# SCHEDULE OF EVENTS

**Tuesday, April 14, 2009**

**Symposium Judging**
9:00 am – 5:00 pm
*Friends Lecture Hall at Doheny Library*
(Judges only – closed to presenters and general public)

**Wednesday, April 15, 2009**

**General Presentations, Exhibits, and Displays**
11:00 a.m. - 2:00 p.m.
*Trousdale Parkway*

**Awards Ceremony & Dinner Reception**
6:00 p.m. – 7:30 pm
*Davidson Conference Center*
April 15, 2009

Dear Members of the USC Community:

It is my pleasure to welcome you to USC’s 11th Annual Undergraduate Symposium for Scholarly and Creative Work. The Symposium is designed to provide USC undergraduates with the unique opportunity to exhibit and share examples of their significant research, scholarly and creative work with the university community. Although the Symposium is modeled on a professional conference poster session, students may exhibit their work in a variety of ways, such as through posters, art exhibits, and electronic media. All undergraduates are encouraged to participate. An award ceremony recognizing the most outstanding works will take place at the end of the symposium and includes First Prize awards of $1000 and Second Prize awards of $500 in each of the following categories.

- Arts
- Humanities
- Social Sciences
- Life Sciences
- Physical Sciences, Mathematics & Engineering

A panel of distinguished faculty will judge submissions in each category. After the judging, you are cordially invited to attend the Award Ceremony at the Davidson Conference Center at 6:00 p.m. where the winners will be announced.

We hope you enjoy USC’s Undergraduate Symposium, which promises to be a highlight of the semester this year and in many years to come.

Sincerely,

Elizabeth Garrett
Vice President for Academic Planning and Budget
The USC Undergraduate Symposium for Creative and Scholarly Work provides undergraduates with the unique opportunity to exhibit and share examples of their significant research and creativity with the university community. This year, we have received over 130 submissions with participation from over 160 students. Students present work in a variety of ways, such as through poster/panel sessions, art exhibits, and electronic media. All undergraduates are encouraged to participate. For some students, the symposium serves as a culmination of work they have produced in partial fulfillment of a senior honors project, or a research project with faculty, both individually and as part of a program.

ACKNOWLEDGEMENTS

On behalf of the Office of Undergraduate Programs and the Office of the Provost, we graciously thank USC faculty judges for volunteering their time. The success of the undergraduate symposium is largely due to the contribution of their expertise in the judging process. We would like to give special thanks to the USC Trojan Knights for their faithful service. Also, we would like to give thanks to the faculty advisors who have sponsored students in this year’s Symposium. Your dedication to embrace teaching through inquiry-based learning has made this event as successful as it has been. And finally, we would like to express our gratitude to USC Stevens for their time, effort and commitment to this special event.

THANK YOU!!!
# 11th Annual Undergraduate Symposium for Scholarly and Creative Work

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Music has always been a tool for expression and sometimes self-intervention. My musical composition, “I Knew,” is both. Inspired by a lyrics workshop in my Songwriting I course, I used certain techniques that enhance the song’s effectiveness in conveying the emotion of the piece. The song is based on a collection of real life experiences and some fictional elements, but the emotions used to tell the story of this one girl is universal. The singer in the song sings a soulful ballad about her significant other ultimately proving that he is unfaithful in their relationship. Turning a blind eye to her suspicions, the singer admits that she knew the entire time that they were wrong for each other, and breaks whatever connection she might have had to the man who hurt her. The song takes the listener on a journey through a simpler time when the couple shared an afternoon on the beach to the prolonged break-up in an Irish pub. In the verses the lyrics show the location and play to the senses. In the chorus the singer tells the listener of her intentions of moving on.

The piece is also an example of new media as it was completed using the music recording software, GarageBand, which broadens songwriters’ capabilities. The drum track was added to the song using GarageBand, while Cory Popovich performs the piano and vocal tracks. Music and lyrics to “I Knew” also written by Cory Popovich.

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“Horsethief” is a song/recording from upcoming album “West” by performing and recording artist Adrian St. John. Horsethief and the remaining ten original songs that comprise “West”, was composed, arranged, produced, performed and recorded by USC Music Industry Major Adrian St. John MacDonald, or, Adrian St. John as she is known on stage. Horsethief quintessentially represents the folk and Americana influenced compositions that exemplify Adrian St. John’s affinity for animal mythology and symbolism, as well as the artist’s unique blend of early American musical influences and contemporary rock style. “West” will be independently released and distributed by
Adrian St. John on her birthday, June 24th 2009.

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**Title:** A Battle Through Time  
**Name(s):** Benjamin Brown  
**Faculty Sponsor(s) and Department(s):** Mason Cooley, Fine Arts  
**Format:** Creative Work  
**Title:** A Battle Through Time  
**Abstract:**  
Man continues to innovate and discover, and takes these discoveries with him through the changing ages. And yet man was born with his instincts, and these do not change despite his evolving surroundings.

One of these most basic instincts is power, force, and dominance. Man seeks to expand and conquer. And with this comes war between competing forces. With that, he who discovers the greater source of power will win the fight.

This piece is a depiction of a battle back through time, back before modern technology, where one’s true strength prevailed to make him victorious.

Man’s innovation brought him to this point centuries ago, and so he has evolved since. This is yet another step through time in man’s pursuit of discovery.

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**Title:** Beautifully Bare  
**Name(s):** Amy Shayne  
**Faculty Sponsor(s) and Department(s):** James Brecher, Writing  
**Format:** Creative Work  
**Title:** Beautifully Bare  
**Abstract:**  
Unfortunately, cancer has touched everyone around the world in some way or another. The prospect and eventual reality of hair loss for those who undergo chemotherapy is often a source of shame and embarrassment. As someone who has witnessed this process several times in my life, I feel the need to stop these feelings and show how much beauty comes from being bald.

