are members of the animal kingdom and will often act instinctually. Men may instinctually hunt, but women should never submit to the threat of predators, and should defend themselves until mutual respect is attained among the sexes that are governed by the natural laws that are implied when we exist together as animals of the same species.





### 1 Democracy in Latin America: An Institutional Approach

Christopher Allison

Faculty Advisor: Emily Edmonds

Department of Political Science and International Relations

For decades democracy has managed to elude Latin America. Until the more recent so-called Third Wave of Democracy, democratic systems have been fallible, inconsistent and have ultimately failed. So the questions must be asked: what makes this wave of democracy different? What are the most important determinants of democracy and can they be applied to a worldwide context or are they unique to Latin America? The reality is, in terms of Latin America, one cannot simply point to one single factor that has led to the recent trend of democracy. It is in fact a hierarchal web of variables that have allowed for a slow and steady process of democratization. At the top of this hierarchy, or perhaps at the crucial foundation, is the variable of institutional stability. If a Latin American country does not have sound, legitimate formal and informal institutions, then democracy is abruptly stopped in its tracks. Once legitimate institutions are in place, then sound economic reform can be enacted. For too long Latin American politics has been crippled by the bribes and economic manipulation of illegitimate government agencies. Finally as socio economic stability increases so too will positive attitudes about political culture and civic participation. In this domino effect all the variables are sufficient but it is not until they are aligned properly that they become both necessary and sufficient to yield a result of democracy. However, for this domino effect to take root, as it has in Latin America, legitimate and efficient institutions must be established.

### 3 Exploring Organizations for Undocumented Students in Higher Education

Denise Ambriz

Faculty Advisor: Michelle Camacho

Department of Sociology

The research study will examine the experiences of undocumented students in higher education who belong to an organization that aims to help AB-540 students. As these students progress in their educational careers it is imperative that they continue to receive support from their mentors and community because they are no longer under the protected status guaranteed to them in K-12. The designated space created by these organizations gives AB-540 students a sense of belonging and legitimacy on their college campus. Through qualitative interviews the researcher will examine how these students have been impacted by the organizations they are part of. As a case study the research focuses on students who belong to the organizations STAND in CSU San Marcos and CoSA, a student organization founded in San Diego for the purpose of supporting the DREAM Act. Results are anticipated to show that through these organizations students promote an increase in civic engagement among their peers and foster a sense of belonging to an established entity. Although they are not citizens of the U.S. they are citizens of change.

## 5 The Art of Remembrance: Art and Photography in Post-Dictatorial Argentina

Maria Arce

Faculty Advisor: Alejandro Meter

Department of Languages and Literatures

My work constitutes an analysis of the transformation of visual arts after Argentina's last dictatorship (1976-1983) that contemplates the birth of a new art form focused on the resistance of people through the deputation of violence, injustice and trauma of the past, as a result of state terrorism. During this period, art became an important form of cultural production that expressed new artistic sensibilities, thus allowing the visual arts to become a vehicle of remembrance in Argentina. This analysis is reflected in the work of Carlos Alonso, Ines Ulanovsky and Fernando Fazzolari. Their work collectively reflects a new Argentina still healing from the brutality of those dark years, that refuses to forget after 30 years since the end of the military dictatorship.

## 7 The Stress Management System

Adam Arevalo, Alex Elizarraraz, Marie Piette, Alvin Javier

Faculty Advisor: Ernest Kim

Department of Engineering

Anxiety disorders affect about 40 million, or 18%, of adults in America. These disorders, as well as multiple physical health issues, are caused by long-term untreated stress. Sponsored by Peartree Technology, the Stress Management System gives an individual the tools needed to understand and control stress before it becomes harmful. Through the use of sensors, smart phones, and host analytics, it is possible to create a friendly interface to help track and manage stress. The sensors would be mounted on a user friendly "bracelet" and will constantly relay the measured information to a selected Bluetooth device. With the connection of a biosensor to an easily accessible analysis, this system could be revolutionary in helping people control their stress and help them get back into the healthy lifestyle they deserve. The senior design portion of this project will be a proof of concept that will contribute to the final product.

## 9 Internship: Office of U.S. Senator Jeff Merkley

Maya Arrieta-Walden

Faculty Advisor: Gary Gray

Department of Political Science and International Relations

The presentation will describe an internship I completed over the past summer in the Washington, D.C. office of U.S. Senator Jeff Merkley of Oregon. During the internship I worked most closely with the communications department and press secretaries, while also assisting with legislative research and constituent services.

## 11 Beyond the Book: Fresh Perspectives on the Print Collection by USD Students

Katherine Ayd

Faculty Advisor: Derrick Cartwright

Department of Art, Architecture + Art History

Beyond the Book features the work of fourteen USD students representing over a dozen academic disciplines, hung alongside the work of 13 artists from the 16th through the 21st centuries. Unlike more traditional art exhibitions, Beyond the Book: Fresh Perspectives on the Print Collection privileges the personal interpretation over the art-historical. However personal these perspectives might seem to us, these responses are not a-historical. Indeed, they reflect our own time and circumstances. And the more personal an insight, the more thought it may provoke in others. The interpretations of works of art on display here won't likely be found in any textbook or academic journal. Just the same, they may encourage us to consider the value of unique perspectives and interdisciplinary dialogue. Beyond the Book aims to make viewers think creatively, while showcasing the diverse interests, talents, and points of view of USD students who are immersed in a diverse set of academic disciplines.

## 13 Wine Devotion

Carrie Baird

Faculty Advisor: Jaime Gomez

School of Business Administration

The presentation will offer a business model involving a wine importation and distribution business of Argentine and Chilean wines. The business looks to present these under-exposed wines to consumers through a uniquely cultural, gastronomic experience. The business model will include a value proposition, business structure, identification of target markets, and marketing and financial plans.

## 15 Diet and Heavy Metal Exposure of Juvenile California Halibut (*Paralichthys californicus*) in Mission Bay, San Diego

Alyssa Beerling

Faculty Advisor: Ronald Kaufmann

Department of Marine Science and Environmental Studies

Estuaries serve as nursery habitats for many juvenile fish species, including California halibut. Mission Bay is a seasonally hypersaline estuary, with the back bay receiving runoff from three main freshwater sources during rainy seasons and experiencing long retention times during dry seasons. Mission Bay displays a contamination gradient from the less-contaminated front bay to the back. In the back bay, sediments contain various contaminants, including heavy metals, that can be harmful to marine organisms. Fishes like California halibut can be exposed to metals through their diet, which I am studying. I collected juvenile California halibut from various locations within Mission Bay and identified and measured metal concentrations in prey from their stomachs. The major dietary components included small fishes, primarily gobies and topsmelt, and invertebrates such as mysids, copepods and shrimp. Results of this study should provide new information about dietary exposure to contaminants in this important fish species.

## 17 Preparation and Investigation of ZIF-8 Thin Films

Brian Benedicks, Andrew Cerro

Faculty Advisor: Lauren Benz

Department of Chemistry and Biochemistry

We will report a study of the formation of zeolitic imidazolate framework (ZIF-8) thin films on gold and silicon substrates. We employed solvothermal deposition as well as dip-coating from a colloidal nanoparticle solution in order to form thin, uniform films. Nanoparticle coalescence was observed to occur on both substrates over time, and thermal annealing of the thin films was explored as a way to control the coalescence process and explore thermal stability. Uniform, thin films were investigated further for interaction with CO<sub>2</sub> using temperature-programmed reaction spectroscopy.

## 19 Civil Society and Its Role in the Success of Democracy in Sub-Saharan Africa

Jessica Berry

Faculty Advisor: J. Michael Williams

Department of Political Science and International Relations

This paper addresses the nature of the role of civil society organizations in the effectiveness and success of democratic Sub-Saharan African nations. African states are often weak due to their inability to influence or give representation to the lower classes. Civil society institutions give people incentives to participate such as a sense of belonging and the ability to socialize their members into the values of democracy. This paper seeks to examine the success of democratic states in terms of their survival, the actions of their leaders in regards to respecting election results, and the ranking of freedom designated to them by the organization Freedom House in correlation to the status of their civil society organizations. The definition of civil society will be that of a population of solidaristic groups which form for collective purposes in the political space between the state and the populace. This definition includes faith-based organizations in order to contextualize the reality of civil society in African cultures as opposed to the normative western definition of the concept. The focus of this research will be in a select group of Sub-Saharan nations which have at some time been democratic between 1990 and 2010.

## 21 Attendance of Football Matches in England and the Effects of the Recent Economic Recession

Roy Bourgazas

Faculty Advisor: Andrew Narwold

School of Business Administration, Economics

After the separation from The Football League and the formation of the Premier League, the demographics of football (soccer) fans in England have greatly shifted. Ticket prices have gone up on account of the rise in popularity of the Premier League with fans tuning in every weekend from all around the world. Many of the working class cannot attend the matches of the teams they support as they are priced out of attending. This has caused a drop in attendance from some clubs in lower positions in the league. This study will develop a linear regression model to analyze what affects stadium attendance, taking into account variables such as the prestige of the club and how well the club is performing in the league. Another variable included will measure the effect of the recent economic crises on the attendance of football fans.

## 23 Blurring Borders: A Neighbor-Hood/Rise Plan for Downtown San Diego

Jacob Bruce

Faculty Advisor: Daniel López-Pérez, Whiteny Moon

Department of Art, Architecture + Art History

Downtown San Diego is a growing urban environment with several overlapping and conflicting models for the urban neighborhood. Unlike traditional connotations of 'neighborhood' as a focal point of communal diversity and interaction, Centre City Development Corporation's Neighborhood Planning Model has restricted the urban neighborhood into horizontal spaces of fixed building codes, single-use towers, and gridlocked, dead spaces. Unlike traditional models of neighborhood planning that create restrictive borders according to predetermined political lines, the urban neighborhood must be perceived as an exploded model, capable of occupying a single block. This revised neighborhood model, A Neighbor-Hood/Rise Plan, proposes to blur traditional urban neighborhood borders, turning the city on its side and perceiving the urban neighborhood through a revised vision of consolidation and separation. The Neighbor-'Hood' is no longer a 'covering' or 'enclosure' of bounded space, rather the Neighbor-'Rise' model embraces the 'vertical' nature of the growing city, promoting unrestricted, open, and spontaneous neighborhood development.

## 25 Asymmetric Diboration of Aldehydes: Formation and Synthetic Utility

Peter Cannamela, Randall Clendenan

Faculty Advisor: Timothy Clark

Department of Chemistry and Biochemistry

The (ICy)CuOt-Bu complex, originally developed by Sadighi, has been shown to be an effective catalyst for diboration reactions of carbonyls. Diboration of such substrates allows direct access to a number of valuable products,  $\alpha$ -trifluoroborate salts and  $\beta$ -hydroxyboronate esters have been the two main types of products this research has focused on. Trifluoroborate salts are extremely stable compounds and are efficient substrates in coupling reactions. Meanwhile, formation of  $\beta$ -hydroxyboronate esters represents the synthesis of a new C-C bond while retaining the C-B bond which remains available for further reactions. In both of these product types stereoselectivity can be controlled, meaning we are able to obtain a single diastereomer of our product, essential to the medical or industrial value of our synthetic products. Future work will focus on broadening the scope of trifluoroborate salt reactions and isolation of homologated products since purification has proved difficult in the past.



## 27 Stochastic Effects on the Outcome of Species in Competition

Matthew Cattivera

Faculty Advisor: Seth Haney  
Department of Mathematics

The vast biological diversity of the Earth cannot be overstated, however, the mechanisms that promote this diversity are still hotly debated. It is well known in community ecology that stochasticity can change the fate of a system of competing species. For example, systems that lead to coexistence in deterministic models may result in competitive exclusion in a stochastic model. Here we study a system of competing species with both stochastic and deterministic models to evaluate the impact of environmental variation and stochastic effects on coexistence. Using a deterministic model we can obtain analytical solutions in the autonomous case and use a perturbation method to extend this to approximate solutions where environmental variation is present. We compare this to a discrete stochastic model and find that, while the stochastic model predicts competitive exclusion, no such environmental variation can reproduce this behavior in the deterministic case.

## 29 Solar Thermal Energy Storage

Carmen Chavez, Mychael Medina, Will Muldowney, Tyler Hoffman

Faculty Advisor: David Malicky  
Department of Engineering

A rooftop-mounted flat plate collector heats water by exposing it to the sun's radiation, and uses a pumped loop to cycle the water through piping. The heated water flows down to the heat exchanger, melting the PCM inside. Municipal water delivered to the house enters the heat exchanger cold, and is heated when it comes in contact with the PCM. When the sun is no longer providing heat energy to the system, the PCM remains melted until cold municipal water enters the insulated exchanger. As it gradually solidifies, the PCM releases heat energy to the municipal water. In order to take advantage of solar energy, our design works along with a conventional water heater. Heated municipal water enters the conventional heater which maintains control, delivering water at the optimal temperature. In this way, our full design can be thought of as a hybrid solar-natural gas system.

## 31 Perceptions of Male Greetings

Benjamin Compton

Faculty Advisor: Jonathan Bowman  
Department of Communication Studies

The purpose of this study is to determine whether individuals rate others' affectionate touch (such as a warm handshake or slap on the back) as more or less appropriate, depending on individual differences and/or information given about the context in which that touch occurs. Both context and normativeness and individual differences drive the attributional process that explains variation in perceived appropriateness of emotionally intimate behavior among heterosexual male friends. The purpose of this current project is to examine whether physical intimacy is perceived as distinct from emotional intimacy, yet operates according to the same attributional processes. In this study, participants completed questionnaires (measuring individual differences such as gender, self-presentation, fear of being seen as homosexual, etc.), viewed a 10-second videotaped episode of affectionate touch with descriptive contextual information, and rated the appropriateness of touch in that context.

## 33 Sustainability Matters

Amanda D'Acquisto

Faculty Advisor: Drew Talley  
Department of Marine Science and Environmental Studies

Sustainability Matters is a trusted source in the sustainable building technologies and materials industry, providing cost effective access to vetted products and practices, promoting transparency and knowledge throughout the industry. The belief that we should take from the earth only what the earth can replenish and preserving our natural resources for future generations of all living beings is central in Sustainability Matters' core values. As a marketing intern for the company, I reviewed and updated the current marketing efforts and researched for potential new clients. I chose this internship because I feel that it would be a great hands-on opportunity for future career goals of becoming a sustainable urban planner or developer. I've gained a lot of insight regarding sustainable materials and building methods and intend to take what I've learned and apply it to future job opportunities.

## 35 The Growing Pains of Integration

Kip Dean

Faculty Advisor: Michael Pfau  
Department of Political Science and International Relations

How did the global financial crisis of 2008 affect the Caucasus and will this hinder future integration into the European Union? There are many variables that can affect a country's willingness to integrate into an inclusive multi-national union. The question now arises whether countries find it necessary to join a political-economic bloc during goods times or do they find it necessary to do so during times of hardship and decline. Perhaps, it is a last ditch effort to revitalize a country in decline or a means to bolster a country's current prosperity. To be more specific, the focus will center on how the crisis affected the Transcaucasus; the North Caucasus, which consists of the states of the Russian Federation and the South Caucasus which is comprised of Armenia, Azerbaijan, and Georgia. Lastly, I will theoretically touch on the potential possibility of one day having a supranational Transcaucasus economic community.

## 37 The Battle Over Voter Blocks: How Parties Capture Particular Voter Groups in Order to Win Elections

Ricardo Dixon

Faculty Advisor: Casey Dominguez  
Department of Political Science and International Relations

In many critical elections, the ability for a political party to capture certain organized voter blocks has resulted in success at the polls and a victory for the party. Previous research has focused more so on political parties and interest groups during the elections. Here we will examine particular case studies from past elections and see how exactly the Democratic, Republican, or Third Parties were able to win the approval of certain voter groups and how much of an impact it had on their success in winning that election. This research will also reveal how the internal structures of the party transform in order to adhere to the policies of the targeted voter block. We propose the theory that there is a direct relationship between the party winning elections, and the targeted attempts to capture the vote of certain organized voter blocks.

### 39 Relationship Between Streamflow and Water Quality in the San Diego River (2004-2012)

Lindsey Dornes

Faculty Advisor: Zhi-Yong Yin

Department of Marine Science and Environmental Studies

This study looked at factors that influence water quality of the San Diego River at two sites of different environments: Fashion Valley and Mast Park. Fashion Valley has more impervious surface and is more populated than Mast Park. Water quality was assessed analyzing temperature, dissolved oxygen, and conductivity levels at each site once a month between 2004-2012. Streamflow data was obtained from USGS. Results at Mast Park show as streamflow increased, temperature and conductivity decreased, and dissolved oxygen increased. Results of Fashion Valley had similar relationships. When comparing the two sites, Fashion Valley had higher streamflow, dissolved oxygen, and conductivity. Mast Park had higher temperatures. Fashion Valley's water quality was closer to EPA standards than Mast Park. This study concludes that streamflow is a dominant factor in water quality. Impervious surface in urban areas increases flow rates, which can regulate and improve water quality through diluting and flushing out pollutants.

### 41 Sonyashnyk

Tayisiya Dubinina

Faculty Advisor: Evelyn Diaz Cruz

Department of Theatre Arts and Performance Studies

Sonyashnyk is an original play of one woman's journey of self-discovery through the broken system of a Post-Soviet State. Throughout the story, the resilient protagonist, Galina, tries to hold on to her traditional values concerning religion, family and economics, even when society seems to turn against her.

### 43 USD Office of Sustainability and Green Office Certification Program

Carrie Enkler

Faculty Advisor: Drew Talley

Department of Marine Science and Environmental Studies

During my internship at the University of San Diego Office of Sustainability I had the opportunity to work on various projects. I have been assigned as the Director of the Green Office Certification program, in which I worked with a team to develop and implement a program in which we evaluate campus offices on their level of sustainability. This program is an important initiative on campus because it makes sustainability a priority not only for students, but for the entire campus community. Additionally in the office I help with the STARS sustainability rating system for institutions, in which we are collecting data from different sources around campus in order to evaluate the level of sustainability for the university as a whole. These projects, among various other side projects, have helped me realize the various applications of sustainability on both a personal and a community level.

### 45 Monitoring Time-Dependent Formation of Oligomers and Brown Carbon in Reactions of Glycolaldehyde, Methylglyoxal, and Amines

Brenna Espelien

Faculty Advisor: David De Haan

Department of Chemistry and Biochemistry

The brown carbon components of atmospheric aerosol exhibit strong UV absorbance with a featureless 'tail' that extends into the visible range. Recent work has shown that brown carbon (or HULIS) is formed at least in part by aqueous-phase chemical reactions in the atmosphere. Reactions between aldehydes (such as glycolaldehyde and methylglyoxal) and amines create brown products that have similar light-absorbing spectra as HULIS extracted from atmospheric aerosol. However, the structures of these products have not been well-characterized. Bulk-phase reactions were monitored using LCMS and UV-Vis spectroscopy over a period of 2-3 weeks to see what products formed, whether oligomerization is occurring, and how this correlates with the development of absorbance peaks in the visible range. UV-Vis data shows that these reactions generally take several days to reach maximum absorbance in the visible range. We suggest that imine oligomers are major products of these reactions.

### 47 The Positive Outcome of Education in Latin America

Maryann Fernandez

Faculty Advisor: Emily Edmonds-Poli

Department of Political Science and International Relations

Scholars have long debated the most important determinants of democracy. Some say that economic development leads towards democratization. Others say that cultural aspects, mainly historic events have shaped Latin American countries to impede democratization. And still others argue that education is the key to promoting democracy. This approach is supported by several important studies. My research will investigate how education plays an important role in the process of modernization, as it begins to change people's political behavior, as well as attitudes that create politics to become more democratic. To build upon this argument, modernization theorists argue that economic development creates greater resources that provide for greater educational opportunities, creating an incentive for people to become involved when they feel they are part of the governmental system. In developing countries, such as in Latin America, increasing education, especially in low socio-economic communities, fosters a positive outcome towards the consolidation of democracy.

### 49 Effects of Sand Deposition on the Sea Anemone, *Anthropluera elegantissima*

Dano Ferons

Faculty Advisor: Nathalie Reys

Department of Marine Science and Environmental Studies

Sand deposition or depth varies over the course of the year along California's intertidal regions. In the case of rocky intertidal zones, an increase in sand deposition covers available habitat. *Anthropluera elegantissima*, or aggregating sea anemone, inhabits the mid-intertidal region and experiences periods of prolonged burial. This study looked at the effects that the intermittent burial has on the abundance and distributions of *A. elegantissima* over the course of seven months from July 2012-February 2013.

## 51 Community Composition of Fishes in Mission Bay

Andrea Ferrer

Faculty Advisor: Ron Kaufmann

Department of Marine Science and Environmental Studies

Changes in hydrographic conditions can affect the diversity and abundance of fish populations in estuarine ecosystems. In Southern California estuaries, gradients in tidal flushing can lead to different communities in areas with different temperature and salinity regimes. For this study, fish community composition was examined by collecting samples with a beach seine in three different parts of Mission Bay: front, middle, and back, reflecting a gradient of decreased tidal flushing. Topsmelt (*Atherinopsis californiensis*) were the most abundant fish species at all three sites. In the front bay, arrow gobies (*Clevelandia ios*) were the other dominant fish species, whereas in the middle bay, anchovies (*Engraulis mordax*), California killifish (*Fundulus parvipinnis*), and shiner surfperch (*Cymatogaster aggregata*) were most common. In the back bay, California killifish, arrow gobies, and mullet (*Mugil cephalus*) were the most abundant fish species. This study should increase our understanding of relationships between environmental conditions and estuarine fish communities.

## 53 Europe: Fiscal Union or Failure?

Henry Frantz

Faculty Advisor: Michael Pfau

Department of Political Science and International Relations

The European sovereign debt crisis that followed the U.S. financial crisis of 2008 raised the question: to what extent has the lack of uniform budget requirements affected integration in the European Union? The current lack of fiscal unity in the EU suggests that member states place a higher value on state sovereignty than complete economic union, creating controversy as to the necessity of a fiscal union for the survival of the EU. Whether the EU survives the debt crisis and sees further integration will depend on member states' willingness to give up sovereignty in order to create a stable fiscal union.

## 55 Depression, Anxiety, Stress, Locus of Control and Prescription Stimulant Misuse in a Southwestern University During Final Exams

Tara Galvin

Faculty Advisor: Michael Ichiyama

Department of Psychological Sciences

Over the last twenty years, college students have increasingly turned to prescription ADHD medication, namely Adderall, Dexedrine, Ritalin, and Concerta as a way to increase academic productivity and concentration (Smith & Farah, 2011). In a study of 10,904 college students, McCabe, Knight, Teter and Wechsler (2005) found that 6.9% of those surveyed reported having used the drugs in their lives, but that prevalence varied widely among college campuses, from 0% to 25%. While much research has been devoted to identifying demographic data about the users of these medications, there lies a gap in research about their personal characteristics. This research aims to discover the relationship (if any) between USD students' personal characteristics (locus of control, stress, depression and anxiety) and their decisions to or not to use prescription ADHD medication as a study method during final exams. Identifying these risk factors would help USD develop individualized intervention programs to curb this dangerous and illegal practice.

## 57 Studies on a Synthetic Analogue of the Nitrile Hydratase Active Site

Madelegne Gerling

Faculty Advisor: Christopher Daley

Department of Chemistry and Biochemistry

Nitrile hydratase is a metalloenzyme that catalyzes the conversion of nitriles to amides. The chemistry of this enzyme is due to the unique active site structure. The site contains a redox inactive metal ion bound to cysteine thiolates and backbone carboxamido nitrogens. Asymmetric oxidation of the cysteine bound thiolates is also observed. A synthetic analogue approach was used to examine the structure and function of NHase. In particular, we modeled the asymmetric, preoxidation, diamidatodithiolate tetradentate plane of the active site for the Fe(III)-based enzyme by preparing an analogue ligand consisting of a dimethylated side chain in place of the native serine side chain. Characterization of the organic ligand precursors and all metal complexes is reported. Characterization techniques include NMR, UV-Vis, Electrospray Mass Spec, Cyclic Voltammetry and X-ray crystallography where possible. Progress on the thiolate oxidation studies of the Fe(III) analogue complex will also be discussed.

## 59 A DivK Homolog Induces Encystment in *Rhodospirillum centenum*

Daren Ginete

Faculty Advisor: Terry Bird

Department of Biology

*Rhodospirillum centenum* is a purple photosynthetic proteobacteria that can form dormant cyst cells capable of withstanding prolonged starvation and desiccation. Although morphological changes that occur in the transformation from vegetative cells to cyst cells have been established, the process that initiates encystment has yet to be understood. A recent study revealed that DNA-binding protein CtrA is involved in regulating the decision to differentiate into motile swarm cells or dormant cysts. In this study, I examined the response regulator DivK, a known inhibitor of CtrA activity in another, well characterized proteobacteria. From phenotypic analyses of a DivK mutant generated in *R. centenum*, I found that DivK functions as an inducer for cyst cell formation and suppressor for swarming motility. This result is consistent with the hypothesis that DivK has retained its role as a CtrA inhibitor in *R. centenum*.



## 61 Why Perception Matters: Objective and Subjective Socioeconomic Status as Factors in Social Identity Threat

Jessica Gomes

Faculty Advisor: Maggie Syme

Department of Psychological Sciences

Previous literature in both psychology and sociology has examined the relative nature of self-perceptions and their importance in our interactions with our environment. The present study examined the relationship between subjective and objective measures of socioeconomic status and perceptions of marginalization. Undergraduate students of varying socioeconomic backgrounds at the University of San Diego (USD), a predominantly White, privileged institution, participated. They were asked to critically judge their socioeconomic status (SES) in both subjective and objective ways, as well as how threatened their SES made them feel within the context of USD. The findings are expected to show two nuances in particular. First, while we predict a positive correlation between objective and subjective SES, subjective SES will be significantly different when participants are asked to compare themselves to USD or to the United States in general. Second, subjective SES will have a stronger correlation with perceived social threat in the context of USD than objective SES.

## 63 The Effects of the Environment on Market Squid

Colleen Grant

Faculty Advisor: Michel Boudrias

Department of Marine Science and Environmental Studies

I conducted research on the effects of the environment on market squid. Specifically I compared paralarval abundance, commercial catches, and fishery effort with selected environmental variables. The purpose of my research was to determine if El Niño events have a negative effect on market squid abundance as has been reported in papers in the past. My research showed that the relationship between warm periods associated with ENSO events and market squid abundance may be more complicated than has been previously noted. My poster will cover the graphs I generated comparing abundance of squid to various environmental variables indicative of ENSO.

## 65 The Past, Present and Future of Creative Accounting

Caitlin Green

Faculty Advisor: Diane Pattison

School of Business Administration, Accountancy

This report will summarize the current status of accounting and auditing procedures in the United States. It will report on how we arrived at these current policies specifically looking at past events that resulted in major policy changes. Some of the referenced events will include the creative accounting practices at Enron Corporation, the negligent accounting practices of Arthur Andersen, and the implementation of Sarbanes-Oxley. It will also include other substantial fraud cases like Barry Minkoh of ZZZZ Best and Bernie Madoff, and the role that accounting played in these circumstances. Lastly the report will look at what other improvements need to be made in the accounting world to prevent the occurrence of large corporate scandals. These suggestions will focus primarily on ethical issues and practices that need to be further addressed.

## 67 Diboration/Elimination of Ketones: Facile Synthesis of Vinyl Boronate Esters

Weiye Guan, Alicia Michael

Faculty Advisor: Timothy Clark

Department of Chemistry and Biochemistry

The copper-catalyzed diboration of ketones followed by acid-catalyzed elimination leads to the formation of 1,1-disubstituted and tri-substituted vinyl boronate esters with moderate to good yields and high selectivity. Copper-catalyzed diboration of ketones is mediated by 3 mol% copper catalyst, 5 mol% base (NaOt-Bu), and a diboron reagent. Addition of tosic acid to the crude diboration product provides vinyl boronate esters. Formation of vinyl boronate esters through this method provide moderate to good yields (41% to 79%) and high selectivity over two steps. The solvent used in the elimination step was found to have a substantial effect on the yield and selectivity of alkene formation. The results suggested that toluene provided lower selectivity than dichloromethane in the elimination step, but were much more consistent in product formation. Preliminary studies on the Suzuki-Miyaura coupling of these vinyl boronate esters have been initiated and a moderate yield has been observed.

## 69 Gender and “The Real Housewives”: Reality Television and Defining Femininity

Aeron Hall

Faculty Advisor: David Sullivan

Department of Communication Studies

This project uses a poststructuralist feminist approach to examine the definition of gender in the franchise, The Real Housewives. The analysis utilizes common themes from the different series as well as audience comments on the website to examine how women are portrayed and received on the shows, especially in their relationship to men. The format of a reality television “docusoap” will be taken into account to show the complications when cultural constructions are blended even closer to reality. Overall, the franchise serves to support the subordinate status of women, with values placed on their marital status, financial power, and appearance.

## 71 Mapping the Source: An Inquiry of the Individual and Collective States in Dialogue Through the Lens of Theory U

Taylor Harrell

Faculty Advisor: Crystal Dujowich

Department of Leadership Studies

Dialogue is a process in which participants illuminate core assumptions and beliefs about themselves and others that reside in conscious or unconscious awareness. Effective dialogue increases the capacity to understand complex and often divisive issues, and it can initiate the first steps towards creating positive change at the individual and collective level. However, it is rare for all participants to be in the same state of awareness as one another, and this could affect the group process significantly. This study analyzes dialogue among four groups of 10 high school students from a range of socioeconomic backgrounds to determine the effect of varying individual consciousness on the progression of collective consciousness. The mechanism through which dialogue analysis occurs is a leadership theory entitled Theory U, created by change management expert, Otto Scharmer. Results indicate that the progression of individual consciousness is positively correlated with the progression of collective consciousness.

## 73 The Role of Environmental Justice in Ghana's Struggle for Water: A Stakeholder Analysis

Darcy Hauslik

Faculty Advisor: Julia Cantzler  
Department of Sociology

Lack of access to clean and affordable water is among the most pressing challenges facing the developing world. Struggles for water are not straightforward problems of resource scarcity; instead they are complex problems involving multiple stakeholders and complicated social and political realities. This project uses Ghana as a case study to examine how the environmental justice paradigm is activated to understand environmental problems as products of disproportionate political power. The environmental justice paradigm provides a powerful, rights-based lens for examining conflicts about development; however, it is limited in its lack of fixed parameters, especially as it is adapted to address environment conflict on the international stage. Focusing on water rights struggles in Ghana, this study examines how environmental justice rhetoric evolved from a grassroots strategy within the United States to a powerful lobbying tool used on the global stage by development advocates and opponents alike.

## 75 Relationship Between Becoming a Manager and Former Playing Position in Major League Baseball (MLB)

Anne Heaton

Faculty Advisor: Nadav Goldschmied  
Department of Psychological Sciences

Almost 50 years after Gursky's (1963) findings that catchers and infielders in Major League Baseball (MLB) were more likely to be hired as managers than pitchers and outfielders, we attempted to replicate this result and to determine whether past playing positions contributed to managerial success. Utilizing data from two recent MLB seasons (2009-2011), we replicated previous findings with regard to former pitchers and catchers but not with respect to in-and-outfielders. In light of the current pattern of results, we suggest an alternative mechanism to the increased likelihood of being hired as a manager: Rather than a theory of formal structure in which high interactors learn cooperative social skills, we suggest that increased "face-time" both on-and-off the field with current management is at the root of greater probability of being hired for a future managerial position. The data revealed no differences in managerial success based on prior playing position.

## 77 Surfing for Peace

Dylan Heyden

Faculty Advisor: Emily Edmonds-Poli  
Department of Political Science and International Relations

The purpose of this project is to examine the extent to which sustainable surf tourism can promote positive peace within developing coastal communities in Latin America. I postulate that sustainable surf tourism projects, if implemented properly, can have a more significant impact on the overall wellbeing of developing coastal communities than other tourist ventures that are not implemented sustainably. Using the town of Gigante, Nicaragua as a case study, I will demonstrate empirically how within the region one particular project (Project Wave Of Optimism, WOO) has contributed to an increase in various measures identified by the Institute for Peace and Economics as indicators of positive peace. I will then seek to identify the theoretical explanation for these findings, as well as the implications for other regions with similar levels of development and access to quality waves.

## 79 Got Democracy?

Sarah Ibrahim

Faculty Advisor: J. Michael Williams  
Department of Political Science and International Relations

This paper seeks to explore the relationship between conflict and democracy. That is, do countries that are involved in conflict tend to be authoritarian, while countries that are peaceful and relatively stable tend to be democratic? Furthermore, this paper seeks to see if there is a third factor causing stability. What exactly is it that caused countries to come out of conflict and establish a democratic system? This paper focuses on South Africa and Botswana as case studies of countries that have been able to establish peace promoting institutions after conflict, and have ultimately resulted in being model democracies in Africa. The DRC, (Democratic Republic of Congo), will be the case study used to show how a country that continues to be in conflict has not been able to transition into a democracy.

## 81 Testing the Function of DivJ Gene in the Purple Photosynthetic Bacterium, *Rhodospirillum centenum*

Samantha Jasso

Faculty Advisor: Curtis Loer  
Department of Biology

*Rhodospirillum centenum* is a purple photosynthetic bacterium that can differentiate into three different cell types: swimmer, swarmer, and dormant cyst cell. A model for the regulation of development in *R. centenum* is based on the genes regulating cell differentiation/growth in *Caulobacter crescentus* where a transcription response regulator, CtrA, controls asymmetric cell division and motility. Interestingly, a CtrA homolog in *R. centenum* is known to regulate motility and encystment. We will investigate a histidine kinase ortholog, DivJ, which is known to regulate CtrA activity in *C. crescentus*. Knockout and overexpression mutants will be created, via gene cloning. Since CtrA does not regulate cell division, *R. centenum*, *divJ* is predicted not to be essential. We expect to see an increase in motility and decrease in encystment in *divJ*-knockout mutant; also, decreased motility and increased encystment in the *divJ*-overexpression mutant.

## 83 Political Parties Are Dictated By Voters in Platform Attitudes

Hyunjin Jeon

Faculty Advisor: Casey Dominguez

Department of Political Science and International Relations

Do political parties alter their platforms in order to secure and win votes? And how far are the parties willing to go? This is a crucial question because it allows political actors and parties to see the importance of issue attitudes rather than party identification. I predict that political parties are willing to alter their platforms altogether in all levels of government due to shifts in issue attitudes, as they did with the abortion issue, and apply it to other cultural and social issues. Voters are willing to disregard party attachment for specific issues.

## 85 The Naturalization and Reinforcement of Ideology in Popular Film: A Look into “The Cider House Rules”

Amy Kame

Faculty Advisor: David Sullivan

Department of Communication Studies

The purpose of this paper is to highlight the way in which popular film naturalizes particular ideologies and reinforces our beliefs, attitudes and values. By researching terministic screens and ideographs (particular words or phrasing reinforcing ideology) I was able to expose how in this case, “The Cider House Rules” reinforced the separation between being pro-choice or pro-life. “The Cider House Rules” naturalizes both sides of the pro-life and pro-choice arguments, while pinning them against one another using ideographs and terministic screens as tools. Depending on the predispositional views of the audience, the film reinforced the two main ideologies, creating an even greater separation. During a time when one’s views on abortion were greatly subjective toward the political and main stream media’s framework of living a pro-life or a pro-choice lifestyle, “The Cider House Rules” played its role as a meaningful discourse to reinforce the segregation.

## 87 Embedding Cycles in Projective Space

Ashley Klahr, Elaina Aceves, David Heywood

Faculty Advisor: Jane Friedman

Department of Mathematics

Our work builds from that of Lazebnik, Mellinger, and Vega about the embedding of graphs in finite projective planes. First, we expand on their findings on embedding cycles in  $PG(2,q)$  by taking cycles in 2 dimensions and piecing them together to get a cycle in three dimensions. Then similarly we piece together cycles in  $n - 1$  dimensions to get a cycle in  $n$  dimensions. Additionally, we expand their findings on embedding bipartite graphs in  $PG(2,q)$  by looking at bounds for complete bipartite graphs that can be embedded in  $PG(3,q)$ .

## 89 Fiscal Responsibility in the European Union

Shelby Kroeger

Faculty Advisor: Michael Pfau

Department of Political Science and International Relations

One of the most complicated obstacles facing the future of the European Union is the European debt crisis. The questionable policies of European countries, most notably in the southern member states, have been exposed and are threatening the political order that has been building up for over fifty years. There is a divide between Northern Europeans and Southern Europeans. What the Germans, the Dutch, and the Finns, who constitute the Northern Europeans, consider a profound lack of financial discipline by its southern partners was obscured by a healthy economy up until recently, when the beginning of the global financial crisis accentuated the differences between the savers and the spenders. This gives rise to the hypothesis that where a country stands in terms of fiscal responsibility will be a major factor behind where it stands on maintaining the union and European integration.