A bare white wig stand can be used as a canvas to express one’s individuality, transforming a symbol of cancer’s side effects into a piece of art. Instead of covering up one’s bald head with a wig, these personalized wig stands commemorate the elegance of a sleek bare figure.

Each wig stand is unique, and each stands proud and strong in the face of what may come. They are inspired by cancer victims I have known and demonstrate the natural beauty of being proud to be bald.

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**Title:** Colorscape  
**Name(s):** Shannon Anderson Schnittker  
**Faculty Sponsor(s) and Department(s):** Jeff Lengyel, School of Cinematic Arts  
**Format:** Creative Work  
**Title:** Colorscape  
**Abstract:**  
My intent with this piece is to explore the essence of how one human impulse can interact with the world and become something tragically beautiful that was not in existence before.
Cardborigami

Tina Hovsepian

Doris Sung, Architecture

Creative Work

Using cardboard as a readily available, cheap, recyclable, sustainable, self-insulated, and structural material I created a portable, flexible, lightweight, and structural skin and enclosure. The immeasurable, or what I envisioned, was an emergency housing shelter for the homeless. I went through many material studies of cardboard including stacking, carving, folding, cutting, and laminating. These endeavors led me to study origami. Using recycled cardboard and Velcro I was able to mimic a traditional origami structure at a human-inhabitable scale. My father helped me build this project and I have created diagrams that would teach any lay person how to build one of these structures for themselves.

goodbye to the boys in the band

Daniel Chen

Helen Kim, Fine Arts

Creative Work

The idea of “the group” is a comforting and empowering experience for its members, but time and stability can sometimes erode individuality and create a yearning for something else that must also contend with the inclination to stick close to those around you: contradictory sentiments that send you in circles.

The pictures are arranged to “get to know” the people first, then live amongst them, and then become disillusioned (to a degree). Group dynamics should also be visible, as the series revisits people from before; each new picture brings a new degree of personality to them. Who’s present? Who’s missing?

Greensburg ‘Natural Swim Park’

Elke Schnittker

Janek Dombrowa, Architecture

Creative Work

In 2007 Greensburg, Kansas lost 90% of its built environment due to one of the largest Tornadoes ever recorded. Instead of abandoning their home for surrounding Kansas towns, Greensburg citizens have committed to rebuilding their community sustainably, and have gained international attention for their cause. Many components are needed for Greensburg to become functional again, one of the most important for a town of 800 people is a place to foster/encourage community events. Greensburg citizens want to rebuild a progressive town that provides jobs, education and recreation to attract and retain a young generation of residents. Like generations before, they want to leave a legacy for their grandchildren and serve as an example for the midwestern towns of tomorrow.

After visiting Greensburg and considering the town goals, I designed a sustainable recreation project. Most small Midwestern towns have community swimming pools that are used during the hot/humid summer months. Greensburg previously had a pool outside of town, I plan to bring
the popular activity back to the center of town and use it as a multi-functional recreation element that would become the centerpiece of town; anchoring main street and connecting pedestrian traffic across and through to the other important landmarks of Greensburg.

Until the last 15 years, was no alternative to chemical pools in the urban environment, the sustainable alternative I designed in Greensburg is called an ecological swimming pool that works with nature to keep the chemical-free water clean at all times of the year.

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Category: Arts
Name(s): Dustin Thorlakson
Submission Type: Individual
Faculty Sponsor(s) and Department(s): James Steele, Architecture
Format: Creative Work
Title: Iban Visitor Community Center
Abstract:
The research and resulting design for this project was conducted during the summer of 2008 during a study abroad trip to Southeast Asia. Through the USC School of Architecture I travelled to Malaysia to work with a Universiti Malaya student on a visitor’s center for the Iban Tribe of Borneo. The tribe is struggling to maintain their identity and cultural presence in today’s capitalistic society while exploring the opportunities existent in tourism. Today, the tribe extracts rubber from nearby trees to sell in the major cities. This, however, is difficult for the tribe since their villages are located hours upriver from any roads. The tribe is thus pursuing the opportunity of allowing tourists to visit the villages as a type of ecological tourism project.

The Iban asked the University Malaya, with aid from the USC School of Architecture, for help in designing a center for these tourists. My design for the visitor’s center integrates the presence of the tourists without disrupting the Iban lifestyles necessary for the functioning of their tribe. The spaces created allow for simultaneous and integrated use by both groups allowing interaction and an exchange of learning experiences. In addition, the structure itself is constructed sustainably from local bamboo and integrates seamlessly with the existing condition of the village. The Iban Visitor and Community Center allows the Iban to reap the benefits of tourism while continuing to advance their culture and tribal identity.