## 91 Mobility and Natural Pollution of Heavy Metals in Bahia de Magdalena, Baja California Sur, Mexico

William Lee

Faculty Advisor: Bethany O’Shea

Department of Marine Science and Environmental Studies

In the pristine environment of Bahia de Magdalena, Baja California, elevated concentrations of heavy metals have been reported in the biota within the bay, including sea grasses, blue crabs, and marine turtles. While the hypothesized source of these metals has emphasized anthropogenic inputs from a local fish cannery, geologic enrichment of metals from natural ophiolite formations in the Puerto Magdalena region may be a source. Mobile ( $HNO_3$  acid extracted) metals differ between rock and soil versus cannery-impacted sites. Most notably, Ni is very mobile (mean 70% total Ni extracted) in pristine ophiolite areas, but almost completely unavailable at cannery-impacted sites. In contrast, Zn is slightly more mobile at the impacted cannery site (mean 55% Zn extracted) than the ophiolite rocks (mean 45% Zn extracted). Additionally, these results suggest that other heavy metals, such as Ni and Cr, should be included in future biological studies within Bahia de Magdalena.

## 93 Elevated Geogenic Arsenic Concentrations in Groundwater in Maine, USA

Sara Leitheiser, Megan Stransky

Faculty Advisor: Bethany O’Shea

Department of Marine Science and Environmental Studies

The risk of arsenic leaching from rocks into groundwater used for drinking has serious health implications for consumers of that water. Significant progress has been made to understand the spatial distribution and geologic explanations behind the occurrence of arsenic in rocks. In our study, we analyzed rock samples from two formations collected in Augusta, Maine, for arsenic, as well as a variety of other elements. Further analysis was conducted to determine mobility and arsenic leaching concentrations. We compared our data with groundwater arsenic levels from a previously published study. We conclude that an intriguing association exists between arsenic concentrations in rocks and groundwater, rock formation, metamorphic grade, and mobility. Furthermore, we determined a correlation between this heavy metal and certain other elements.



## 95 Publication Bias as a Form of Scientific Misconduct

Glennie Leshen

Faculty Advisor: Veronica Galvan  
Department of Psychological Sciences

Publication bias, which is the tendency to publish certain types of results over others, has implications that reach past the academic realm. With a comprehensive literature search, this review investigates the relationship that publication bias has to various medical and psychiatric treatments and whether publication bias is a form of scientific misconduct. Largely due to factors related to publication bias, journals publish a greater number of studies exhibiting positive results than those that report negative results, which leads to the assumption that the various treatments published have a greater efficacy, meaning that people place more trust in the treatments than they should, because there is no simple method to access the unpublished negative results. Such misplaced trust could place those who receive the treatments in danger, because there could be a large amount of unpublished data purporting alarming side effects.

## 97 The Impact of Political Leaders Towards Its People: A Case Study in the Democratic Republic of the Congo

Mauricio Lopez

Faculty Advisor: J. Michael Williams  
Department of Political Science and International Relations

In my research, I focus on the structure of the ruling class in Africa, (i.e. political leaders) and how it establishes relationships with the common citizens. It examines how specific rule and process of political institutions can provide insight for certain types of political behavior that will promote a strong democracy. Specifically, I explain how presidential power is exercised in the Democratic Republic of Congo. The country of main focus in this research is the Democratic Republic of Congo, past and present. Through this case study, I will explore how political behavior has been influenced by political institutions over time in the DR Congo.

## 99 Migration in Europe: The Vessel for Integration or the Fault Line for Fragmentation

Victoria Mancuso

Faculty Advisor: Michael Pfau  
Department of Political Science and International Relations

The trajectory of European integration seems to be headed towards the formation of a nation. Still, while Europe is a political entity on the international landscape, it is lacking the necessary foundations for political unity. With a diverse spectrum of nations, languages, cultures, and peoples it seems this unity will be a hard objective to implement. However, migration and the cross-cultural exchange it evokes provide a viable route for European integration. In opening their borders, States are adopting an inclusive ideology that deepens the roots of integration. However, this inclusivity can also be seen to hinder integration. In the case of NAFTA, some argue the migration between the US and Mexico has had a negative impact on their economic integration. Throughout this paper the ambiguous relationship between migration and integration, along with its implications in Europe will be explored and explicated. Ultimately answering the question, does migration increase integration?

## 101 Effects of Temperature and Salinity on the Growth of Botryllid Ascidiaceans

David Martinez

Faculty Advisor: Nathalie Reys  
Department of Marine Science and Environmental Studies

The objective of this research was to determine the effects of temperature, salinity, and flow on the growth rates of the invasive ascidian species *Botrylloides violaceus*, at two locations within Mission Bay. PVC plates were deployed for one year (Fall 2011-2012) to identify the spatial and temporal settlement patterns of ascidian species, and were photographed weekly. Environmental parameters were also measured at this time. Using the image analysis software ImageJ, area cover and growth rates of *B. violaceus* were calculated and examined in conjunction with the environmental parameters. The results indicate similar temperatures and salinities between the two sites, so it is likely that biotic interactions, such as competition between the various species, are the primary force in governing the growth of *B. violaceus*. Analysis of how this ascidian thrives or declines can help to control the spread of non-native species in San Diego and abroad.

## 103 Using Multi-Parameter Coral Reef Monitoring Platform to Evaluate Temporal Variability in Sea-Air CO<sub>2</sub> Fluxes

Anthony Mau

Faculty Advisor: Matthew Craig  
Department of Marine Science and Environmental Studies

Anthropogenic emission of CO<sub>2</sub> has resulted in lowering of pH, which has increased the acidification of our oceans. As our surface seawater acidifies and biogeochemical conditions change over time, sensitive coral reef ecosystems will be impacted from the bottom up. Using the CRIMP-CO<sub>2</sub> continuous monitoring program in central Kaneohe Bay, HI, we were able to assess the temporal variability of air-sea carbon flux and the mechanisms driving this carbon flux. I also conducted three transects across the patch reef surrounding the moored buoy to assess community composition as percent coverage in relation to CO<sub>2</sub> flux. The central bay showed seasonal variability with an elevated CO<sub>2</sub> concentration during the summer months, and daily fluctuations driven by primary productivity/respiration and carbonate calcification/dissolution. As climate continues to warm and seawater conditions become more acidic, community structure of coral reefs are likely to shift in favor of algal dominance.

## 105 Preference for the Underdog When Sampling Commercial Products

Caiti McDaniel, Monique Rico

Faculty Advisor: Nadav Goldschmied  
Department of Psychological Sciences

Underdog entities are well-liked and supported (Goldschmied & Vandello, 2009; Goldschmied & Vandello, 2012). The current investigation attempted to extend this so-called underdog effect into the realm of marketing and branding. Absent from this emerging line of research is the actual use of the “underdog” products, as the majority of studies to date have relied on the use of narratives or focus group polling, rather than product sampling. In the first study, participants sampled two identical items of chocolate but were told that they were

sampling two different products, each representing an ‘underdog’ and ‘favorite’ competing brands. Preliminary data showed significant preference for underdog products on a range of dimensions (e.g., future purchase preference, taste, etc.), regardless of the participants’ demographics and past consumption habits. In a follow-up test, utilizing the same procedure with fragrances, mostly primacy effects were detected.

## 107 **Diamonds: A Hindrance to Democracy?**

Tenaya Miller

Faculty Advisor: J. Michael Williams

Department of Political Science and International Relations

This research examines the complex relationship between African countries and natural resources. In particular, it will elaborate on why the presence of diamonds has been a source of destabilization in some African countries. In order to do so the role of civil society in DRC and Botswana will be examined in an effort to explain why some diamond-rich countries prosper while others do not. The findings indicate that the level of democracy in a given country directly impacts its ability to successfully manage natural resources. Although Botswana is often portrayed as an exceptional success story, it too must take the next step and turn its growth into development.

## 109 **Political Economy and Democratization in Sub-Saharan Africa**

Erin Murphy

Faculty Advisor: J. Michael Williams

Department of Political Science and International Relations

This research will discuss discrepancies between different democratic transitions across Sub-Saharan Africa; it will address why some are more democratic than others by looking through the lens of political economy. It will show that several key economic trends in Africa continue to retard economic growth and the potential for successful democratic transition for many countries in Africa. These trends include the resource curse, foreign aid dependency, the lack of privatization, colonial legacies, the lack of capital infrastructure, and the policies of international organizations like the World Bank and the IMF. Perhaps one of the most compelling reasons why democracy is hard to achieve in light of economics is because of the lack of middle class that holds the government accountable. The creation of a middle class is best fostered through capitalist systems that interact with the government. This explains why democracy was in many cases the product of industrialization and modernization in Europe. Ultimately, the argument will be that until Africa is able to turn the tide of its economic problems like resource curse through more accountable leaders that break foreign dependence and better allocate resources, democracy will continue to remain elusive.

## 111 **Effect of Civil Societies on the Democratic Consolidation of Sub-Saharan African Countries**

Christopher Ngo

Faculty Advisor: J. Michael Williams

Department of Political Science and International Relations

This research paper attempts to answer the question, “What causes democracy in Sub-Saharan African countries to thrive and persist?” The scholarly debate regarding democratic consolidation is vast and full of arguments on whether or not certain aspects play a key role in maintaining democracy within the African state. This question is also important with regards to the debate on democratic systems as the ultimate answer to sustaining peace in the international community. In this paper, I will look at various groups of civil societies ranging from religious organizations to educational establishments in order to identify what groups effect the most democratization within the state. I will also use a case-by-case approach to study how civil societies affect democracy from nation-state to nation-state. The ultimate goal of this paper is to gage a better understanding for how the process of democracy should be applied to countries and whether they have the desired effect.

## 113 **Badminton App for Android**

Nicholas Nobles

Faculty Advisor: John Glick

Department of Computer Science

Badminton is a sport that requires quick reflexes and precise movements. Human motion is difficult to represent accurately in computer graphics. This project hopes to be able to accurately depict the motion of a badminton player in a dynamic situation. This is done in the form of a video game developed for the Android platform. Gameplay results in numerous situations that can occur during a game of badminton. This project provides perspective on the types of movements involved in badminton in an entertaining and engaging manner.

## 115 **Justification for Subjugation: Does Democracy Benefit the Wealthy Elite Over the Poor?**

Luke Ogden

Faculty Advisor: Emily Edmonds-Poli

Department of Political Science and International Relations

This study asks the question, “Does democracy only consolidate when elites give their accent to the institution?” To examine this question, I look at the methods by which elites may prefer democracy, as well as build a theory as to how elite preeminence can remain unchallenged in a system which on its surface seems to equalize socioeconomic class. In asking this question, I will use Latin America as my location of study.

## 117 Not to Be Forgotten: The Muslim Minority's Relations with Han China

Alyssa Ong

Faculty Advisor: Yi Sun  
Department of History

As the world's attention focuses on the ongoing controversy of China-Tibet relations, much of the historical experience of the Uyghurs, a prominent muslim minority in China's Xinjiang Province, goes unnoticed. This study is designed to analyze the causes behind the Uyghers' desire for independence from Han China. It examines the persistent tensions between the Han Chinese and the Uyghurs due to their different perspectives on policies that affect their beliefs in religion, education and politics. Part of my study will be devoted to discussing the lives of Uyghur women in the midst of the ethnic tension and conflict.

## 119 Office of US Senator Dianne Feinstein Internship

Liana Pardini

Faculty Advisor: Gary Gray  
Department of Political Science and International Relations

I conducted a semester-long internship in the office of US Senator Dianne Feinstein. Over the course of the internship, I performed administrative tasks, interacted with constituents, conducted policy research, and became further acquainted with the San Diego region, its local political climate, and the legislative system as a whole.

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

Taryn Parsons, Delora Faaborg

Faculty Advisor: Mitchell Malachowski  
Department of Chemistry and Biochemistry

Organic moieties called dipyrromethenes have become increasingly popular as donor ligands to metal ions. We have synthesized a series of new ligands where we have combined the dipyrromethene unit to a variety of organic moieties. Attempts to bind these ligands to metal ions such as copper and cobalt will be presented along with their characterization by a combination of elemental analysis, mass spectrometry and X-ray crystallography. The ability of the complexes to form supramolecular arrays will be discussed. Stemming from the results, progress toward the design and synthesis of modified complexes to improve the formation of supramolecular arrays will also be presented.

## 123 Challenges for Smart Wireless Sensor Networks

Dan Partynski

Faculty Advisor: Simon Koo  
Department of Computer Science

Due to increasing computational power and advancing sensing technology, there is increasing interest in using large, dynamically distributed smart wireless sensor networks in a variety of problem domains. These networks consist of a group of small, autonomous sensing nodes capable of complex collective intelligence. Such technology could provide great benefit in terms of health and environmental monitoring, and military applications to name a few. Due to the ability of sensor networks to both sense the environment and apply algorithms to process the data, more information can be gathered about the physical world than from traditional sensing systems. Before wireless sensor networks can be fully realized, a number of challenges ranging from hardware and software to security need to be addressed. This project will explore the challenges faced by wireless sensor networks and the current research being done in the area.

## 125 Intelligence Identity in Three California High Schools

Kelsey Perry

Faculty Advisor: Lisa Nunn  
Department of Sociology

This project is based on statistical analyses examining relationships between students' perceptions of their own intelligence, and how they perceive other school-related factors including fairness of grading, whether their grades give a good picture of their intelligence, and whether they feel smarter inside or outside of school. Our findings indicate that the school you attend matters for such factors, as do the grades you receive. But such school related factors are only predicting less than half of what makes up your intelligence identity, so this project investigates this issue further to see what affects students' understandings of their own intelligence.

## 127 Geogenic Arsenic Contamination of Drinking Water in Southeastern Kenya

Colin Phillips

Faculty Advisor: Bethany O'Shea  
Department of Marine Science and Environmental Studies

Arsenic contamination of water is an issue in numerous areas throughout the world. The maximum allowable concentration of arsenic (As) in drinking water is 10 µg/L. The surface water in a region of southeastern Kenya contained arsenic concentrations ranging from 10-70 µg/L. In the absence of any obvious pollution sources, the arsenic in the drinking water is assumed to be naturally occurring. Arsenic contamination from geological sources occurs in particular rock types, usually metamorphic formations. The Mozambique formation, which forms the underlying basement rocks throughout much of Central Kenya, consists of high-grade metamorphic rocks and is a probable source of arsenic contamination in local waters. Based on this geology, and a review of case studies of arsenic occurrence in waters associated with other rock types, this study aims to identify areas of potential risk of arsenic contamination in the local drinking water in southeastern Kenya.



## 129 Economics and Institutions: Understanding and Affecting Democracy in Latin America

Alicia Piña

Faculty Advisor: Emily Edmonds-Poli

Department of Political Science and International Relations

Within the past few decades, the democratic climate in Latin America has shifted. According to internationally recognized leaders, one of the main said purposes of the support and sustainability for democratic improvement of the region has now become to fulfill academic, political and economic interests among top leaders of the region and abroad. Based on the literature, this shift in climate has rendered a myriad of national and international policies implemented by the state, local and federal governments of Latin America to maximize the potential benefits of healthy and thriving democracies. Simultaneously, a shift in outcomes has occurred. Thus, the gaps in achievement of democracy are widening between Latin American nations with developed and maintained structures and nations without. Because of the historic events commonly shared within Latin America, and the different approaches taken individually upon successful independence, it is important to study the roles that economics and institutions play in mediating polices in order to understand what Latin America can do to achieve favorable democratic outcomes. By accessing and summarizing important arguments of leading scholars, I look further into how Latin America can address the multitude of challenges associated with the wide variety of regimes and political systems of the region. Such insight is necessary for the drafting of future policies and participation affecting the successful sustainability of thriving democracies throughout Latin America.

## 131 Brown Carbon Formation by Aqueous-Phase Aldehyde Reactions with Amines and Ammonium Sulfate

Michelle Powelson

Faculty Advisor: David De Haan

Department of Chemistry and Biochemistry

The formation of light-absorbing 'brown carbon,' or HULIS, in atmospheric aerosol has an important impact on climate. Several aldehydes present in clouds have the potential to create brown products when reacted with ammonium sulfate or primary amines such as methylamine or glycine. The formation of light-absorbing products from these reactions was characterized as a function of cloud-relevant pH using UV-Visible spectroscopy. Of the aldehydes tested, the largest production rates of light-absorbing compounds were observed in reactions of glycolaldehyde and methylglyoxal. Primary amines produced more light-absorbing products than ammonium sulfate at lower concentrations. The addition of a small amount of glycine to aldehyde + ammonium sulfate reactions can increase the production of light-absorbing products. These results suggest that the presence of primary amines significantly influence atmospheric brown carbon production by aldehydes even when much greater quantities of ammonium sulfate are present. Through the use of Differential Scanning Calorimetry the brown carbon products were tested for a property, known as the glass transition phase, to further help identifying these harmful products.

## 133 Marketing and Outreach at the Trans-Border Institute

Anna Randall

Faculty Advisor: Gary Gray

Department of Political Science and International Relations

The border between the United States and Mexico is as unique as it is challenging. As the only international land border between a first-world and third-world nation, the United States has struggled to be a good neighbor while maintaining diplomatic integrity. With the explosion of drug violence in particular in the last 10 years, the issues have become even more pressing than ever. The Trans-Border Institute at USD seeks to address these challenges through research, economic solutions, and cultural understanding to foster a friendly relationship between the two nations. As an intern, I assisted with this mission through social media outreach, marketing and promotional materials to broaden our audience. I learned a lot about not only U.S. and Mexican issues but also about marketing, hosting events, creating documents and operating a non-profit organization.

## 135 Maintaining Democracy in Sub-Saharan Africa

Katherine Riedlin

Faculty Advisor: J. Michael Williams

Department of Political Science and International Relations

Over the past century the democratization process in Africa has been well underway. Although many countries have struggled to create the foundations for a liberal democracy, countries such as Botswana and South Africa have been able to produce government policies allowing for a democratic regime. In this paper, the relationship between civil society and emerging democratic regimes in Africa will be analyzed. More specifically, this research will be looking at whether or not certain civil societies have an influence over democratic government policies and the overall promotion of democratic ideals in their surrounding areas.

## 137 Outdoor Guide to San Diego

Emily Roberts

Faculty Advisor: Drew Talley

Department of Marine Science and Environmental Studies

This Outdoor Guide to San Diego is a resource for the guides in the USD Outdoor Adventures office to use on the adventure trips around San Diego. It is a way for participants on trips to be introduced to the flora and fauna of different regions in San Diego. Also, environmental issues and anthropogenic impacts are brought to light to assist with environmental preservation through education. Experiencing nature is a great way to learn about it and learn to care for it. This resource will be used as a tool for the trip guides to introduce topics and knowledge. There is a map component with linked pictures and information to use as talking points at specific points during the trips. This project focuses on La Jolla and Torrey Pines regions. The guide is growing to include more locations and information.

### 139 Portable Sustainable Surveillance Device

Michael Ruffino, Sergio Alvarez, Ross Johnson, Warren Putman

Faculty Advisor: Ernie Kim  
Department of Engineering

A system will be designed to work in any environment and under any conditions in order to monitor an area via video capture and by temperature, humidity, and carbon monoxide sensors. A Wi-Fi network will be setup to cover a wide area necessary to gather vital sensory data. A microcontroller will retrieve data from the sensors and transmit it over the internet via the Exede broadband network. An IP camera will be connected to the network and transmit video through the internet as well. The system must be portable and self-sustaining. A server will receive all the data and present it through a website.

### 141 The Military Institutional Complex: Latin America's Biggest Impedement to Stable Democracy and Its Transition Out

Kevin Santamaria

Faculty Advisor: Emily Edmonds-Poli  
Department of Political Science and International Relations

Latin America had faced a circular history of authoritarian and democratic rule. We will therefore look at the most authoritarian structures that often take the role of a democratically elected government in Latin America, the Military. We will do this for several reasons. First, because these are the most undemocratic stages in the region's history, yet they have often been supported, and secondly, because they seem to be the only institution to maintain order in times of economic or political turmoil. As an institution serves as the basis for a Democratic system, we will therefore examine how the only institution strong enough to weather political and economic turmoil has been the military since the 20th century. How do we explain their lack of appearance in the 21st century though? Through the shift in cultural norms into democratic institutions.

### 143 Water Use and Obstacles in the California-Baja Border Region

Brooke Schiefelbein, Brisa Halviatti, Yajaira Hernandez

Faculty Advisor: David Shirk  
Department of Political Science and International Relations

As sustainable economic development interns at the Trans-Border Institute this spring, much of our semester has been dedicated to research for our upcoming publication Water in the Border Region: Challenges and Opportunities in the Cali-Baja Region. This report highlights major water problems plaguing the region and offers potential solutions for dealing with this crisis. Expansive population growth on both sides of the border, large-scale agricultural production, and booming industry compete for the regions limited local water supply. Couple this rivalry and inadequate source with pollution, inefficient use, and conflicting cross-border management strategies and the water crisis in Cali-Baja is amplified to a dangerous degree. The report offers multiple potential methods for curbing effects of the water crisis including water reclamation projects, rainwater capture systems, installation of low flow toilets and shower heads, a shift towards native landscapes, and improvements in irrigation technologies.

### 145 Residual Particle Sizes of Evaporating Droplets: Ammonium Sulfate and Aldehydes

Nazin Sedehi

Faculty Advisor: David De Haan  
Department of Chemistry and Biochemistry

The reactions of carbonyls like glyoxal, methylglyoxal, and glycolaldehyde, with ammonium salts have been proposed as sources of atmospheric organic aerosol. Aerosol containing these compounds was generated in the laboratory using the Vibrating Orifice Aerosol Generator (VOAG). The particles were dried before they were measured using an SMPS system. The nonvolatile fraction of the resulting aerosol was measured. The drying times varied between two and twenty minutes, and for ammonium sulfate and glyoxal reactions, minimum residual particle sizes were reached after 3.5 minutes. Reactions of glyoxal, glycolaldehyde, and methylglyoxal with ammonium sulfate appeared to have lower non-volatile fractions remaining at higher starting concentrations, suggesting that a constant 'excess volume,' likely water, was present in the residual particles that could not be evaporated even after 20 minutes of drying. At the highest concentrations tested (100  $\mu$ M), non-volatile fractions of aldehydes present in residual particles were 16 ( $\pm$ 17) %, 41 ( $\pm$ 28) %, and 17( $\pm$ 32) % for glyoxal, glycolaldehyde, and methylglyoxal, respectively.

### 147 Assessing the Effectiveness of a Student-Designed Experiment with USD's Laboratory Wind Tunnel

Colleen Sevier, Mackenzie Sparks, Phillip Megden

Faculty Advisor: Frank Jacobitz  
Department of Engineering

Engineering students spend their senior year working on a capstone project that is meant to challenge students by utilizing their knowledge of engineering. As the University of San Diego's engineering student enrollment has increased over the years, the department had found itself in need of more laboratory experiments. While USD had a laboratory wind tunnel as of 2008, it was not yet fully instrumented for practical experiments. A senior design group accepted the challenge to update the existing wind tunnel. Completed in the spring semester of 2012, the wind tunnel was utilized for its first set of fluid dynamics experiments in the fall of 2012. A study was conducted concurrently with the laboratory experiments to gauge the students' learning as a result of the improved instrumentation. The results of this study have been compiled and are being presented here.

## 149 The International Preconditions That Breed Consolidated and Lasting Democracy in Sub-Saharan Africa

Nicole Shook

Faculty Advisor: J. Michael Williams

Department of Political Science and International Relations

This paper explores a long-standing question in international discourse: Why are some Sub-Saharan African countries more democratic than others? There are many schools of thought that seek to explain democracy, especially in post-colonial Africa. No one approach can explain disparities in democracy. We must instead focus on the comprehensive exogenous preconditions to democratization. This will help political scientists and African leaders determine why democracies have emerged in some states, and why these states are able to produce strong institutions, economies and vibrant civil societies. This paper does not suggest that international understanding and aid will breed democracy in Sub-Saharan Africa. Rather, only with conditioned aid and domestic cooperation will democratic reforms be possible.

## 151 University of San Diego Degree Planning Tool

Marc Slaughter

Faculty Advisor: John Glick

Department of Computer Science

For any university student, determining what classes to take during a given semester can be a daunting task. Considering courses for the future is even more difficult with the student paging through the course catalog trying to ensure that they meet university requirements. This project will attempt to alleviate the frustration and uncertainty faced by students by providing them with a single comprehensive location to choose classes for their future. The application will be web based utilizing the Google App Engine to allow for multiple user support. It will contain all necessary information from the USD course catalogs needed to provide users with course recommendations and problems with their desired degree plan. Additionally, it will contain functionality to read an uploaded DARS report and auto-populate completed classes. Ultimately the goal is to improve students' planning capabilities reducing wasted time and allowing students to graduate in a timely manner.

## 153 The Rocky Horror Carnival

Jackson Smith

Faculty Advisor: Monica Stuftt

Department of Theatre Arts and Performance Studies

My research fills an important gap in the body of knowledge surrounding the cult classic The Rocky Horror Picture Show because of connections between this phenomenon and Mikhail Bakhtin's theory of the Carnavalesque. In particular, I explored Rocky Horror's status as a subversive society for those who attend the movie. Funded by the SURE grant last summer, I attended ten showings of The Rocky Horror Picture Show and analyzed the rituals and customs of the Midnight Society in light of Bakhtin's theory of the Carnavalesque. The research culminated in the realization that the Midnight Society of Rocky Horror is a virtual, temporary community with actual subversive elements. Through their weekly showings, this society continuously reestablishes itself through its rituals, providing its audiences with an alternative world where authority is mocked and mainstream values and behaviors are degraded.

## 155 Shooting an Air-Ball in Basketball: A Survey of Division I Players About an Ego-Threat Situation

Nicole Stenoish, Damien Vira, Nergis Akkaya, Serena Mezzacappa

Faculty Advisor: Nadav Goldschmied

Department of Psychological Sciences

We surveyed two division I men's college basketball teams, focusing on their perceptions of shots that completely missed the basket, also known as 'air-ball' shots (ABS). When an away player launches such a shot, the home crowd is likely to chant "air-ball, air-ball" to single him out, generating an ego-threat situation. A similar poor performance by a home player is ignored. We found that players believed that away players were more likely to launch an ABS than those playing at home in contrast with the actual performance data, which indicate similar likelihood of ABS for home vs. away players. The players' belief is consistent with the availability heuristics or the tendency to make a likelihood judgment for an event based on how easy it is to recall similar instances. Illustrating the actor-observer asymmetry participants also believed that other players were more likely to be influenced adversely by the chants than themselves.

## 157 Effects of Partner Distraction and Amount of Individual Information on Task and Relational Achievement

Connor Sullivan

Faculty Advisor: Jonathan Bowman

Department of Communication Studies

The purpose of this factorial experiment was to determine whether or not dual-tasking has a connection with communication outcomes including the features of the intimacy of communication. Additionally, this project scrutinizes whether participants' knowledge that someone is preoccupied has a direct influence on the conversation being carried out. In the study, individuals' abilities to hold a conversation with a close friend while distracted by an outside factor, as well as their abilities to accomplish a task while at the same time being attentive to a conversation through a telephone, may influence a wide variety of communication outcomes. When looking at the intimacy of these conversations among friends, this study raises the question whether one's ability to connect in conversation is diminished when someone is doing an additional task (and is distracted). This study discusses whether playing a video game has a negative effect on communication quality, and whether one's knowledge of said distraction changes conversational participant's evaluation of a distracted game player.

## 159 PleD Regulation Over Motility and Encystment in the Purple Photosynthetic Bacterium, *Rhodospirillum centenum*

Kiersten Svatos

Faculty Advisor: Curtis Loer

Department of Biology

*Rhodospirillum centenum*, a purple photosynthetic bacterium, has a regulatory system that controls differentiation into either swarm cells or dormant cysts. Previous work in *R. centenum* demonstrated that a *ctrA* loss-of-function mutant is defective in swarming motility and shows increased cyst formation relative to wild type. Therefore, the DNA-binding transcription factor CtrA contributes to the switch between motile and quiescent cell types. In the well-studied



bacterium *Caulobacter crescentus*, the CtrA homolog is regulated by a diguanylate cyclase called PleD, which modulates the ability of CtrA to affect gene expression. A *pleD* loss-of-function mutant in *R. centenum* has a motility-defective phenotype, like the *ctrA* mutant, suggesting that PleD may be a positive regulator of CtrA. To further test the role of *pleD*, I will build a DNA construct that can over-express PleD protein in *R. centenum*. We predict that over-expression of PleD will result in increased motility and decreased cyst formation.

## 161 Effects of Bystander Conversations on Attention

Gabriella Taverite, Neesha Daulat, Katelyn Quan, Ashley King

Faculty Advisor: Veronica Galvan

Department of Psychological Sciences

Research suggests that hearing irrelevant speech can disrupt reading tasks such as proofreading. The consequent brain arousal from the conflicting stimuli causes short-term memory to recognize words heard but not seen. Participants were asked to read a short passage and correct it for errors. At the same time, participants overheard either a one-sided or two-sided conversation. Afterwards, the participant was asked to answer a few reading comprehension questions and recall certain words from the conversation. We expect that participants will perform worse on the proofreading and comprehension task and remember more of a one-sided conversation. The logic behind the findings is that participants would pay attention more to a one-sided conversation because there is no context to understand the conversation when another person starts speaking again. These findings would demonstrate that overheard conversations can be an everyday distraction.

## 163 Inferring Extinction from Sighting Records

William Tressel

Faculty Advisor: Jane Friedman

Department of Mathematics

Andrew Solow has developed methods of inferring the time of extinction of species based on sighting records. This poster will present a description of a new approach to the question of inferring extinction from sighting records using simulation and viewing extinction as a change-point.

## 165 Nicotine-Induced Conditioned Place Preference in Zebrafish

Elise Turner, Julia Sutton, Michelle Crawford

Faculty Advisor: Rachel Blaser

Department of Psychological Sciences

Zebrafish were treated with nicotine in two versions of a conditioned place preference experiment. In one, nicotine was paired with either the black or white chamber of a black/white apparatus (black is preferred, and white appears aversive). In the other, nicotine was paired with either the grey or transparent chamber of a similar (unbiased) apparatus. Some zebrafish received chronic treatment with nicotine with either 0 or 50mg doses everyday for two weeks. The study involved a 15-minute pre-test, four 30-minute trials and a 15-minute post-test. One group of animals received nicotine on the side preferred in the pre-test, and the remaining received the drug on the less-preferred side. The sole conditioned preference was in animals receiving pairings of 100 mg/L nicotine with the white chamber. This demonstrates a nicotine-induced anxiolytic effect in the context of an aversive situation and suggests that nicotine serves a negatively-reinforcing effect on the zebrafish brain.

## 167 Latino Catholicism: An Unorthodox Approach to Promote Parental Involvement

Diana Velazquez

Faculty Advisor: Judith Liu

Department of Sociology

The differences between Latino and main stream views on parental involvement have been subject to social research. However not much has been said on the different elements that culturally construct these different perspectives. This research will explore how culture, specifically the interaction between Latino Catholicism and values, shapes the ideas of parental involvement. Through an in-depth analysis of scholarly works, this paper will take this unorthodox, interdisciplinary approach to understand the impact and role popular religion has on the Latino community, and its potential to not only empower families, but also incorporate both Latino and mainstream values in a culturally sensitive manner. These findings may be useful to researchers that are committed to improving the academic achievement gap amongst Latinos in a culturally respectful way.

## 169 Partisan Taunting on Facebook: A Recent Study of Incivility in Congress

Cynthia Villacis

Faculty Advisor: Casey Dominguez

Department of Political Science and International Relations

This project aims to explain political incivility through the analysis of partisan taunting by members of Congress on Facebook. Partisan taunting refers to instances in which the opposition party or one of its members uses exaggerated language to put them down or devalue their ideas (Grimmer and King, 2012). The objective of this textual analysis of Facebook posts, on a sample of senators' pages over a one-year period, is to characterize the levels and variability of incivility in congressional discourse in social media. This paper will specifically study the causal effect of marginality on the presentational style of members of Congress. What is the relationship between constituency preferences and presentational style utilized strategically by members of Congress? This project will allow us to address assertions about when taunting peaks, when it falls, and which type of Congress member taunts most often.

## 171 Understanding the Causes of Sexual Selection

Jason Wang

Faculty Advisor: Adam Siepielski

Department of Biology

Sexual selection through mate choice is a driving force of evolution and has been demonstrated numerous times. However, the underlying causes of sexual selection are poorly understood. We tested the hypothesis that the relative body size of male to female damselflies is a cause of sexual selection, because females rely on the match in size between themselves and their mate to determine if they are the correct species. Our observational study showed that females preferred males of similar body size resulting in sexual selection. Experimental studies manipulating male relative to female body sizes within and among populations verified the observational study results, and also provided evidence that females prefer mates of similar size regardless of their population. Collectively, these results support the hypothesis that differences in body sizes between males and females can cause sexual selection.

## 173 Fleeing the “Panopticon”: The Role of Identity in 20th Century Literature

Erin Waters

Faculty Advisor: Atreyee Phukan  
Department of English

Entrapment, the role of imprisonment is interestingly portrayed in 20th century literature as a set of social structures that entrap its “inmates” in both physical and psychological ways. In Ken Kesey’s “One Flew Over the Cuckoo’s Nest,” for example, the narrator “Chief” Bromden is physically entrapped in a mental hospital, as he is institutionalized for schizophrenia. Yet as the plot progresses, the reader finds out that his schizophrenic behavior is a result of the negative labels he has become chained to as a stereotyped Indian in American culture. His journey in overcoming the illusory “fog” that hides the machine of society—the “Combine”—must result in his escape both physically and psychologically. Similarly, Jack Gladney, protagonist of Don DeLillo’s *White Noise*, must find some form of escape from the penal complex of the media that has been built around him and most other 20th century Americans. Yet while Bromden’s escape from his entrapment is characterized by both a physical emergence from the mental hospital as well as a psychological transcendence of an ideological prison, Gladney’s liberation is characterized by his awareness of the media’s oppression. However, just as the woman’s self-perception detents her within her own mind, the way we perceive ourselves as well the societal forces that label and entrap us is a crucial factor in escaping the institutions that bind us to systemic oppression. DeLillo’s *Point Omega* illustrates the necessary “watchfulness” and consciousness that must be established in psychologically escaping the Panopticon. The role of the individual as well as the role of society will be examined in Kesey’s and DeLillo’s work; the latter role essentially “builds the panopticon” while the former must escape it.

## 175 Teaching Algorithmic Design Through Gaming

T.J. Weiten, James Ruther

Faculty Advisor: Simon Koo  
Department of Computer Science

Education in algorithmic design is often not taught at lower levels of education. The purpose of our project is to create a tool for which basic algorithmic design techniques and low-level computer science can be taught to high school students and younger. The platform will be a fun and intuitive game in which the users will build a very simplified artificial intelligence (AI) and pit it against other users’ creations. AI’s will be designed using a very simple programming language that illustrates concepts such as if statements, arrays, and basic path-finding algorithms, among others. Results will be provided using a rich interface and users can quickly refine their strategies and retest to see improvements in their AI.

## 177 Sex and Champagne: A View of Beijing’s Middle Class

Hannah Wolf

Faculty Advisor: Yi Sun  
Department of History

The rise of the contemporary middle class in China has created a consumption-driven and brand name conscious segment of the urban population, as seen in cities such as Beijing. Consumption is not only limited to luxury brand names, such as Chanel or Gucci, and other brand name products equated with status, such as Apple’s iPhone, but also includes different types of experiences. In China, experiences such as traveling, dining out, frequenting nightclubs, etc., are also indicative of a middle class lifestyle. Through the analysis of primary data obtained from questionnaires and personal interviews, and review of secondary source materials, this research seeks to identify the consumption patterns - that of brands and/or experiences - of women in Beijing, ages 18-40, who fit the criteria for members of the middle class population.

## 179 Basic Utility Vehicle

Andrew Wood, Luke Daenitz, Byron Riemhofer, Emilio Mejia, Ian Mahaney, Nachapal Methakul

Faculty Advisor: David Malicky  
Department of Engineering

Due to growing populations in developing countries, the demand for vehicles to assist in transporting supplies and performing agricultural tasks is on the rise. Basic Utility Vehicles have become a popular solution to this issue and organizations such as the Institute for Affordable Transportation currently design vehicles suitable for this application. These vehicles must be capable of handling off-road terrain, achieve high efficiency in fuel consumption, and be free of unnecessary components. These conditions allow the vehicle to be simple to use and easy to repair. Our group will be conducting research for, designing, and fabricating a 3-wheeled Basic Utility Vehicle for the primary purpose of transporting supplies and people in rugged, unpredictable terrain of rural areas. We have received specific design specifications from the Institute for Affordable Transportation and are planning on donating the vehicle to the community of La Morita, Tijuana with the help of University Ministry.

## 181 Teaching Shakespeare, Teaching Peace

Elisabeth Yeruuldelger

Faculty Advisor: Molly McClain  
Department of History

Teaching Shakespeare to elementary school-aged children is of the utmost importance: when humanity disciplines are valued in education it can be a means to teach world peace.