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Category: Arts
Name(s): Ciaran Vejby
Submission Type: Individual
Faculty Sponsor(s) and Department(s): Natalie Joseph, English
Format: Creative Work
Title: Ishi’s Legacy
Abstract:
In 1911, the last known Yahi Indian walked out of the wilderness and immediately became an international sensation. Since his death in 1916, Ishi has become one of the most written about Native American public figures in our history. However, not until recently has the entire story been told. It was discovered in 1998 that although Ishi’s remains had been cremated by anthropologists, his brain had been removed and preserved. Thus began a fervant effort on the part of California Native Americans, University of California officials and advocates alike to repatriate Ishi’s remains. Through diligent reserach and conversation with Native American elders, Smithsonian repatriation officials and University of California experts, the story of Ishi’s struggle can now be told in full. This documentary research project is an intensive labor of love and respect for Ishi, one of California’s most influential figures.
Category: Arts  
Name(s): Nicole Ferguson  
Submission Type: Individual  
Faculty Sponsor(s) and Department(s): Dallas Willard, Philosophy  
Format: Creative Work  
Title: Knowledge and Art  
Abstract: Twentieth century western philosophers Martin Buber and Henri Bergson describe reality with an emphasis on that which exists beyond concepts and analysis. They point out how analysis and representation alone do not lead to complete knowledge of any given object. They zoom in on this detail and expand it into the main focus regarding our attempts to understand and describe reality. We often fail to explain away or fully clarify certain point in analysis, and so these considerations about knowledge are essential to our understanding of information and human experience. We see these ideas come to life in areas such as consciousness, intelligence, and the mind. There is a nonexpressible part of consciousness that can be formed into concepts but that cannot be recreated by such conceptions. Art is one way to communicate this part of thought and experience to which information and analysis do not have access.

Art is a unique form of communication in the way that it is both offered by its creator and received by its viewer. Unlike language, a painting is presented wholly and immediately. It asks the viewer to actively participate in the formulation of its meaning. In viewing art, conceptual analysis (through history and information) must be partnered with an intuitive non-dialogue. Our relationship to a work is both subjective and objective. These two perspectives interact with one another, allowing us to see that which exists beyond the art object itself, namely the subject of the work, and idea of the artist. A painting is capable of guiding our attention in such a way that expands our encounter with reality into a more vivid, meaningful and coherent experience.

Category: Arts  
Name(s): Christopher (Chris) Kaye  
Submission Type: Individual  
Faculty Sponsor(s) and Department(s): Gary Macheel, Cinema - Production; Phil Messina, Cinema - Production; Angelo Pacifici, Cinema - Production  
Format: Creative Work  
Title: Letter to the Unknown  
Abstract: This is a film that takes place in a world devoid of sound. The luxury of sound has disappeared and has left this world spiraling into despair, into depression, into hell. I want the audience to experience this world, to feel it, to know what such a world might actually be like. For that reason, the majority of the film will be near silent. I hope that such a tactic will immerse the audience in this world. That they too will be suffocated by it. No doubt this will be an uncomfortable experience. That is the point. This is not a world of comfort.

Category: Arts  
Name(s): Emily Yu  
Submission Type: Individual  
Faculty Sponsor(s) and Department(s): Ron Rizk, Fine Arts  
Format: Creative Work  
Title: Maun: A Travelogue from Botswana  
Abstract: With the award of the Summer Undergraduate Research Fund (SURF), I was able to conduct a month long research on the effectiveness organized sports
programs as a means to reinforce healthy core values linking conservation and environmental issues to personal, real life health and lifestyle decision-making in rural Botswana this past summer. In their twenty years of research, Dr. Tico and Lesley McNutt have concluded that education is key to conservation. As such, I took on the role of a conservation coach for their second annual “Coaching for Conservation Program”. We invited approximately five hundred children from elementary schools to participate in our program. Utilizing innovative teaching strategies, the conservation coaches taught fundamental conservation concepts through group games and activities. Visual arts also played a key role in my experience. I was given the honor of designing and executing a mural for a “Conservation Camp” constructed in Matshwane Elementary School. The outdoor space is now used interchangeably as a classroom and stage for teaching conservation. Before visiting Botswana, conservation was only an intangible concept. After witnessing the shrinking natural habitat of wildlife and the dire living conditions of ordinary children in Maun, conservation now resonates in my everyday life. The experience gave me an intimate perspective on how art can influence a community. It is my goal to use art to better improve and aid under-privileged and minority communities. To promote research, art, and volunteerism programs at USC, I created an illustrated book detailing my experiences in Botswana.

Abstract:
An excerpt:
It sounded like mountains being torn apart. At first it emerged as a simplistic, singular tapping, like an unenthused announcement of some forthcoming force; a noise so faint and assimilated into the surrounding silence of the night that the sheer abruptness of its realization inherently questioned whether its existence was unique or tied to a history that spans itself backwards into a topsy-turvy, timeless frame of reference. It began more as a feeling than an audible resonance, a psychological sensation turned physical like the cramping of a child’s stomach as he convinces himself that a killer lurks outside his bedroom door during his most vulnerable of hours. This feeling, like the manifestation of any emotion, existed beyond reason and outlived its catalyst. Even once the initial sound disintegrated into the atmosphere, it could be felt growing and transforming within the emptiness of the room until that emptiness could no longer be explained as silence, but rather compared to the high pitch of an old whistle or the full-bodied shrieks of a new widow. And with the precisely equal amount of surprise and haste in which that immediate, independent tap swelled into a pseudo-metaphysical uproar, it vanished and the concept of quiet was utterly redefined.