2 Metabolic Intensity in Eared Grebes

Brent Allman, Valerie Thorngren

Faculty Advisor: Hugh Ellis

Department of Biology

The Eared Grebe (*Podiceps nigricollis*) is a migratory waterbird. Prior to migration, they stage on lakes where they put on fat and change their body composition. The Ellis lab has found that basal metabolic rate (BMR) does not change among staging grebes irrespective of their composition. Since BMR must be related to organ metabolic rates, we are trying to determine if changes in organ size or changes in their metabolic intensity control BMR. Most researchers have argued for the former, but our data suggest the latter explanation. We are measuring the activities of two enzymes, lactate dehydrogenase (for anaerobic pathways) and citrate synthase (for aerobic pathways), in viscera associated with digestion (gizzard, liver, and kidney), the heart, and two muscles important in locomotion (gastrocnemius in the leg and pectoralis in the breast). Early results show metabolic intensity changes in some organs more than organ size and independently for each enzyme.

4 Gene Therapy and Its Ethical and Scientific Implications for Gene Doping in Sports: A Focus on Insulin-Like Growth Factor (IGF-I)

Melissa Andruzzi

Faculty Advisor: Laura Rivard

Department of Biology

Gene doping is defined by the World Anti-Doping Agency as “the nontherapeutic use of genes, genetic elements, and/or cells that have the capacity to enhance athletic performance.” Gene doping is the inevitable monster created through the advancements of gene therapy. Gene therapies that have successfully treated diseases target key genes such as erythropoietin or insulin-like growth factor I (IGF-I)- genes that are great targets for enhancing athletic performance if manipulated correctly. The threat that arises is that the new protein encoded by the manipulated gene is produced endogenously, thereby making it virtually impossible to differentiate between the recombinant protein and other proteins that are being manufactured by the same cellular machinery. IGF-I has been a primary target for gene dopers because of its role in muscle growth and repair and increasing strength. By overexpressing IGF-I, increased hypertrophy would occur at the localized treatment site, with concurrent gains in strength.



## 6 Modeling Yellow Fever in Senegal Africa

Samantha Armstrong, Spencer Fowler

Faculty Advisor: Diane Hoffoss  
Department of Mathematics

We condensed the course of the Yellow Fever virus into five complex phases, consisting of a three to four day incubation period, an acute infection phase, a toxic infection phase, and a recovered or permanently immune phase. We then mathematically modeled how the virus would move through a population of ten million people in Senegal Africa, which resulted in almost two million deaths. However, there is a vaccine that is 95% effective in preventing the virus from reaching the first infectious phase. With this information, we were able to model how Yellow Fever moved through the population with the effects of introducing the vaccination to different portions of the population. Further, we modeled how treatment of symptoms would prevent more deaths from the virus from occurring. We found that vaccinating 40,000 people per day along with treatment of symptoms reduced the number of deaths to 334 people in total.

## 8 Quagga Mussel Observation in the San Diego River

Andrew Ayala

Faculty Advisor: Drew Talley  
Department of Marine Science and Environmental Studies

The study and research of the Quagga mussel invasion to reservoirs, lakes, and rivers in the Southern California region has been a growing issue of concern for the Dept. of Fish and Game. The mussels have accumulated in many of the reservoirs and lakes that provide Southern California's water. A concern of the mussels in the San Diego River was apparent, and thus a research project was conducted to monitor and possibly detect if Quagga mussels have infiltrated into the San Diego River. Three locations within the San Diego River were chosen for setting traps to monitor over a five month period from August to December. An angler survey was also conducted to gather information from anglers about their knowledge of the Quagga mussel and how it spreads. Fortunately, throughout the five month monitoring project, no Quagga mussels were found in the San Diego River.

## 10 Structural and Functional Studies of the Histone Chaperone Hif1, a Component of the Hat1 Chromatin Assembly Complex

Michael Bagley

Faculty Advisor: Robert Dutnall  
Department of Chemistry and Biochemistry

The Hat1 chromatin assembly complex contains the Hat1 histone acetyltransferase and two Hat1-interacting factors: Hat2 and Hif1. This complex specifically acetylates histone H4 and is part of a pathway that deposits newly synthesized histone H3 and histone H4 onto DNA during chromatin assembly. The Hat1 complex contributes to gene regulation and DNA repair. We are using biochemical and biophysical methods to study the structure and function of the yeast Hif1 protein to understand how it contributes to the Hat1 complex. Hif1 contains four tetratricopeptide (TPR) sequence motifs, binds histones, and has histone chaperone activity. Bacterially expressed yeast Hif1 is an oligomer, forming dimers and possibly tetrameric assemblies, and interacts with histones. A Hif1 truncation mutant consisting of only the TPR sequence motifs is also an oligomer and retains histone binding activity. We are currently

testing further truncation mutants to delineate the Hif1 region(s) responsible for oligomer formation and histone binding.

## 12 Do Perceptions of Mexico in the Border Region Change After Exposure to a Given Film?

Nicole Balgemino

Faculty Advisor: Kristin Moran  
Department of Communication Studies

The goal of my project will be to explore the changed perceptions of Mexico in the border region after viewing different types of films and genres during the Trans-Border Institute's Border Film Week. Film selections include a documentary about a leader of human smuggling networks, a "rockumentary" about the development of the Mexican band, Molotov, films about kidnapping, the toxicity of lead-based Mexican pottery, and musical explorations, and a video created by Mexican-American students studying "participatory culture." I will be interviewing groups of college students before and after each screening.

## 14 Public Sector Employment and European Integration

Jorge Benavides

Faculty Advisor: Michael Pfau  
Department of Political Science and International Relations

Following the Second World War, Europe embarked on an experiment testing the notion of national sovereignty. Beginning with the European Coal and Steel Community in 1952 and culminating with the current European Union, European states have constantly redefined traditional conceptions of sovereignty. As national powers have gradually been relegated to the supranational Union and financial hardship has affected the global economy, some member states have begun to question the marginal benefits of remaining in the Union. The purpose of this presentation is to determine whether or not there is a relationship between the size of a nation's public sector and its willingness for further integration in the context of European Union member states. The predicted outcome is that there is an inverse relationship between the size of a country's public sector and its willingness to integrate.

## 16 Unknown

Caitlyn Benjamin

Faculty Advisor: J. Michael Williams  
Department of Political Science and International Relations

In this research project I will explore the effect of the current peace and conflict resolution method on African democratization. It is in the hopes of figuring out which structures are more effective and lead to a successful and lasting transition to democracy. In my research I am looking to find whether or not the current peace making and conflict resolution structures are the best suited for the democratization in Africa through the analysis of comparing Democratic Republic of Congo. How are institutions used in society's conflict to facilitate democracy and democratization? How do certain peace institutions do that?

## 18 The Individual, State, and Society in Chinese Philosophy

Tanner Boisjolie

Faculty Advisor: Matt Zwolinski  
Department of Philosophy

Politics in Mainland China has historically been characterized by paternalism, authoritarianism, and rigid collectivism. Skeptics of democracy and individualism often root their arguments in China's rich philosophical tradition, claiming an incompatibility between Chinese culture and a society built around individualism. However, strains of ancient Chinese philosophy do provide support for individualism and principles of limited government. This paper examines various schools of Chinese thought that emerged during the Warring States Period, with special attention to the roles assigned to both individuals and the state in society.

## 20 Intern Season Inside the Beltway

Oliver Brantley

Faculty Advisor: Gary Gray  
Department of Political Science and International Relations

My time in Washington D.C. as a Congressional intern for Representative Greg Walden (OR-02) was an incredible learning opportunity that complimented my knowledge of the legislative process that I have studied in the classrooms of USD. However, the experience enhanced my understanding in ways that a textbook cannot fully encompass. The internship I completed allowed me to observe and participate in important functions such as constituent correspondence, research for potential bills, and general office tasks. In doing this I learned about a wide spectrum of political issues ranging from familiar ones, such as healthcare, to obscure ones, such as horse slaughter. Aside from learning about the current political dynamic, working in D.C. taught me about the rewards and stresses that come with working in a fast paced political environment.

## 22 Democratization in Sub-Saharan Africa: The Role of Institutions and Their Progress

Rachel Buntrock

Faculty Advisor: J. Michael Williams  
Department of Political Science and International Relations

Democracy in Africa has a precarious history. In this paper, I examine the question of what factors help promote or hinder democratization in Sub-Saharan Africa. Specifically, I focus on what role institutions play in making some democracies more effective and responsive to the people. I hypothesize that while there are many other possible factors that could make democracy more effective, such as civil society, it is the institutional foundation that makes democracy stronger and thus more responsive to the people that it is representing. I specifically want to look at the roles the judicial branch, legislative branch, and executive branch play in strengthening democracies in Sub-Saharan Africa. Unfortunately, the African state has also encouraged neopatrimonial relationships to occur due to the strong executive

role and also the lack of oversight that occurs from the macro to the micro institutional levels. With those setbacks in mind, democracy in Africa is not as effective as it could be, and thus institutions need to be stronger in order to encourage democracy in Africa.

## 24 Dual Fuel Diesel Engine

Stacy Castner, Brandon Joye, Dillon Keim, Lauren Yamamura, Vanessa Donnelly

Faculty Advisor: David Malicky  
Department of Engineering

In recent years there has been increasing recognition of environmental deterioration. This is partially caused by the over usage of fossil fuels. Therefore, there is a need for an alternative fuel to use in engines. Our solution is a dual fuel system to allow cold weather usage of straight vegetable oil (SVO) in diesel engines. A significant amount of diesel fuel is used in the startup and shut down of the engine in existing dual fuel systems, and the SVO is heated either electrically or with coolant. Our solution increases engine run time on SVO by introducing a new SVO heating concept. The design uses the waste heat from the exhaust gas to heat the SVO quickly. By decreasing the SVO heating time, the time the engine is running on green SVO fuel is increased. Our design will be implemented as a prototype using a small water pump.

## 26 Protein Structure Determination Via X-Ray Diffraction Methods in an Undergraduate Laboratory Course

Lani May Centeno

Faculty Advisor: Robert Dutnall  
Department of Chemistry and Biochemistry

Understanding the relationship between structure and function of biological macromolecules is a commonly emphasized concept in biochemistry. Teaching experimental aspects of structure determination is important so that students can navigate structure databases, understand method limitations, and critically interpret the growing body of structural information. We sought to test the feasibility of undergraduate students solving a protein structure, starting from purified protein, using X-ray diffraction methods. We chose trypsin as a target protein and used an X-ray diffractometer at USD to collect high quality, high resolution data sets. Using the Phenix software program, we solved the structure via sulfur-single wavelength anomalous diffraction and/or molecular replacement methods, and built and refined molecular models. Our results indicate that all aspects of this process can be implemented in a laboratory class. There is potential for altering the target protein to address hypothesis-driven questions, and also for sharing data with other institutions for instructional purposes.

28 **Effects of Language in Pain Mediation: Replication of the “Swearing and Pain Study”**

Lindsay Colletti, Jessica Flores-Vasquez, Gabriella Taverite

Faculty Advisor: Annette Taylor

Department of Psychological Sciences

The purpose of our study was to replicate the findings of Stephens, Atkins and Kingston (2009). They measured participants' heart rate during a cold-pressor task while repeating either a swear word or a neutral word. We believed their procedure allowed for alternative explanations of their findings, so we modified several aspects. We added a mild oath condition, room temperature bath, and changed the design from within-subjects to between-subjects. Our data for 60 participants using our modified procedure failed to show any significant results. We are currently collecting additional data following the original procedures more closely. During this process, we experienced an adverse event where one participant sought medical attention for possible nerve damage secondary to ice water submersion. This case went before the IRB and after review, we were granted permission to continue the study. As a result, we included more specific medical exclusionary criteria for future participants.

30 **“Strong People Don’t Need Strong Leaders”: Perspectives on Transformative Pedagogy and Liberatory Leadership Through the Model of Ella Baker**

Daniela Conde

Faculty Advisor: Judith Liu

Department of Ethnic Studies

In an ever-changing world, self-determination of all individuals is vital to overcoming oppression. This study aims to investigate an effective form of leadership, as exemplified by Ella Josephine Baker, an African American civil rights activist and organizer. Through an analysis of her egalitarian vision and inclusive leadership style we obtained a thorough understanding of how her pedagogical method is consistent with the praxis in the works of Antonio Gramsci, Paulo Freire and the theoretical framework of black feminist theorists such as Patricia Collins. Baker's belief that “strong people don’t need strong leaders” is the essence of her philosophy of leadership and grassroots activism. An analysis of her work provides a powerful historical discourse and is essential for expanding the meaning of leadership and the power of pedagogy. By firmly integrating them in the tradition of liberatory pedagogy and social activism, a revolutionary model for social change emerges.

32 **Effects of Types of Conversations on the Attention and Memory of Bystanders**

Neesha Daulat

Faculty Advisor: Veronica Galvan

Department of Psychological Sciences

The pervasive use of cell phones impacts many people--both cell phone users and bystanders exposed to conversations. This study examined the effects of overhearing a one-sided conversation versus a two-sided conversation on attention and memory. Participants were led to believe they were participating in a study examining the relationship between anagrams and

reading comprehension. While the participant was completing an anagram task, the researcher left the room and participant overheard a scripted conversation. Then the participant took a recognition memory task with words from the conversation, and completed a questionnaire measuring the distracting nature of the conversation. Participants who overheard the one-sided conversation rated the conversation as significantly higher in distractibility. Participants in the one-sided condition scored higher on the recognition task showing that people are more attentive to one-sided conversations than two-sided conversations. Therefore, cell phone conversations may be a common source of distraction causing negative consequences.

34 **A Day in the Life: Undocumented Students in the City of Escondido**

Angelita Delgado, Kalea Wiseman, Maritza Rodriguez-Diaz

Faculty Advisor: Gary Gray

Department of Political Science and International Relations

This qualitative study examines the lived experiences of undocumented students in the city of Escondido. Ethnographic fieldwork and semi-structured interviews will be conducted in an attempt to better understand the ways in which immigration policy, at both the macro and micro level, have affected this population.

36 **Targeting the Gene Hpl-2 in the Nematode *C. elegans* in Order to Test Its Function in Specifying Serotonin Neurons**

Angelica Dollesin

Faculty Advisor: Curtis Loer

Department of Biology

We are evaluating the function of genes in nerve cell development in the nematode *C. elegans*; specifically, we are focusing on how genes are regulated to produce the neurotransmitter serotonin in certain neurons. Studying gene functions in *C. elegans* can give us information on their functions in other animals, including humans. The hpl-2 gene in *C. elegans* encodes an HPI-like heterochromatin protein known to regulate HOM-C/Hox genes, some of which also function in serotonin neuron development. Therefore, we plan to block its function using RNA interference. We will clone a fragment of the target gene into an RNAi vector, then transfer this into appropriate bacteria. We can use these bacteria to block hpl-2 function in worms via RNAi and observe the effect on production of the neurotransmitter serotonin in nerve cells.

38 **Simulations of the Microcirculation in the Human Conjunctiva**

William Dow

Faculty Advisor: Frank Jacobitz

Department of Engineering

The microcirculation in the conjunctiva of a healthy human subject is analyzed using a simulation approach. Previous work suggests that hypertension, arteriosclerosis, and diabetes mellitus cause very early noticeable changes in the microvasculature (Landau and Davis, 1957; Ditzel, 1968; Kunitomo, 1974) and the vessels of the conjunctiva are specifically useful for this research because they can be studied non-invasively. The microcirculation in the conjunctiva

has been documented over the course of disease treatments, providing both still images and video footage for information on vessel length, diameter, and connectivity as well as the direction of blood flow. The numerical method is based on Stokes flow in the microvessels and a sparse matrix solver is used to obtain the solution. The simulations use realistic vessel topology for the microvasculature, reconstructed from microscope images of tissue samples, and consider blood rheology as well as passive and active vessel properties.

#### 40 An Ideological Analysis of Reality Television: The Bizarre Appeal of TLC

Michelle Ellis

Faculty Advisor: David Sullivan  
Department of Communication Studies

Reality television tends to highlight deviancy through the narrative's form, content, and depiction of characters—in effect validating and naturalizing mainstream ideology. Understanding this particular construction of the cultural logic that sustains these types of shows is important in identifying how the program messages interact, leading to broader implications and often audience acceptance of hegemonic representations. The texts studied not only bolster cultural assumptions through instances of hegemony, but also marginalize certain social and cultural groups in an obstructive and distasteful light. “The Learning Channel” capitalizes on this by exploiting reality stars and their families in shows like *Here Comes Honey Boo Boo*, *Toddlers and Tiaras*, and *Breaking Amish*, consequently contributing to the recent decline in broadcasting standards. This project pursues a textual, interpretive analysis of TLC hit reality shows, narrowing the scope of themes they draw upon and uncovering how their veiled meaning pertains to shows of the same genre.

#### 42 Reactions to Public Safety Reports of Hate Crimes in Terms of Sympathy and Helping Intentions

Mackenzie Entrikin

Faculty Advisor: Anne Koenig  
Department of Psychological Sciences

This study looked at students' reactions to hate crimes in terms of blame, sympathy, and helping behavior. Participants read a report of a crime with either a White male, Black male, or homosexual male victim which was either explicitly labeled as a hate crime or not. I hypothesized that crimes would elicit increased sympathy and helping behavior both when the crime had a minority victim and when the crime was labeled as a hate crime. In addition, greater blame was predicted for homosexual victims. Results indicated that students reported greater sympathy and helping intentions when they read about a crime with a minority victim than a White victim. White victims were blamed more than minority victims, but contrary to predictions, homosexual male victims were less blamed than Black victims. Crimes with minority victims labeled as a hate crime did not elicit stronger reactions than those without this label.

#### 44 Engine Waste Heat Recovery

Sophie Fallon, Ty Otteson, Nathaniel Scherrer

Faculty Advisor: David Malicky  
Department of Engineering

The purpose of this project is to explore an option for increasing overall fuel efficiency for vehicles operating with internal combustion engines. Utilizing a 7 horsepower propane engine, our team will explore the potential for extracting waste heat thermal energy from the exhaust in an attempt to convert it into mechanical work. A Rankine steam cycle will be used to ultimately convert the extracted heat into work, which can then be used as additional power supplementing the shaft output. Increases in overall fuel efficiencies are expected to be in the range of 1 to 12 percent. Some obstacles will be high material cost, proper component sizing, corrosion prevention, control and regulation of working fluid, and overall safety for a lab environment. Aside from demonstrating the possibility for efficiency increase, the resultant system will be used as a lab device apparatus for exploring thermodynamic processes.

#### 46 The Role of Culture and Its Effect on Democracy

Brian Fernandez Oquendo

Faculty Advisor: Emily Edmonds-Poli  
Department of Political Science and International Relations

The Spanish, French, Portuguese, and British influences have tremendously shaped the various countries and cultures that we see today in Latin America. This colonial history along with American involvement in this part of the world has shaped the cultures of this region in the world. With different political and economic ideologies practiced in Latin America we have seen a particular amount of political regimes in the development of the region of this world. However, today the majority of Latin America has been “democratized”. But to what extent are these democracies successful and why do we see so many different types of democracy in this region? Though institutions and economic policies may be strong determinants in defining a democracy, culture seems to have a stronger correlation with democracy. In this research I examine the role of culture and how culture defines the quality of democracy.

#### 48 Microfinance and Microsavings in the United States

Peter Ferrari

Faculty Advisor: David Shirk  
Department of Political Science and International Relations

One of the important tools in the fight to end global poverty is microfinance, the practice of lending a small amount of money to poor entrepreneurs so that they may improve their businesses. This practice is primarily done internationally, but microfinance is also crucial in the United States. Microfinance is often considered successful because of its high rate of loan payback, often above 90 percent. Currently, a similar practice, microsavings, is growing in scope and popularity. In microsavings programs, individuals save for a specific goal, such as home ownership, educational expenses, or business expenses, and institutions then match successful savings. Attempts to evaluate these programs generally exist at the institutional level of analysis, looking at payback and success rates. This study attempts to evaluate something much more important, the success of these programs in significantly improving people's lives as well as bringing them out of poverty.



## 50 Curbing Corporate Power: An Analysis of Corporate Rights and Restrictions

Samantha Finegan

Faculty Advisor: Craig Barkacs  
School of Business Administration

This analysis of corporate power first explores the common perception of corporate power as a threat in need of regulation. On which distinguishing elements do people focus when deciding the ways in which corporations should be regulated and subjected to different standards than individuals? Do these distinguishing elements justify such subjection in every case? How applicable is the concept of corporate personhood? Whether people seek to support corporate power for personal gain, fight it for self-preservation, or deem it a subject of indifference, threats against both individuals and corporations persist. This thesis will thus address not only corporate rights, responsibilities, and restrictions in the face of the legal system, but also individual rights, responsibilities and the restrictions imposed upon them by corporations. The possibility of reconciliation between the individual and the corporation in a mixed economy will be discussed.

## 52 The Applications of Algorithms and Mathematics in the Military: Cryptography and Ciphers

Kelly Fromm

Faculty Advisor: John Glick  
Department of Computer Science

In the early 16th century, the mathematician known as Tartaglia first applied mathematical ideas to warfare, specifically to ballistics. As technology continues to improve at a consistently fast rate, the applications and importance of algorithms and mathematics in the military grow as well. Cryptography, the study of transmitting secret messages through encryption and decryption, plays a large role in the military. Cryptography relies on the use of ciphers, or algorithms that perform the encryption and decryption. This thesis takes a look at some of the historical and modern applications of mathematics and algorithms in the military, specifically with respect to cryptography and ciphers. As ciphers are broken, the algorithms must get increasingly more complicated. It is important to understand the historical and current status of cryptography in relationship to its applications in the military in order to preserve the confidentiality and secrecy that is essential to military procedures.

## 54 In Lak'ech: I Didn't Cross the Border the Border Crossed Me

Alex Gaona

Faculty Advisor: Saba Oskoui  
Department of Art, Architecture + Art History

"In Lak'Ech" is a traditional Mayan word and belief. To say "In Lak'Ech" is to say "you are my other me." This is at the very heart of my Senior Thesis exhibit. With immigration being a hot topic in the US today the people this is about and that it affects the most are often forgotten. These people become numbers, statistics, and problems and often are seen as a plague. Their very dignity is often forgotten and that is what I hope to shed light on. By applying the teachings of Catholic Social Thought and Liberation Theology alongside the ideas of other proponents of human dignity I hope to bring dignity and respect to those often left on the margins of society. Through visual imagery and text I hope to present the image and story of a people to reflect the true reality of our humanity.

## 56 Entre La Realidad y el Mito

Rebecca García Rangel

Faculty Advisor: Kevin Guerrieri  
Department of Languages and Literatures

This independent study project is an exploration of writing techniques, themes, and intertextuality in the contemporary Latin American novel. I will analyze works such as the Chilean Roberto Bolaño's 2666 and Los sinsabores del verdadero policía, the Guatemalan Rodrigo Rey Rosa's Caballeriza and El material humano, and the Colombian Juan Gabriel Vásquez's Historia secreta de Costaguana and El ruido de las cosas al caer. I seek to examine the historical past represented in the novels, the fictional worlds they create, and writers' diverse aesthetic projects in the context of current Latin American realities.

## 58 Group Theory and the Rubik's Cube

Mason Geysler

Faculty Advisor: John Glick  
Department of Computer Science

The Rubik's Cube is a combinatorial puzzle designed by Ernő Rubik. Over the last 39 years the puzzle has been analyzed by professors of mathematics and computer science. Certain complexities and properties of the cube allow it to be studied by mathematical group theory and used as a testing ground for computer algorithms. This project aims to solve the Rubik's Cube using sets of algorithms as a human would through computer simulation and solve the cube through iterative deepening to find optimal solutions. This project will also explore group theory as it would be applied to a Rubik's Cube.

## 60 Determining the Effect of Turning Angle on the Traveling Salesman Problem

Kelly Goldsteinholm, Carolina Bellizzi

Faculty Advisor: Rachel Blaser  
Department of Psychological Sciences

The Traveling Salesman Problem (TSP), which assesses optimization or efficiency of target selection, has been studied in interdisciplinary fields ranging from mathematics to computer science. Additionally, it has been favored by cognitive psychology researchers as a means of examining the underlying mechanisms of decision-making, planning, and spatial problem solving. Humans produce extremely good solutions to TSP problems, and other species show spatial optimization, but it is not yet known what strategies they use to solve the problem. Some proposed strategies for successful navigation include global 'gestalt' like mechanisms, and simpler methods such as selecting the nearest neighbor or following a preferred turning angle. Our project focused on the question of whether rats might employ a strategy using a preferred turning angle. To this end, sixteen Long-Evans variety lab rats were presented with six different versions of this navigational task that varied in the turn angle of the optimal route, in order to examine the effect of preferred turning angle upon route efficiency.

## 62 Security and Rule of Law Internship: Trans-Border Institute

Nathalie Gomez

Faculty Advisor: Gary Gray

Department of Political Science and International Relations

The internship that I chose to participate in was the Security and Rule of Law Internship with the Trans-Border Institute. I worked specifically under the Justice in Mexico project with the Institute, which began its work in 1994 and was created by Dr. David Shirk. The Trans-Border Institute is one of the country's leading centers for promoting understanding, dialogue, and cooperation across the U.S.-Mexico border. My internship deals specifically in promoting the rule of law in Mexico and greater security. I participated regularly in publishing blog posts on the Justice in Mexico website which were compiled and released in the Justice in Mexico News Monitor on a monthly basis. In addition I worked as a research assistant on the 'Violence and Victim's Monitor' compiling and correcting data sets to include the most up to date cases of organized crime in Mexico and those individuals who have perished because of it.

## 64 The Importance of Physician-Patient Interactions in the Treatment of Trauma Victims

Dominique Grayeb, Alexander Sidhom, Alexis Dawson, Alexandra Herweck

Faculty Advisor: Michael Ichiyama

Department of Psychological Sciences

Selected Pre-Health students from the University of San Diego participated in a semester-long internship at the Scripps Mercy Hospital Emergency Trauma Center in San Diego. A significant component of the internship was the first-hand experience pertaining to the intricate dynamics that must take place in order to provide effective treatment for patients suffering traumatic injuries. A key factor involved in the treatment process for trauma victims are the communication exchanges between the patient and health care service providers. These coordinated interactions include: physician-to-patient, health care provider-to-health care provider, and physician-to-patient's family. The quality and efficiency of these interactions are critical for enhancing the overall treatment experience. In our poster we will highlight and illustrate the communication exchanges that occur in the treatment of trauma patients from intake to follow-up care.

## 66 Potential Consequences Relating to the Differences in Auditing Standards and Regulations Between Europe and the United States

Elizabeth Grossett

Faculty Advisor: Jillian Phillips

School of Business Administration, Accountancy

The rapid increase in the globalization of businesses as well as cross-border capital flows prompts us to evaluate the implications of numerous different international reporting standards. Although there is much support for the unification of accounting standards, adopting one single set of rules or principles would still be unlikely to provide the consistency and assurance investors are looking for. As a result, it is important to examine the potential consequences related to the differences in auditing standards between the United States, and,

for the purposes of this thesis, Europe. Furthermore, I will examine the role of culture in the effectiveness of independent auditing in a global context. This will enable auditors with increasingly multinational clients to be better equipped for working internationally, as well as making external investors more aware of the risks associated with multinational corporations.

## 68 The Role of Third Parties in American Politics

Christopher Halbritter

Faculty Advisor: Casey Dominguez

Department of Political Science and International Relations

Third parties and intra-party factions have proven to be influential actors in American politics. Some groups have managed to elect politicians to office and even push the two major parties to reshape their party platforms, while others have been little more than a footnote. The purpose of this paper is to understand why third parties and factions emerge and how the Democratic and Republican parties respond to these groups. Looking at a series of case studies that focus on particular movements since the latter half of the twentieth century may help us understand how change occurs in politics and how the two major parties will react to these groups in the future.

## 70 Wilde Thing: How the Rebellious Oscar Wilde Challenges Victorian Mores

Anna Halligan

Faculty Advisor: Atreyee Phukan

Department of English

Oscar Wilde has often been celebrated for his humor, intelligence, and sparkling wit. He is adored for his charmingly flamboyant antics and elevated glorification of beauty and art. He is not often remembered as a radical political commentator—and yet, he was. My thesis explores how Wilde, through two of his better-known works, "The Picture of Dorian Gray" and "An Ideal Husband," offers a voice to women and homosexuals and challenges the conservative and misogynistic Victorian ideals of masculinity, femininity, sexuality, and marriage.

## 72 Naturally Occurring Concentrations of Seventeen Metals in the Bay Point Formation, San Diego, California

Cornelius Harris, Vanessie Christensen

Faculty Advisor: Eric Cathcart

Department of Marine Science and Environmental Studies

The natural variability of metals in the native formations of San Diego County is poorly understood. The concentrations of metals in soils is a fundamental criteria regarding remediation and potential disposal options for soils removed from contaminated or potentially contaminated properties in San Diego County. We present the results of distinct geogenic soil samples representing the in-situ Bay Point Formation of San Diego, California. All of the soil samples were analyzed following Environmental Protection Agency 6000 / 7000 Series Methods on an ICP Mass Spectrometer. The naturally occurring Arsenic concentrations detected during this study exceeded commonly used health risk soil screening levels and other risk-based corrective action guidelines utilized by many regulatory agencies in California. Additional data will be collected from specific locations so that a comprehensive study of the concentration of naturally occurring metals in San Diego County sediments can be published.

## 74 Synthesis, Characterization, and Reactivity of a Fe-Based Nitrile Hydratase Synthetic Analogue

Hillary Hawkins

Faculty Advisor: Christopher Daley  
Department of Chemistry and Biochemistry

Nitrile hydratase (NHase) is an enzyme that converts nitriles to amides via hydration. NHase is useful in society as an industrial biocatalyst for amide production, as well as in nitrile-waste reduction of streams. The active site of NHase is unique by having a low-spin metal ion (Fe(III) or Co(III)) coordinated to the enzyme through two amide nitrogens and three cysteine sulfurs, two of which have been post-translationally modified via oxidation. These unique characteristics are crucial to NHase functioning. The successful preparation of functional models of NHase will allow for a better understanding of the structure-function relationship in NHase. Our progress on the synthesis and characterization of an Fe-based analogue of the NHase active site will be presented.

## 76 The Impact of Citizenship in Forming Democracy in Latin America

Yajaira Hernandez Trejo

Faculty Advisor: Emily Edmonds-Poli  
Department of Political Science and International Relations

This paper focuses on the relationship between political culture and the establishment and/or consolidation of democracy in Latin America. In particular, it analyzes the development of different types of citizenship. This research seeks to analyze if people who become engaged in developing citizenship in their country will become engaged, create a political culture, and have a greater impact in the creation and expansion of democracy. Citizenship will be measured by looking at trust and social capital. Democracy will be measured based on competition, having more than one candidate for presidential elections and voter turnout, participation. Additionally, I will use Freedom House's measurement of political freedom score and Vanhanen's Index of Democracy. The results will show that countries who have active citizenship will establish democracy and if democracy already exists further consolidate it.

## 78 Bioavailability of Heavy Metals in the Coral Bay Watershed

Jacob Holley

Faculty Advisor: Sarah Gray  
Department of Marine Science and Environmental Studies

An evaluation of heavy metals in sediments collected in watershed and coastal marine environments in the Coral Bay, US Virgin Islands was conducted to determine a.) how the concentrations of bioavailable heavy metals varied from bedrock source to marine sediment sink and b.) to compare methods of determining bioavailable heavy metal concentration. Copper and Zinc were removed from the collected sediments by nitric acid and EDTA digestions and their concentrations measured on an ICP-OES. The concentrations of bioavailable Cu in the marine nearshore sediment exceeded the EPA ERL. Also, data suggested the hydrothermally altered rocks might be a major supplier of natural heavy metals to the marine environment. Nitric acid digestion removed a significantly higher concentration of heavy metals from sediments than EDTA. Due to interactions between nitric acid and clay, EDTA may be a more accurate indicator of bioavailable environmental conditions.

## 80 Military Spending and Its Economic Repercussions in the United States

Dillon Jacobsen

Faculty Advisor: Andrew Narwold  
School of Business Administration, Economics

The purpose of this project is to investigate the economic relationship between military spending and Gross Domestic Product (GDP) in the United States. In 2012, the U.S. spent \$711 billion and China was the next closest at \$228 billion—this project attempts to explain this discrepancy. Although the United States government is responsible for how much military spending there will be per year, its citizens are the ones who feel the effects. How much money is allocated to military spending is not all determined by domestic needs; factors like other countries increasing their spending, what party controls Congress, what party the President belongs in, and contemporary economic variables such as the growth rate of the economy will be evaluated in the models created. War has been widespread in modern history, and this project explores its economic repercussions.

## 82 Chronic Stress in College Students

Sarah Jensen, Jessica Flores-Vazquez, Sarah Potter-Smith, Hazel Hidalgo, Cori Tergesen, Corey Salas

Faculty Advisor: Veronica Galvan  
Department of Psychological Sciences

College students report the highest levels of stress compared to other age groups. Of the factors related to college-age stress, locus of control may be the greatest influence. Internal locus of control, the perception that one has control over his or her life, has been correlated with higher levels of DHEA and lower levels of cortisol stress hormones compared to an external locus of control, the perception that one has no control over his or her life. These stress hormone levels can be measured using biological markers in saliva. We hypothesize that the greatest indicator of self-reported stress will be locus of control. In particular, we expect that an internal locus of control will correlate with low levels of cortisol and high levels of DHEA compared to participants with an external locus of control. We expect that other reported stress factors will be related to perceived stress and biomarker levels.

## 84 Harmonious World or Hegemony: Assertiveness Chinese Foreign Policy in the 21st Century

Matthew Jones

Faculty Advisor: Vidya Nadkarni  
Department of Political Science and International Relations

Beginning in 2008, the People's Republic of China (PRC) began pursuing what many China watchers described as a more assertive form of foreign policy. And, despite the PRC's greater emphasis on soft power over the same span of time, in addition to its drive to create a "harmonious world," Chinese foreign policy has, paradoxically, become more assertive over the last decade. My research seeks to answer, "Why has Chinese foreign policy become more assertive?" This thesis concludes that PRC foreign policy decision makers are constrained by domestic politics, in which their decisions are made with the domestic consequences in mind. And, this is only exacerbated with the rise of nationalism in the PRC.

## 86 Empress Elisabeth of Austria-Hungary: Impacting Society from the Grave

Gwenllian Kern-Allely

Faculty Advisor: Molly McClain  
Department of History

A presentation on the roles played by Empress Elisabeth during her life in the social, political, and cultural realms of the Austrian Empire. The project looks at her roles that are played in contemporary society, and how she continued to affect society even after her assassination before the turn of the century.

## 88 Myoglobin Levels of the Eared Grebe

Joshua Klem

Faculty Advisor: Hugh Ellis  
Department of Biology

Eared grebes are small aquatic birds. They are skilled divers that inhabit much of North America. Because they are diving birds, oxygen storage and their aerobic capacity is very important. I chose to study how these birds store oxygen in their muscles by studying their myoglobin levels. I found the eared grebe have very high levels of myoglobin in their heart and legs. Their leg values exceed those of better known diving birds such as the penguin because grebes are leg-propelled divers rather than wing-propelled. I also found that fall stagers have more myoglobin in their gizzards than spring grebes. This could be due to the fact that they are actively digesting more food while staging in the fall. Future research needs to be done on hemoglobin and blood volume, which are also important in oxygen storage.

## 90 Vapor Risk Assessment from a Chlorinated Solvent Release

Kimberly Kunihsa

Faculty Advisor: Eric Cathcart  
Department of Marine Science and Environmental Studies

Volatile Organic Compounds (VOCs) are gases which are emitted from certain solids and liquids. VOCs are able to contaminate groundwater and soils through spills, leaks, and storage. They can be transported to exposure mediums where they are known to cause adverse health effects such as headaches, respiratory problems, and cancer. For this reason, vapor risk assessments are important to ensure the safety of the people exposed to VOCs through indoor air. We analyzed a former industrial site located in San Marcos, CA for VOC levels in the soil-vapor. This was done to analyze the human health risks of indoor air into a proposed residential building. Our objective was to assess if the indoor air vapor risks of VOCs, specifically chlorinated solvents, were within EPA health management standards.

## 92 Prosocial Responses to Ostracism Are Unrelated to Thwarted Fundamental Needs

Julian Leiro, Jamie Shea

Faculty Advisor: Jennifer Zwolinski  
Department of Psychological Sciences

Threats to belonging following ostracism lead to prosocial response to enhance group inclusion, whereas threats to control supersede the belonging need, leading the victim to act more aggressively towards the excluder(s) to gain more control and receive more attention from others (Williams, 2005, 2007). A total of 206 primarily Caucasian (69%) female (62%) freshman college students played two games of Cyberball, an experimental manipulation of ostracism. In game 1 (G1), participants were randomly assigned to the ostracism group (48%) or the inclusion group. In game 2 (G2), all participants were assigned to the inclusion group and were told that one of the two other players was a “repeat” player from G1 and the other player was a “newcomer”. Results suggest that although ostracized participants were more likely to show prosocial responses in G2, thwarted needs of belonging and control following ostracism in G1 were unrelated to prosocial and/or antisocial tendencies.