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Title: Music For Martin Luther King, Jr.
Name(s): Douglas Mosher
Faculty Sponsor(s) and Department(s): Russell Ferrante, Jazz Studies; Alan Pasqua, Jazz Studies
Submission Type: Individual
Category: Arts
Format: Creative Work
Title: Music For Martin Luther King, Jr.
Abstract:
Dr. Martin Luther King, Jr. is one of the greatest orators of the 20th century and his speeches have helped shape American society. His commentary about race, brotherhood, equality, peace, and non-violence are still as relevant today as ever. Many people, however, have heard very little of Dr. King's speeches. I have composed and recorded music to eight of his speeches in an effort to add another dimension to his work. Through this I found that there is a strong resemblance between music and speech. The first track on the CD, “Brighter Freedom,” contains five different speeches that set a tone of urgency. I attempted to compose music that matched that urgency by paying particular attention to the rhythm in Dr. King’s delivery. The focus of the second composition, “A King,” was to write music that accentuated Dr. King’s use of pitch, which he employs regularly to emphasize certain points. The piano chords and the two tenor saxophones set a tonality under Dr. King’s emotional speech, which is the melody. The last track is the 18 minute speech, “Been To The Mountain Top,” the last speech Dr. King gave. It is an important and personal speech where Dr. King simultaneously speaks of his philosophies about on-violence and equality while also summarizing his life. I wrote each section of music to correspond to each section of Dr. King’s speech while paying close attention to his use of pitch and rhythm.

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Title: One for Love
Name(s): Caroline Wong
Faculty Sponsor(s) and Department(s): Dana Johnson, English and Creative Writing
Submission Type: Individual
Category: Arts
Format: Creative Work
Title: One for Love

Abstract:
In this compilation of photographs and poetry, the story of lost love unfolds. A girl remembers their times together and apart.

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Title: Stroke Permanence
Name(s): Imran Shafi
Faculty Sponsor(s) and Department(s): Robert Waller, Writing Program
Submission Type: Individual
Category: Arts
Format: Creative Work
Title: Stroke Permanence

Abstract:
White paper and black imaging of information, to me, references and conveys a sense of the pure translation of intellectual material. When one transfers his thoughts on to the page, the page itself reflects that individual’s ideas and sensibilities. In essence, the page becomes a physical representation of the unphysical, and this is the concept I was essentially trying to tap into through my artwork. The human associations integral with the color white—a blank canvas, a space devoid of any matter, made it the perfect medium for this art. I believe this reinforces my artistic value of the artist’s creative material being alone and without distractions. I often find that in modern art, artists use so many materials and a variety of processes that the work to some degree is diminished in all the noise. They use so many sources of material which makes the work more of a craft, ultimately detracting from the artist’s intellectual translation. What I wanted to work on through this series was developing a type of purity, devoid of any external influence, removed from distracting internal forces, and any conscious references. The ink drawings I created are based on the idea that the unconscious stream of thoughts on the paper develop into its own form. Therefore, the finished piece is never preplanned. The first stroke of the pen is the final stroke. From this
method I developed the title of this series as Stroke Permanence.

Title: The American Perspective
Name(s): Luke Kraman
Faculty Sponsor(s) and Department(s): Virginia Kuhn, Ph.D., School of Cinematic Arts - Institute for Multimedia Literacy
Format: Creative Work
Abstract:
The American Perspective is an intricate analysis of the various opinions on the Iraq War from Americans of diverse demographics. The film medium is kinetic typography – a type of animation combining text and motion. In terms of content, the interviews were selected from a larger project called “Talk to An Iraqi” done by Haider Hamsa and later aired on Ira Glass’s Showtime Series “This American Life”. The subject of these interviews is the Iraq War. I chose not to include any images in this piece since the media has constantly barraged us with photos from Iraq. I believe due to this overload, we have become desensitized to the statistics, stories and images surrounding the Iraq War. The full scope of the meaning of these words has sadly been taken away due to this overexposure. Through kinetic typography, the film attempts to give back meaning to these words. As a result, this film not only comments on the Iraq War but also acts as an exploration of the film medium. Do you need a visual image to have an emotional reaction? What is the true power of text?

Title: The First Angel
Name(s): John (Burke) Mohan
Faculty Sponsor(s) and Department(s): Mary Joan Negro, Theatre
Format: Creative Work
Abstract:
A ghost comes into existence and questions his creation and purpose.

Title: V is for Virtue
Name(s): Gehan Cooray Arasaratnam
Faculty Sponsor(s) and Department(s): Kathleen Berens, Writing Program
Format: Creative Work
Abstract:
This collection of songs affirms the traditional Catholic belief that a man who remains a virgin is angelic and celestial, while he who succumbs to sex is but a common, "mere mortal" so to speak. The Council of Trent decreed that Virginity is superior to Marriage, and that holding the opposite view was anathema. Considering the fact that we live in a depraved era in which a man's sexual prowess is deemed the cornerstone of his masculine power, I see these songs as my systematic attempt to counter this utterly immoral point-of-view. I want to establish the fact that my Masculine Chastity and Purity place me on a pedestal that cannot be touched by men who are disposed towards having sex and satiating the "lower appetites".
Category: Arts
Name(s): Adam Perez
Submission Type: Individual
Faculty Sponsor(s) and Department(s): Cater Mull, Fine Arts
Format: Creative Work
Title: Watching from a distance
Abstract:
My project is rooted in the content of representation. I employ a journalistic aesthetic and complicate it by photography images that first glance provide menial information. I sequence 8 photos together creating a grid. The purpose of the grid is to bombard the viewer with visual. The subjects of my photos are women workers from a restaurant in Los Angeles, “Phillipes.” Through my images I hoped to convey an aura of sensibility and distance. The distance in my photos is also addressed by the spatial relations between the images. Thus, it asks the viewer to question their relationship with the piece and the people being represented.

§§§§
**Title:** Acquisition of Ser and Estar in Bilinguals

**Name(s):** Helena Montes

**Faculty Sponsor(s) and Department(s):** Carmen Silva-Corvalán, Spanish

**Submission Type:** Individual

**Format:** Senior Honors Project

**Abstract:**
This study addresses the central issue of crosslinguistic influence and acquisition delay through a study of data from two Spanish-English bilingual siblings (1;5:8 to 3;6). The research more specifically focuses on the acquisition and development of Spanish ser and estar in the younger of the two siblings, Bren. His language production is compared with that of his bilingual brother Nico, who has developed a more balanced bilingualism due to the equality of input from adults. The questions examined include how one language affects the other, whether the weaker language of a child differs from the language of a balanced bilingual child, and whether the child expresses ser and estar in ways that violate the rules of the Spanish language.