## 94 Health and Benefits Actuarial Internship

Jeremy Leon

Faculty Advisor: Jane Friedman  
Department of Mathematics

Mercer is an international company which provides services in many industries, including financial investments, health and benefits, mergers and acquisitions, retirement, and outsourcing. Their actuarial businesses are health and benefits and retirement. Almost all companies offer employee benefit plans which include medical, dental, vision, and other insurance coverage. A workforce covered under these and other insurance coverage pose risk toward both the insurance companies and their employers (in the case of self-funded benefits). Mercer consults their clients on their risk under self-funded plans and their benefit plans that are fully insured under a benefit provider. While working as an actuarial intern, I helped consult our clients on a variety of tasks, including Incurred But Not Reported updates (IBNR), Underwriting, Government compliance including Healthcare Reform, and many others. I learned much about the intricacies of the healthcare system and insurance, and the rising problems of the healthcare industry.

## 96 San Diego River Park Foundation: Community Cleanups

Mar-Lynn Long

Faculty Advisor: Drew Talley  
Department of Marine Science and Environmental Studies

My internship took place at the San Diego River Park Foundation, where I was a Healthy River, Healthy Community intern. My internship involved GPS mapping, data entry, public outreach, as well as many other factors. From this experience, I have gained valuable knowledge about the workings of a non-profit organization as well as the health of our local San Diego River.



## 98 Salary Negotiations and Women: An Analysis of the Gender Gap

Laura Lombard

Faculty Advisor: Linda Barkacs  
School of Business Administration

The business world has made great strides toward equality between men and women, but numerous studies show that women are still earning less. My thesis will focus on the role that negotiations play in the disparity between men's and women's salaries in the United States. Women are much less likely to negotiate than men, and when they do negotiate, they tend to settle for less. Using data from government agencies such as the Bureau of Labor Statistics and information from negotiation experts, I will discuss the current situation regarding men's and women's earnings and the reasons for the disparity.

## 100 The Partisan Media's Affect on the Attitudes of Partisan Voters on Frequently Mentioned Issues

Justin Marini

Faculty Advisor: Casey Dominguez  
Department of Political Science and International Relations

This project assesses the role of the partisan media on voter outlooks of political issues. By examining the partisan media's role in attitude formation, the effect of the media on voter behavior, and the media's selection of content, this project intends to better understand to what degree the partisan media can affect partisan opinion formulation on frequently mentioned issues.

## 102 Explorations in Urban Sociology and Critical Criminology: Agency, Education and Social Change

Fernando Masias

Faculty Advisor: Thomas Reifer  
Department of Sociology

In "Great American City: Chicago and the Enduring Neighborhood Effect," Robert J. Sampson argues that with the concentrated increase in crime in major urban cities comes White flight and related resource deprivation, decreasing the neighborhood's sense of collective efficacy, thus increasing crime, racially biased perceptions of criminality among low-income communities of color, and incarceration. In emphasizing 1965, the year where crime rates began to explode, and the corresponding White flight, Sampson arguably ends up reinforcing the very idea of criminality among communities of color. The contrasting hypothesis to be explored here is that it was 1954, the year of the landmark Supreme Court decision, *Brown v. the Board of Education* that was the key year in stimulating White flight, as Whites sought to protect their material and ideal monopolies; thereby removing affluent White populations with their substantial resources. Data will be gathered on White flight in the US in the 20th century right up to the present, especially after 1954. Literature on collective efficacy and education will also be reviewed, to see if it conforms to the hypotheses proposed herein.

## 104 An Analysis of Major League Baseball Attendance: Do Fans Discriminate?

Andrew McCraven

Faculty Advisor: Stephen Conroy  
School of Business Administration, Economics

This project examines attendance data for Major League Baseball from 1993 through 2010 in order to construct a statistical model that explains variation in attendance over the time period. A variety of factors are examined including team quality, stadium characteristics, and market characteristics. The model will be used to determine if fans racially discriminate against certain types of players or managers. If there is a significant negative relationship between attendance and the race of a team's manager or its star players, then there would be evidence of fan discrimination. If fan discrimination exists then there is a hidden cost associated with employing minority managers and players. Teams would be paying their salary and losing attendance and concessions revenue because fewer fans would be attending their home games.

## 106 The Effects of U.S.-China Trade on Mexican Exports from Maquiladora Industries

Anastasiya Menshikova

Faculty Advisor: Andrew Narwold  
School of Business Administration, Economics

This article examines the impact of low-wage competition from China on exports from Mexico's Maquiladora Industry throughout the Mexican states of: Aguascalientes, Baja California, Coahuila de Zaragoza, Chihuahua, Distrito Federal, Durango, Guanajuato, Jalisco, México, Nuevo León, Puebla, Querétaro de Arteaga, Sonora, Tamaulipas, Veracruz de Ignacio de la Llave, and Yucatán. Using Mexico's governmental monthly data from the National Institute of Statistics and Geography (INEGI) for 2007-2011, it is evident that increased trade from China is identified with decreased Mexican exports. The results testify to the significant effect of increased Chinese competition on the decrease of Mexican maquiladora exports. It is clear that Mexico's maquiladora industry is being challenged by the emergence of China as a source of low-wage labor for the United States and other foreign competitors.

## 108 Aqueous-Phase Reactions of Glycolaldehyde and Formaldehyde with Primary Amines and Ammonia: A Possible Secondary Organic Aerosol (SOA) Forming Pathway

Katherine Millage

Faculty Advisor: David De Haan  
Department of Chemistry and Biochemistry

Atmospheric aerosol cans interact with clouds in many ways, often resulting in the redistribution or absorption of solar energy. Secondary organic aerosol (SOA) in particular has been linked to climate change. Reactions between many nitrogen-containing compounds and simple aldehydes in aqueous cloud droplets have been identified as sources of SOA. In this study, reactions between glycolaldehyde and amine compounds were monitored using nuclear magnetic resonance spectroscopy. Additionally, aerosol was generated from formaldehyde and nitrogen-containing compounds and equilibrated into a chamber containing humid air (83-86% RH). Particle sizes and volumes were measured using a scanning mobility particle

sizer. Most experiments displayed overall decreases in total particle volume, which is likely due to the evaporation of formaldehyde and first generation imine products. Experiments with formaldehyde and arginine displayed the opposite trend, suggesting that aerosol phase oligomerization products might be scavenging formaldehyde from the gas phase in order to react with it again.

## 110 Coastside County Water District

Spencer Morgan

Faculty Advisor: Drew Talley

Department of Marine Science and Environmental Studies

The Coastside County Water District (CCWD) is a private sector water district that serves about 20,000 people in the county of Half Moon Bay, California. The district has two main water supplies; Pilarcitos Lake in rural San Mateo County, and Hetchy Hetchy fed Lower Crystal Springs Reservoir. In order to keep up with a growing population, a massive pump station was implemented at the Crystal Springs Reservoir as well as a water treatment plant at the Deniston Reservoir located in the northern region of the district. In the summer of 2012, I was employed as an intern for the CCWD and received firsthand experience with the water treatment process. The water treatment process involved the addition of coagulants and chlorine to raw water as well as settling in various retention basins. I also constructed an unidirectional flushing program and worked on a variety of other projects.

## 112 Serotonin Levels: A Mathematical Model

Erica Nederend

Faculty Advisor: Seth Haney

Department of Mathematics

Serotonin is a neurotransmitter that regulates mood, behavior, aggression, suicidality, and body weight. Regulation of serotonin is very complex, involving multiple feedback loops and auto-regulation. Levels of serotonin tend to fluctuate in response to many factors, including amounts of other hormones and even food intake. A major study on this subject was performed by Best et al. in 2010, titled: "Serotonin Synthesis, Release and Reuptake in Terminals: A Mathematical Model", where a mathematical model of this complex system was created based on differential equations. Here, we have reduced this complex model into a simplified version with the intent to more easily analyze the effects of the many parameters in the model. Simplifying the mathematical model of this complex system has biological advantages to give insight to mental disorders that are linked to low levels of serotonin. It may also help predict the body's response to an SSRI, potentially benefitting the ongoing search for a cure for depression. Currently, we are in the middle stages of our intentions of this project. We have determined a simplified version of the model in this paper, which is reduced to three differential equations. Our next step will be to input our model into capable software, which will allow us to visually observe the model and the effects of the various parameters. Furthermore, we will be able to analyze the behavior of serotonin in a single neuron based on different initial conditions and potentially consider states at which all levels of serotonin are constant. This will allow us to make predictions about the long-term behavior of serotonin in the body and make conclusions of the impact that these changes have on mental health.

## 114 Do Aspects of Maternal Parenting Behavior and Toddler Temperament Work Together to Predict Compliance During a Control Situation?

Carolyn Noack, Sarah Gragg

Faculty Advisor: Adriana Molitor

Department of Psychological Sciences

The present study examined relations between maternal behavior, child temperament, and toddler compliance during a laboratory-structured control situation (child clean-up). From a domain-specific socialization perspective, clean-up is a reciprocity task for children with genuine interests in compliance due to histories of mutual accommodation during play. For many dyads, however, clean-up reflects a control task where goals conflict. Although gentle control styles are generally considered better than power-assertive approaches, researchers still need to clarify the effectiveness of specific techniques, especially in light of recent re-conceptualizations of parental control. In the present study, we assessed children's temperament qualities and cooperation levels (during toy clean-up) among a subsample of 30-month-old toddlers who were classified as experiencing a control situation. Additionally, we coded maternal behaviors (during clean-up) that reflected theoretically distinct features: structure vs. ambiguity and autonomy-support vs. control. Analyses examined the relations between these parenting behaviors, children's temperament qualities, and toddlers' cooperation levels.

## 116 The Conflict of Measurement and Creativity

Kelly O'Connell, Gabriella Taverite

Faculty Advisor: Jennifer Mueller

School of Business Administration

Prior work shows that factors which evoke intolerance towards uncertainty can activate a negative underlying bias against creative ideas which diminishes creative idea recognition. The current study examines the possibility that measurement – showing extremely precise estimates of expectations - can promote creativity bias and diminished engagement (or deter) in creative problem solving. In this study, student participants are asked to choose either a "creative" or "practical" topic to write a paper and are given goals. However, one group of participants receives a measurement condition (extremely precise metrics for grading). We predict that in the measurement condition, participants will choose to write about the practical topic and generate fewer creative solutions than in the no measurement condition. These findings have wide implications for the use of grading rubrics, and suggest that our very efforts to make tasks less ambiguous and quantifiable may actually harm students ability to creatively problem solve.

## 118 Amanda Knox Around the World: A Frame Analysis

Katharine Olsen

Faculty Advisor: Kristin Moran

Department of Communication Studies

Amanda Knox, a University of Washington student living and learning in Perugia, Italy has been the subject of a constant stream of international media attention since Knox's British roommate, Meredith Kercher, was brutally murdered in November 2007. In this project, media coverage of Amanda Knox's case during the month immediately following Kercher's death will be examined, using all news articles from that time period in the Italian *Corriere della Sera*, the British *Times* of London, and the American *Seattle Times*. This research project will utilize frame analysis to determine the differences in coverage of Amanda Knox's case. Media framing goes beyond agenda-setting in that it invites audience members to apply information and ideas in particular ways. Distinct differences amongst media portrayals of Amanda Knox are expected to be found between the three newspapers analyzed.

## 120 Lifting the Veil of Silence and Fighting Amnesia: Active Memory Through the Voices of the Mothers of Plaza de Mayo

Corrine O'Sullivan

Faculty Advisor: Alejandro Meter

Department of Languages and Literatures

This investigation proposes to explore the collectivity that is the Mothers of Plaza de Mayo in their various representations: as a social and political organization, defender of human rights and above all their role in disseminating and keeping alive the active memory of the Argentine dictatorship in the 70s: its crimes against humanity and its victims, better known as "the disappeared". This study is interested in the organization beginning with its creation in Buenos Aires in the early years of the military dictatorship up until their contemporary role, which carries with it international implications. It hopes to understand the different factions of the organization, including the Grandmothers of Plaza de Mayo, which was originally born out of the Madres, and how these factions have affected the image of the association itself, that is to say, what roles they fulfill in Argentine society and what their contributions to active and open memory have been.

## 122 Foreign Aid in Sub-Saharan Africa: Why 50 Billion a Year is Not Working

Lucas Parelius

Faculty Advisor: J. Michael Williams

Department of Political Science and International Relations

This project will examine the ways in which foreign aid is currently hindering democratization in Sub-Saharan Africa. Specifically, I will explain the functions of democracies and what countries must provide their citizens to be a democracy. I will then show how foreign aid is not enhancing or improving these functions, making foreign aid, in its current form, not conducive to democratic consolidation. By explaining why foreign aid is not being effective and advancing the country forward, I will be able to explain what must be improved upon to make foreign aid more efficient and beneficial and thus conducive to democratic consolidation.

## 124 Molecular Engineering Using Dipyrromethene Ligands

David Peters, Michael Perkins

Faculty Advisor: Mitchell Malachowski

Department of Chemistry and Biochemistry

Our interest is in designing organic molecules with particular shapes. In order to do this, we have synthesized rigid organic molecules based on a set of organic units including adamantanes. 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, iron and copper. The complexes were characterized by a combination of elemental analysis, mass spectrometry 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 these dipyrromethene ligands.

## 126 Effects of Exercise on Calcium Handling in California Yellowtail and White Seabass Muscles

Kaitlyn Philpott

Faculty Advisor: Sue Lowery

Department of Biology

Parvalbumin is a protein responsible for the sequestration of calcium ions in the sarcoplasmic reticulum of skeletal muscles, leading to muscle relaxation. Using California yellowtail and white seabass that were exercised at either a control (slow), intermediate, or fast velocity, we were interested in determining if the expression of parvalbumin was affected by this exercise in both red and white muscles. By using gel electrophoresis and by computing the densitometry for a variety of muscle tissue samples, the density of the parvalbumin protein was able to be determined. Using this data, comparisons between species, muscle type, and exercise velocities could be made. The results indicated that there was an increase in parvalbumin expression in the yellowtail, white muscle, and in those fish exercised for short periods of time. The results of the effect the various exercise velocities had on parvalbumin expression was inconclusive.

## 128 Ghana and South Korea: A Case Study of Development

Marissa Pledger

Faculty Advisor: Vidya Nadkarni

Department of Political Science and International Relations

The development of Sub-Saharan African states has not taken off in a way that many other similar states have. Despite the continued involvement of international organizations, other states and multinational corporations in Africa, the continent as a whole continues to lag behind the rest of the world in terms of development. In 1960, both Ghana and South Korea shared a per capita GNI of US \$100, with an expectation that Ghana was in the position to rapidly develop. It was not Ghana that took off however; it was South Korea. Today, the per capita GDP of South Korea has increased by over 300% since 1960, while that of Ghana has increased by less than 20% -- an outcome that has puzzled both scholars and policy-makers. This project seeks to explain this discrepancy from a political lens, as opposed to a more common explanation from an economic lens.

### 130 Phosphine-Directed C-H Borylation of Arenes

Timothy Ramseyer, Kristina Crawford

Faculty Advisor: Timothy Clark

Department of Chemistry and Biochemistry

Phosphine ligands have proved very important in metal-catalyzed reactions from the synthesis of organic molecules to new approaches to solving the energy crisis through catalysis. Efficient and cost-effective synthesis of these ligands is an important factor in the advancement in these important areas of organometallic chemistry. The focus has been on the development of a high yielding and selective process that uses common available materials to efficiently synthesize the building blocks of these phosphine ligands. Starting with a published process to selectively ortho-borylate substituted amines the reaction scope was expanded and modified for use with various substituted benzylalkylphosphines. The developed process does not require an added ligand, contrary to other reactions of this type, but produces ortho-borylated products with high selectivity, purity, and yield. Further study is being done to investigate the catalytic cycle and active catalyst structure for this reaction. The results of this study are being used to further expand the scope of phosphine substrates that can be used and to further refine the purification process.

### 132 The Use of SMURFs in Assessing Summertime Recruitment of Larval Fish in Mission Bay

Thomas Remington

Faculty Advisor: Steven Searcy

Department of Marine Science and Environmental Studies

Many marine organisms have a two-part life cycle with an adult phase that is nearshore and associated with the bottom and a larval phase that develops offshore in the water column. The transition between these two periods is known as settlement and is widely acknowledged as a critical determinant of future population strength. In this study, we used standard monitoring units for the recruitment of fish (SMURFs) to examine summertime settlement pattern of fishes to Mission Bay. Our objectives were (1) to compare the relative efficiency of two different SMURF designs, one standard design that was made of a cylinder of plastic fencing material and a novel design that replaced plastic fencing with live kelp (*Macrocystis pyrifera*). Our second objective was to examine the relationship between abiotic variables (water temperature, swell direction, salinity, etc.) and settlement patterns of estuarine fishes.

### 134 Substrate-Directed C-H Borylation Reactions: Catalyst Development and Study

Marissa Ringgold, Timothy Ramseyer, Nicholas Huynh

Faculty Advisor: Timothy Clark

Department of Chemistry and Biochemistry

Ortho-C-H functionalization is difficult to accomplish, due to steric interactions, but beneficial in that it can be used to build valuable molecules and pharmaceutical precursors. The newly installed carbon-boron bond is very versatile and allows access to a number of medicinally relevant functional groups. Understanding this mechanism is key to optimizing the reaction. Through the exploration of ligands (molecules that binds to the central metal of the catalyst) the selectivity and reactivity can be optimized precisely for various amines. Focusing on substrates that have previously been problematic including meta-substituted amines, a variety

of ligands have been explored to increase overall yield and selectivity of the purified products. The effect of ligand sterics, electronics, and bite angle will be discussed in the context of the mechanism of the catalytic cycle. The results of this study were used to analyze additional directing groups such as esters based on the results of this study.

### 136 Formation of Hexamethylenetetramine by Aqueous Solutions of Formaldehyde and Ammonium Sulfate

Alyssa Rodriguez

Faculty Advisor: David De Haan

Department of Chemistry and Biochemistry

Formaldehyde and ammonium sulfate are prominent compounds found in cloudwater. Electronic structure calculations and lab experiments were carried out to explore the oligomerization reactions between formaldehyde and ammonia. Density functional theory calculations along with solvation and thermodynamic corrections were performed to map the kinetic and thermodynamic landscape for the reactions leading to the formation of hexamethylenetetramine (hmta). The reaction was studied experimentally using bulk-phase aqueous solutions of formaldehyde, ammonium sulfate, and in some experiments, iron (III) sulfate (chosen because  $\text{Fe}^{3+}$  forms a brown complex with hmta). Aqueous standard solutions of hmta were also made. Reaction mixtures were analyzed using NMR, UV-Vis spectroscopy and LCMS. Compound hmta was the main product observed by both NMR and LCMS. Using LCMS a large peak was observed within minutes of mixing the reactants. The absorbance of the reaction mixture increased strongly below 225 nm but little to no absorbance was observed in visible spectrum.

### 138 Testing Irp-1 Involvement in Cell Fate Specification in the Nematode *Caenorhabditis elegans*

Mays Salih

Faculty Advisor: Curtis Loer

Department of Biology

As in other animals, nerve cells in the nematode *C. elegans* use the neurotransmitter serotonin for communication. Therefore, it is vital for neuronal function to properly regulate genes needed to produce serotonin. One *C. elegans* gene shown to regulate serotonin production in the male CP neurons is the HOM-C transcription factor gene *lin-39*. In worm vulval development, *lin-39* expression is regulated by an RTK signaling pathway. We aim to determine whether low density lipoprotein receptor-related gene *lrp-1*, known to be involved in RTK signaling in vulval cells, plays a similar role in serotonin neurons. A fragment of *lrp-1* will be amplified using PCR and cloned, transferred into an RNA interference (RNAi) plasmid vector, and then into dsRNA-producing bacteria. We will block *lrp-1* function by RNAi and test the expression of serotonin-related genes in the male worm CP neurons.



## 140 Walking Through the Königsberg Bridge Challenge

Brook Santangelo, Katherine Fotion, Leah Mandeville

Faculty Advisor: Lynn McGrath  
Department of Mathematics

This poster will present the classic Bridges of Königsberg problem of Euler. This problem, explored by Euler in the 17th century, led to the birth of the important mathematical field of Graph Theory. The city of Königsberg in Prussia (now Kaliningrad, Russia) was set on both sides of the Pregel River, and included two large islands that were connected to each other and the mainland by seven bridges. The problem is to find a walk through the city that would cross each bridge once and only once. The islands can not be reached by any route other than the bridges, and every bridge must be crossed completely every time; one cannot walk halfway onto the bridge and then turn around and later cross the other half from the other side. The walk need not start and end at the same spot. This poster will present the history and solution of the problem and explore some of its extensions.

## 142 30 Years of Struggle: The Construction of Collective Memory in Post-Dictatorial Argentina

Shannon Schumacher

Faculty Advisor: Alejandro Meter  
Department of Languages and Literatures

In my project, I explore the means through which the various social movements that emerged from the 1976-1983 dictatorship in Argentina became protagonists in the process of negotiating national memory. Today, individual culpability has been translated to a collective responsibility that these organizations work toward as part of the process toward national reconciliation. Working with national, regional, and municipal governments, the Asociación Madres de Plaza de Mayo, Madres de Plaza de Mayo Línea Fundadora, Abuelas de Plaza de Mayo, and H.I.J.O.S work to construct memory not only as a means of remembrance, but to reflect and understand the events of the brutal past. Through their rhetoric and involvement in creating museums, monuments, and other places of memory, these organizations actively engage in and foster dialogue around the use of the violent memories of the past to promote human rights across the globe today.

## 144 Immigration and Its Effects

Sarah Serrano

Faculty Advisor: Gary Gray  
Department of Political Science and International Relations

This presentation will focus on the immigration of Mexicans into the United States and the social impacts it has on both them and the American people. I will show an array of pictures to demonstrate this for the most part with minimal wording within the poster. I want to convey my message with photos and give my audience a moving message of how immigration affects those immigrating and those that witness it.

## 146 Finding Padania: Questioning the Nationalist Claims of the Italian Northern League

Nick Shanesy

Faculty Advisor: J. Michael Williams  
Department of Political Science and International Relations

In 1861, Massimo d'Azeglio asserted what has become a clichéd quote for Italy after unification: "We have made Italy; now we must make Italians." Abruptly out of the traditional nation-building timeline, the process of "making Italians" and the construction of Italian identity have resulted in serious implications for the state, one of the most potentially complicating being a populist party in northern Italy called the Lega Nord. This party began to postulate its own identity within the last twenty years in an area that has had no historic claims to nationalism. While it has made multiple attempts to justify its identity in traditional senses, I argue that this "identity" is only based in economic ideas, which are not sufficient grounds on which to build an identity. Thus, the Lega Nord can never hope to be successful so long as it makes claims to an identity that does not exist.

## 148 The Allelopathic Impacts of Eucalyptus on Invasive Species of the Lower San Diego River Basin

Nicolas Silveira

Faculty Advisor: Zhi-Yong Yin  
Department of Marine Science and Environmental Studies

Eucalyptus trees are an invasive plant species found in numerous parts along the banks of the San Diego River. Previous studies have shown that these plants deposit chemicals that hinder the growth of other native plant species in their vicinity. However, the research conducted in this study analyzes if the same process will potentially hinder the growth of other invasive plant species under the canopy cover of Eucalyptus trees. To study this, the canopy area of Eucalyptus groves were estimated, followed by a survey of other invasive plant species and their relative distance from the center of the grove. The results showed that larger invasive plant species were able to withstand the chemical process, while invasive grasses were rarely found. It is critical to fully understand not only how invasive plants interact with native species, but also how invasive plants may interact with each other in an environment.

## 150 Where Do We Go From Here? Tragedy and Commemoration

Samantha Slavinsky

Faculty Advisor: J. Michael Williams

Department of Political Science and International Relations

The study of nations, nationality, and nationalism seeks to discover under what conditions groups of people identify commonalities among themselves to the point that they all belong to one community. One of the most widely accepted theories about nations comes from Benedict Anderson's groundbreaking work on nationalism, "Imagined Communities," where he argues that a "nation" is a socially constructed community that is imaged by the people who perceive themselves as a part of that group. In this thesis, I test how community identity is affected following community tragedies in regards to commemoration efforts. Utilizing community tragedies from the United States as case studies, I present the positive, negative, and neutral affects commemoration has on community identity by studying newspaper editorials immediately following the tragedy and following the commemoration efforts. The results show that corresponding levels of tragedy and commemoration lead to increased community identity.

## 152 Permaculture

Kaitlin Soper

Faculty Advisor: Drew Talley

Department of Marine Science and Environmental Studies

Permaculture, an agricultural system that seeks to integrate human activity with natural surroundings, aims to create highly efficient self-sustaining ecosystems (Merriam-Webster). The name itself, the literal combination of "permanent" and "agriculture", supports the specific definition. With permaculture, there exists a basic set of ethics and 12 key principles that remain the key to all permaculture farms. However, as I experienced through a hands-on internship and study abroad experience at different permaculture farms, this definition is interpreted in a multitude of ways. In both instances, the environmental and anthropogenic benefits of permaculture were both apparent. I introduce this novel agricultural practice and its benefits to humans and our current sustainability efforts.

## 154 Advantage or Liability: The Use of Genetic Testing to Predict Sports Performance Potential

Kelly Stone

Faculty Advisor: Laura Rivard

Department of Biology

DNA analysis has led to an ever-broadening range of genetic testing applications. The role of genetic factors in determining athletic potential has become a topic of interest in recent years. The advent of personal genetic testing to evaluate and predict sports performance potential has been prompted by factors such as an increasingly sports-oriented society, winning-is-what-counts attitudes, and expanding economic benefits for successful athletes. Is athletic performance determined by a single gene, a combination of genes, or the complex interaction of multiple factors? Can and should genetic testing be used to predict potential for athletic success in certain sports? The translation of an advantageous genotype into a champion's phenotype is controversial. This study will explore recent research regarding the influence and role of genes in athleticism, in order to promote a better understanding of the benefits, limitations, and risks of attempting to predetermine athletic success via genetic testing.

## 156 Synthesis of a Novel Tridentate Nitrogen-Based Enantioselective Ligand

Raymond Sullivan

Faculty Advisor: Christopher Daley

Department of Chemistry and Biochemistry

There is a demand for enantiopure compounds since one form of an enantiomer may have beneficial medicinal properties, while the other may have potentially harmful effects. The use of enantioselective ligands in stereoselective catalysis serves as a method for the synthesis of enantiopure compounds. The synthetic pathways and characterizations of three, differently substituted new enantiopure ligands were studied. We report on the synthesis of the metal complexes using a rapid, small-scale microwave technique; and the characterization of the novel cadmium complex containing the tert-butyl substituted ligand by <sup>1</sup>H NMR and X-ray crystallography. Progress on the decomplexation of the enantiopure tert-butyl substituted ligand from the cadmium complex will also be presented.

## 158 Testing the Function of Wnt Pathway Gene *cfz-2* in Nerve Cell Specification in the Nematode *C. elegans*

Stephen Szabo

Faculty Advisor: Curtis Loer

Department of Biology

Serotonin is a neurotransmitter used by nearly all animals including humans. In order to utilize serotonin, nerve cells must express genes that encode enzymes in conserved serotonin synthesis pathways. It is our intent to study cell specification for serotonin-producing nerve cells in the model organism *C. elegans*. The Wnt biochemical signaling pathway is known to take part in cell specification. Our target gene *cfz-2*, which encodes a receptor in the Wnt pathway, was chosen to test whether it functions in specification of serotonin-producing nerve cells. We will clone a fragment of the *cfz-2* gene, then use bacteria to produce dsRNA to cause RNA interference, which will block the gene's function. We will then study the resulting phenotypes, especially whether serotonin nerve cell differentiation is altered.

## 160 Human Impacts on Water Quality (Turbidity) in St. John, U.S. Virgin Islands

Ruby Teague

Faculty Advisor: Sarah Gray

Department of Marine Science and Environmental Studies

Coral Reefs in the US Virgin Islands are declining partly due to increased turbidity and sedimentation. Development (such as the building of dirt roads) on high islands may be contributing to elevated turbidity on coral reefs. My project focuses on how human development and storms impacted the level of sediment loads in marine waters with coral reefs on the island of St. John, USVI. To approach this I compared the Total Suspended Sediment [TSS] and Total Organic Matter [TOM] in near shore sites below developed vs. undeveloped watersheds. Water samples were collected regularly (every 26 days) between Jan 2010-December 2012. TSS was generally higher and the percentage of organic matter was generally lower below the developed compared to undeveloped watersheds. Elevated TSS was recorded following record rainfall during the summer and fall of 2010, suggesting a link between storm-induced watershed runoff and turbidity in the marine environment.

## 162 Trade Liberalization: An In-Depth Analysis of the United States' and The European Union's Proposed Transatlantic Trade and Investment Partnership

Anna Troha

Faculty Advisor: Craig Barkacs  
School of Business Administration

The research to be presented here is centrally focused on the proposed Transatlantic Trade and Investment Partnership (TTIP) between the United States and the European Union announced earlier this year by President Obama in his State of the Union Address. Specifically, this research focuses on a financial and statistical analysis of potential job growth, potential growth in Gross Domestic Product, and the potential for increased competitiveness within both regions. Additionally, a compilation of publication research, interviews with professors, and historical benefits and conflicts resulting from trade liberalization will be included in the agreement's potential benefits. The TTIP, while not yet in effect, serves to substantially increase jobs, GDP, and competitiveness for both the United States and the European Union. The future of its approval lies with the ever increasingly complicated politics and governmental structure of the aforementioned regions.

## 164 Free Your Mind — Unlocking Your Inner Creativity

Jessica Urbano, Kathleen McGuire, Stephanie Harrison, Alyssa Black, William Dow, Adam Krebs, Philipp Storch

Faculty Advisor: Frank Jacobitz  
Department of Engineering

As engineering students, we often hear it is important to be creative, yet most engineers do not think of themselves as particularly creative. Since the engineering process demands creativity, we looked into how creativity can be improved, and how exactly it is used in the engineering design process. We surveyed ENGR 102 (Introduction to Engineering Design) students to determine how they view themselves and how important they think creativity is in relation to engineering. We then conducted research to see what creativity means to different people, how one can improve creativity according to various trials, and how creative processes have been used in past engineering projects. When asked about what characteristics best describe a creative person, students most frequently responded with “thinks outside the box,” “innovative,” “open minded,” “intelligent,” and “imaginative.” Students also believe that group creativity can be enhanced by “different backgrounds,” “working together,” “sharing ideas,” and “brainstorming.”

## 166 The Cognitive Effects of Overhearing Different Types of Conversations

Rosa Vessal, Sara Jensen, Alison Lebenbaum

Faculty Advisor: Veronica Galvan  
Department of Psychological Sciences

In today's society, cell phones are an inescapable means of communication. This study examines the differences between different types of conversation as well as different levels of stimulation and their effect on attention and memory. Participants overheard either a one-sided cell-phone or two-sided 'typical' conversation. These conversations were either interesting or boring. The participants are then administered a list of words and are asked to recognize which ones they heard in the conversation. Participants who overheard a one-sided conversation performed better on the recognition task. There are no significant differences between interesting and boring conversations on the recognition task. These results suggest that cell phone conversations are more distracting than typical conversations. Cell phone conversations may be more disturbing in school and work environments, causing adverse repercussions in these settings.

## 168 Whose Demands Matter More?

Bridget Vuona

Faculty Advisor: Casey Dominguez  
Department of Political Science and International Relations

My question is: “At any given time in history, do political parties in the United States intentionally adhere to the demands of certain voter blocs represented by their respective interest groups over/ more than they do to the demands of other groups that make up that party's coalition?” I will search for evidence of this trend in the two parties over time by identifying the policies the party promotes, and how that relates to the major voter blocs that make up the party. Then, I will determine if there is a positive relationship between the Independent Variable, the power that a certain group has in either party, and the Dependent Variable, the policies that party supports favored by those groups. This question is important because it provides information on how party's decide which issue fights they will pick, as well as how the party's “goodies” get distributed among its constituents.

## 170 National Influences on Gender Inequality

Kara Waters

Faculty Advisor: Casey Dominguez  
Department of Political Science and International Relations

This project will seek to explore the effect that several independent variables, namely religiosity, percentage of women in the national legislature, Gross Domestic Product, and percentage of women doctors in a country will have on a country's level of gender inequality. The project will be divided into two sections. First, the literature review will provide scholarly information about the relationship between each of these variables and my dependent variable. The second portion of this paper will consist of a research design that will include information about my underlying question, theory, and hypothesis that will be drawn from evidence found in the literature review. As I am speculating that religion will have the strongest effect on a country's level of gender inequality, a good share of the literature will explore this relationship. However, information regarding the alternative independent variables will not be neglected.

## 172 The Interaction of Dibenzothiophene with Ag Clusters on Oxidized and Reduced TiO<sub>2</sub> (110)

Elizabeth Webster, Aileen Park, Victoria Park, Miranda Stratton

Faculty Advisor: Lauren Benz

Department of Chemistry and Biochemistry

We have investigated the interaction of dibenzothiophene (DBT) with a TiO<sub>2</sub>(110) surface using temperature programmed reaction spectroscopy and X-ray photoelectron spectroscopy. DBT molecularly desorbs from a reduced surface with a desorption activation energy of 110 kJ/mol. No reaction products were observed, and no residual carbon or sulfur accumulated on the surface. We also studied the effect of metallic silver nanoparticles on the desorption activation energy, as well as the interaction of DBT with the oxidized surface, and oxidized supported Ag clusters. The results of this work are important in understanding the adsorptive removal of DBT and related compounds from petroleum using supported Ag clusters.

## 174 Unknown

Kalea Wiseman

Faculty Advisor: Emily Edmonds-Poli

Department of Political Science and International Relations

The purpose of this research is to investigate the factors that affect consolidation of democracy in Latin America. My research will focus on the role that institutions play in solidifying a democratic political culture. This research hopes to investigate the role of formal and informal institutions on democratic political culture, examining the question of whether or not informal institutions lead to a less or more democratic society. The research will also examine levels of trust within the institutes and how this plays a role in the success of certain systems.

## 176 San Diego Creative Arts

Betty Wong

Faculty Advisor: John Glick

Department of Computer Science

Online stores today are too large and include artists from around the world. This online store will create a place for local artists and customers to view and purchase artwork of the San Diego community. This store, San Diego Creative Arts, will be used as a networking tool for artists in the San Diego area and local prospective employers. This store will be able to display inventories and catalogs drawing from a MySQL database using Ruby scripting language. It will include a log-in system for users to upload their own items into the database and sort their items on their own pages. Users can edit personal information for the public and select items they wish to purchase. The store will allow users to manage their own inventories and orders. This store will implement a search engine to traverse through the inventory and allow users to look for specific items.

## 178 Spatial Analysis of the Microcirculation in a Capillary Bundle from Rat Spinotrapezius Muscle Fascia Tissue

Lauren Yamamura

Faculty Advisor: Frank Jacobitz

Department of Engineering

Previous work on the microcirculation in skeletal muscle was based on statistical analysis of fundamental hemodynamic variables without regard of microvascular details. The focus of this project is the development of a software tool to perform a spatial analysis of hemodynamic results. The vessel network considered is a capillary bundle in rat spinotrapezius muscle fascia with transverse arterioles supplying blood, capillary vessels, and collecting venules removing blood. The software tool represents information about blood vessel location and connectivity in two matrices, which are used to produce result matrices holding the values of flow properties at the locations that they are observed in the vessel network. The resulting images provide a full display, for example, of the pressure drop in the network. The highest velocities are obtained in the transverse arterioles and adjacent capillaries, while other vessels show lower velocities. Areas of elevated hematocrit are observed in the periphery of the network.

## 180 Improving College Admissions and Retention by Predicting Student Performance

Stanley Zhou, Gunnar Moore

Faculty Advisor: Eric Jiang

Department of Computer Science

Universities and colleges have always been concerned with who they admit into their programs. The vast majority still uses traditional methods of screening and picking students that exclusively involve human efforts. In addition, once students are admitted, it may be difficult to determine their retention rate. This can be useful to know who may need more incentive (scholarships) or help (tutoring) to stay in school. With the evolution of computer science, we can dramatically improve the quality of students accepted into the University of San Diego and monitor their progress by employing data mining methods and software instead of manual processes. To do this, the software predicts the success of students throughout their college career using Weka (a data mining program) functions. This success is measured by a variable that we created and is based heavily on past GPA performance. We have also developed a graphical user interface so that others find it easy to use.





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Derrick Cartwright, PhD	Art, Architecture + Art History
Alana Cordy-Collins, PhD	Anthropology
Tara Ceranic, PhD	Business Administration
Kristine Ehrich, PhD	Marketing
Christopher Daley, PhD	Chemistry and Biochemistry
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Geoff Morse, PhD	Biology
Frank Jacobitz, PhD	Engineering
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