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**Title:** Bringing the Past to Life: Recreating an Ancient Egyptian Gilding Technique

**Name(s):** Jennifer Crawford

**Faculty Sponsor(s) and Department(s):** Lynn Swartz Dodd, Religion

**Submission Type:** Individual

**Format:** Laboratory-based Research

**Abstract:**
My research investigates the unique features of an Egyptian gilded bronze figurine located in the USC archaeology collection, focusing on the innovative techniques that were employed to achieve a gold layer that would last for at least 2000 years. By analyzing the gilding technique in a lab setting and attempting to recreate the object utilizing ancient methods, I have gained a more thorough understanding of this craft than has ever been possible before. Through my collaboration with Getty conservation scientists and a classically trained artist, I am contributing to the most detailed, systematic study of gilding technology on bronze ever undertaken.

Gilding refers to the application of a thin layer of gold onto a less expensive material, such as gesso, a white filler bound by an organic medium. A layer of gesso is normally found on wooden artifacts, but there are rare examples of gilded bronzes featuring a layer of gesso.

By systematically reconstructing the object using the precise methods I discovered, I am now able to fully appreciate the difficulty of the task that ancient craftsmen achieved thousands of years ago. My research has identified a rare example of the increasing sophistication of an Egyptian craft technique and the transfer of technology between craft traditions. Egyptian craftspeople altered their gilding
methods through time. This raises questions about the nature and organization of craft production in Egypt. In particular, my research shows that the techniques originally used for wood furniture gilding were adopted into the realm of cultic statuary.

§§§§

Title: Chumash Trade Beads - No Longer Accepted at the Camarillo Outlets
Name(s): Anna Fryxell, Alexandra Zigrang
Faculty Sponsor(s) and Department(s): Lynn Swartz Dodd, Religion
Submission Type: Group
Format: Field Research
Title: Chumash Trade Beads - No Longer Accepted at the Camarillo Outlets
Abstract:
The San Buenaventura Mission was the ninth California mission established in order to convert the Chumash Native American inhabitants of the Ventura area and establish a permanent community. As a result of modern attempts to expand their community, the city of Ventura has been subject to a number of excavations over the past 35 years. In the most recent excavation beginning in 1997, remnants of the original mission orchard wall were discovered. During the excavation an inconsiderate employee moved the entire orchard wall material to a secondary site, thus destroying the original context and stratigraphy of the site. Some of the objects discovered there as a result of this initial excavation include Chumash trade beads, a revolver, apothecary bottles, and small children’s marbles, however 99% of the finds still remain in piles of dirt outside of the historical center in Ventura. In January 2009, the excavation was resumed on the secondary site by a USC led team. At the site, we were individually responsible for the complete excavation of one of five randomly selected 1x1 meter squares. In our trench we have discovered two different types of trading beads that were used during different historical periods. One of the trade beads was identified to be made out of clamshell, which was a common material, used during the post mission period. Through the items found in our trench we can hypothesize that Chumash trade continued among the original inhabitants into the post-mission period.

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Title: Daddy’s Girl
Name(s): Christine Greer
Faculty Sponsor(s) and Department(s): Lois Banner, History
Submission Type: Individual
Format: Field Research
Title: Daddy’s Girl
Abstract:
Over the summer and during the fall semester of 2007 I researched the media’s portrayal of father, daughter relationships after World War II. My findings indicated that an eroticized father, daughter relationship emerged as a result of psychoanalytic emphasis on the Oedipal Complex and the emerging concerns of mental health. However, the media incited this sexualized relationship, which becomes evident throughout the literature and popular culture during this era. Because a sexual portrayal of fathers and daughters in the media became widespread, teenage girls’ awareness of appropriate sexual behavior dissolved. Therefore, instances of transgressing a non-intimate relationship could be masked.

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**Category:** Humanities  
**Name(s):** Jacob Bongers  
**Submission Type:** Individual  
**Faculty Sponsor(s) and Department(s):**  
Ran Boytner, Anthropology; Lynn Swartz Dodd, Religion  
**Format:** Laboratory-based Research  
**Title:** Illuminating Culture Clash: Material Smashing in Northern Chile  

**Abstract:**  
This research project aims to shed light on the incorporation of European products in Native American culture in the Andes (South America) by analyzing the dispersion and consumption of European drinking vessels in the Tarapaca Valley of Northern Chile. Hundreds of sites located in this valley have been identified containing foreign bottles that show signs of “ritual killing,” or the deliberate act of breaking artifacts. For the purposes of this project, I analyze six such artifacts. I utilize these vessels as a means of understanding the impact of Spanish imperialism and colonial domination on the local, indigenous cultures of Northern Chile. By using microprobe analysis on the bottles and deriving insights from the archaeological record, historical accounts, and other literary sources, I discuss how these vessels served to initiate, establish, and perpetuate articulation and contact between the Spanish colonizers and the indigenous people. In addition, I assess whether there is any argument to be made for or against temporal continuity of a cultural tradition involving the smashing of foreign containers in the Tarapaca Valley. My analysis of the introduction and consumption of foreign products is an essential foundation for my examination of the indigenous cultural response to colonial contact in South America for historical archaeologists.

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**Category:** Humanities  
**Name(s):** Aaron Muller, Jennifer Yee  
**Submission Type:** Group  
**Faculty Sponsor(s) and Department(s):**  
Lynn Swartz Dodd, Religion  
**Format:** Laboratory-based Research  
**Title:** Khirbet Mazra’a: Virtual Archaeology  

**Abstract:**  
The Khirbet Mazra’a excavation was led by a team of USC students, faculty, family, and students from other universities in the summer of 1968. The village site, located one mile southeast of the Crusader port city of Tel Dor in Israel, was inhabited during the late Roman, Byzantine, Arab, Crusader, Mamluk, and Ottoman periods: around 1500 years on the same piece of land. The information gathered from the fieldwork, such as stratigraphic, architectural, and administrative records, photographs, and ancient objects -- including pottery shards, metals, pipes, and other finds -- have been stored at USC since the excavation forty one years ago. Our research is centered on a virtual reconstruction of the site. The floor plans and walls were placed into Google Sketchup, a 3-D modeling program, in order to create a probable reconstruction of the buildings excavated there. However, the floor plans only showed a portion of the buildings. In order to produce a more realistic view of the previously unreconstructed buildings, the known floor plans were compared to other archaeological sites from the same time period and culture. Where the floor plans look similar, the information, and reconstructions, from those similar sites were used to paint a picture of how the Khirbet Mazra’a buildings might have stood. In addition to the reconstructions there is also a new website to showcase the project, previous student research on the excavated material, an interview with the original archaeologist, USC Professor Dr. Gerald Larue, and an interactive alumni page.
Located in the heart of Central America, the Republic of Honduras has a population of 7.7 million and half this population lives in poverty. The literacy rate of Honduras, however, is 80%. Major infectious diseases that affect the lives of the average Honduran include hepatitis A, diarrhea, and malaria. The aforementioned diseases can all be cured and are preventable. Nevertheless, the people of Honduras are unfortunate victims.

This piece of literature was originally a journal entry that I wrote during my trip to Honduras with the other members of USC Global Medical Brigades. As the group traveled on dirt roads to various villages to provide health care solutions to the impoverished individuals of a developing country, I learned numerous life lessons which are underscored in my journal entry. In addition, I found happiness. I felt the joy of giving up the luxuries of living in a first-world country and putting myself in the shoes of people less fortunate than myself. I found satisfaction in assisting those in desperate need of help. Most importantly, I realized how blessed I am with everything that I have in my life. This journal entry is a first-hand account of the most spectacular, eye-catching and miraculous occurrence of my life.
means of exploring the ancient site in its relation to other sites and to views of the surrounding landscape, which is critical for understanding the ancient worldview.

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Category: Humanities
Name(s): Aubrey McClure
Submission Type: Individual
Faculty Sponsor(s) and Department(s): Margaret Rosenthal, Italian
Format: Analytical Paper
Title: On the Dignity of Mankind: A Testament to the Infinite Potential of all Men
Abstract:
From the dark ages, man saw himself as a being condemned by his sinful origins and subject to the destructive power of his carnal nature. Out of this darkness emerged the writings of Pico de Mirandola, a humanist that had a revolutionary view of man’s true nature and potential. Through the use of syncretism to unify Christian and ancient schools of thought, Mirandalo sought to prove that man was not a fallen being, but a man with infinite capability. He discarded the common view of man—an individual forever tossed to and fro on the winds of fortune and fate—and created a vision of man vastly different from what had been held before—that is, a man in control of his destiny. A century later, Moderate Fonte, in The Worth of Women, sought to use the Christian and ancient writings to elevate women to a plane of divine potential. This had a dramatic and lasting impact on the power of the ultimate authority of the Renaissance world—the Catholic Church—and would have an enduring effect on all aspects of Renaissance society—from the artisans to the writers, the common man to the philosophers. The Oration on the Dignity of Man and The Worth of Women are exhortations from a myriad of voices from the dust for men, and women, to recognize their divine nature, for man truly can reach his desired destiny, but only if he makes a conscious decision to strive toward it.

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Category: Humanities
Name(s): Ethan Freeburn, Christian Maltbaek
Submission Type: Group
Faculty Sponsor(s) and Department(s): Lynn Swartz Dodd, Religion
Format: Laboratory-based Research
Title: Scarabs and Figurines of Tell al-Judaidah
Abstract:
The site of Tell-al Judaidah in southwestern Turkey is located on a large trade route between the Mediterranean coast and inland Syria. Excavations were carried out in the 1930s by Robert Braidwood. The data collected from the site now include store rooms of artifacts, databases of information, and books of site plans. The data is vast, but important information is missing. Artifacts from the Judaidah excavation are currently best viewed on a database which compares columns of text in a way of organizing and reviewing the material. The goal of this project is to provide images which organize the artifacts geographically, rather than by their attributes. The artifacts that we are specifically concentrating on are the numerous scarabs and figurines from Tell-al Judaidah. We will create replicas of the Tell-al Judaidah site plans and then plot the artifacts in their respective locations. These images will provide information at a glance which would previously take a great deal of research. Never before have people been able to view detailed images of Judaidah artifacts while simultaneously viewing object locations on maps of the site. The information produced will show how the site was used from areas as large as levels themselves, to specific rooms in specific levels. This project will plot out, specifically and visually, where artifacts in Judaidah were found - an
invaluable tool for preserving the archaeological contexts for future generations.

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Category: Humanities
Name(s): Joseph Henderer
Submission Type: Individual
Faculty Sponsor(s) and Department(s): Andrew Simpson, Linguistics
Format: Field Research
Title: Southern California’s Indigenous Languages: Documenting Our Intangible Cultural Heritage in the Fight Against Language Endangerment
Abstract:
One of the world’s languages disappears every two weeks.

This independent short film features linguistic research and documentation of endangered languages across Southern California. The initial purpose was to expand on survey research published by Leanne Hinton in “Flutes of Fire” (1994) as to the actual number of native speakers remaining, as well as language preservation efforts’ successes or failures, but this has been expanded to incorporate personal experiences in the development of the ongoing project. Video and audio documentation of native speakers is currently being conducted, providing the field with high-quality linguistic data archives and the speech community with a means to document and preserve their intangible cultural heritage for future generations.

This project may also prove useful to linguistic preservation efforts in the future, heightening awareness of language loss and providing insight on what best courses of action may be taken for each language. The information gained will prove valuable to current efforts internationally to determine the status of endangered languages, such as the UNESCO Atlas or Ethnologue catalogues.

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Category: Humanities
Name(s): Christopher Johnson
Submission Type: Individual
Faculty Sponsor(s) and Department(s): Carmen Silva-Corvalán, Spanish and Portuguese
Format: Senior Honors Project
Title: Subject Position in the Speech of Spanish-English Bilinguals
Abstract:
A study of the position of the grammatical subject in the speech of two Spanish-English bilingual siblings. The position of the subject in English declarative sentences is fixed preverbally; in Spanish, subjects may be preverbal or postverbal. The study examines the possible effects that the fixed preverbal position in English may have on the Spanish of the bilinguals. The hypothesis examined is that bilinguals with lower proficiency in Spanish will place subjects preverbally with a higher frequency than monolinguals or Spanish-dominant bilinguals. This is expected as a consequence of influence from the English pattern. The data for the study consists of transcriptions of audio recordings of the children between the ages of 3 years and 3 years 10 months. These data are analyzed both quantitatively and qualitatively. The results lend some support to the hypothesis: the sibling with a lower level of Spanish dominance places subjects preverbally with a higher frequency than the other child and than the adults who provide the Spanish input. By contrast, English does not appear to be influenced by Spanish since both children place subjects only preverbally in this language.
Category: Humanities
Name(s): Rebekah Sick
Submission Type: Individual
Faculty Sponsor(s) and Department(s):
Carmen Silva-Corvalán, Spanish
Format: Senior Honors Project
Title: Subject Use by Bilingual Spanish-English Children

Abstract:
This project is based on a study of the expression of the grammatical subject in the speech of two Spanish-English bilingual siblings. The subject in English sentences is expected to be expressed in all cases (except in coordinate sentences with identical subjects); in Spanish, subjects may be expressed or unexpressed. The study examines the possible effects that the frequent subject expression in English may have on the Spanish of the bilinguals. The hypothesis examined is that bilinguals with lower proficiency in Spanish will express subjects in this language much more frequently than monolinguals or Spanish dominant bilinguals. This is expected as a consequence of influence from the obligatory expression of subjects in English. The data for the study consists of transcriptions of audio recordings of the children between the ages of 3 years and 3 years 10 months. These data are analyzed both quantitatively and qualitatively. The results lend support to the hypothesis: the sibling with a lower level of Spanish dominance expresses the grammatical subject with a higher frequency than the other child and than the adults who provide the Spanish input. By contrast, English does not appear to be influenced by Spanish since both children express all obligatory subjects in this language.

Category: Humanities
Name(s): Sarah Hawley
Submission Type: Individual
Faculty Sponsor(s) and Department(s):
Lynn Swartz Dodd, Religion
Format: Laboratory-based Research
Title: The Iconography of Empire: Figurines from Tell al-Judaidah

Abstract:
This project, directed by Lynn Swartz Dodd and supported by the University of Chicago’s Oriental Institute, seeks to uncover and publish information about previously unknown figurines from a significant Turkish archaeological site. Tell al-Judaidah was excavated in the 1930s, but the later half of the site material was never published. Only a portion of the 474 figurines found (a corpus of unusual size) have been documented—the majority have never been seen or analyzed by the archaeological community. This project, which will be published by the OI, compiles information from written sources, original excavation records, and personal observation. The publication will represent the first comprehensive documentation of the figurine corpus, including an analysis of where the objects were found to determine how the figurines were used, displayed, or deposited.

This project will also contribute to understanding a fascinating period of history: the Greek confrontation with the Persians. Specifically, it tracks the changes in terracotta figurine production around the time of Alexander the Great’s triumph against the Persians. This was a period of significant cultural change that dramatically affected people living in the region and set the stage for the ascendancy of Greek culture across the Near East. The research details changes in material culture and links these changes to political history. Changes in the form of figurines and in the images represented reflect new traditions in craft production and ideology. These figurines
offer one way of tracing the impact of regime change on the receiving society.

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**Category:** Humanities  
**Name(s):** Cara Polisini, Nathanael Troupe  
**Submission Type:** Group  
**Faculty Sponsor(s) and Department(s):** Lynn Swartz Dodd, Religion  
**Format:** Laboratory-based Research  
**Title:** The Silver Lining: Roman Coin Composition as a Proxy for Discerning Structural Economic Weakness in the Roman Empire  

**Abstract:**  
Our research is focused on Roman coin composition (purity versus debasement) as a proxy for economic deficiencies in imperial administrative structures. We analyzed silver coins using X-ray Florescence to determine their metal composition. This analysis is a starting point for assigning the roots of administrative decline to an earlier time period than is usually cited. We began research with an Alexandrian tetradrachm and a Hadrianic denarius. Roman economic historian Erik Christiansen believes that Nero raided the Alexandrian coinage for silver and Christiansen points to poorly manufactured, debased coinage being produced by Nero at a time when money was desperately needed in the Empire.

Our research uses the coins’ silver content, iconography, and production quality to look at other economic factors in the Empire, like sources for precious metals, the credit and debt system, and the cost of an overgrown government. Looking at a small period of Roman history, Nero’s rule through Hadrian’s, we are able to trace a subtle but significant decline that shows how the Roman Empire was becoming unable to provide for all of its needs using its given resources. While Hadrian is part of a group called “the 5 good emperors” this accolade does not take into account the economic state of the Empire, only the public’s and senate’s view of their ruler.

Our findings corroborate Mason Hammond’s article “Economic Stagnation in the Early Empire” which traces specific signs of economic decline starting around the time of Nero.

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**Category:** Humanities  
**Name(s):** Tara Norwood  
**Submission Type:** Individual  
**Faculty Sponsor(s) and Department(s):** Margaret Rosenthal, Italian  
**Format:** Analytical Paper  
**Title:** Women Writers and Gender Roles  

**Abstract:**  
The city of Venice, opportunely situated along the Adriatic Sea at the trading crossroads of Europe and Asia, was a major commercial center during the Renaissance. The influx of wealth from trade made Venice one of the richest cities in the world. Paradoxically, prosperity adversely affected the freedom of women living in the city. In keeping with the mercantile spirit of the day, women in general were regarded as commodities. The male-dominated Venetian culture trafficked in the monetary and social value of virginity, making chastity a marketable strategy for desirable marital alliances. As a result, women of all social groups were sequestered until marriage to maximize their marital worth and also after marriage to ensure the unadulterated continuation of their husbands’ hereditary line. Renaissance wives were expected to be wholly dedicated to their husbands and children, and they spent their time toiling in the home. And yet, some of them managed to write and to publish their literary works even though they were encouraged to exemplify religious piety through the virtues of prudence, humility and silence in the public arena. The confluence of these circumstances meant
that many noblewomen did not participate in the dramatic and otherwise positive progressive changes in sixteenth-century Italy which we associate with the renaissance period. Only one group of women escaped to some measure this subjugated condition. Courtesans of Venice were relatively free from the social and political constraints of the pious noble wife; courtesans were encouraged to educate themselves and to satisfy their spiritual and intellectual pursuit of a self-realized identity. Unfortunately, for this freedom, the courtesans traded their bodies to satisfy the physical desires of their clients. Although the Venetian courtesan and the wife led very different lives, they were nonetheless, both controlled by the gender ideologies of this period. The lives and literary production of these two different groups of women is the subject of my research project. I will explore both the secondary literature concerning noblewomen and courtesans, as well as the primary sources: which include their poems, dialogues, and letters published during their lifetime. I intend to compare how women of different social groups lived and involved themselves in intellectual pursuits during the Venetian Renaissance. My research will focus specifically on two female writers: the famous courtesan Veronica Franco and the middle class widower Modesta da Pozzo (aka Moderata Fonte). They were both proto-feminists who, in their writings, denounced the treatment of women from very different perspectives.

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Developing knowledge of the molecular structure and its implications on the function of hPepT1 will elucidate the specificity and manner of its interaction with its substrates, which is of significant importance in the rational design of drugs and prodrugs for this transporter. The difficulty in elucidating the structure of hPepT1 is that being a transmembrane protein, it is not amenable to X-ray crystallography. Therefore, we attempt to derive its structure through a computer modeling approach in conjunction with site-directed mutagenesis. Previous studies have indicated that hPepT1 contains 12 transmembrane domains and a large extracellular loop between TM6 and TM7. We hypothesize that this loop plays an important role in the uptake of substrate, undergoing a conformational change from a helical loop to an extended loop to allow for an opening of an entry way for the substrate to enter the intracellular region. Therefore, with site directed mutants and uptake studies, we can refine predicted models of hPepT1.

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Category: Life Sciences
Name(s): Marlo Gawey
Submission Type: Individual
Faculty Sponsor(s) and Department(s): Will Berelson, Earth Sciences (Geobiology)
Format: Laboratory-based Research
Title: Aerobic and Anaerobic Respiration Rates of Long Term Stationary Phase Microbes

Abstract:
This project seeks to understand microbial survivability under nature-simulating and limiting conditions. Microbial life is the most ancient and dominant life form on the planet. Microbes are adapted to survive in almost any environment on earth, including deep sea sediments, and they play a crucial role in many biogeochemical cycles. Measuring the rates at which microbes consume or release chemicals into...
their environment is important to understanding, modeling and predicting these biogeochemical cycles. Microbial respiration, in particular, plays a crucial role in both the nitrogen and carbon cycle. However, most laboratory research on microbial respiration rates is concerned exponentially growing cultures. The majority of microbes in the environment survive under starvation conditions, or Long Term Stationary Phase. Rate of respiration and growth in Long Term Stationary Phase microbes is not well known. The aim of this project is to quantify the growth and rate of respiration of microbes in conditions that mimic real environments. I will analyze microbes in oxygen rich environments, where they will consume oxygen as the primary electron acceptor for respiration, and in anoxic environments, where they will utilize nitrate as the primary electron acceptor. I will perform this analysis on three species- Escherichia coli, Shewanella oneidensis MR-1 and Marinobacter aquaeolei- during Long Term Stationary Phase.

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**Title:** Amyloid Beta as a regulator of cholesterol clearance and efflux

**Name(s):** Adrian Pedroza

**Faculty Sponsor(s) and Department(s):** Roberta Diaz-Brinton, Department of Pharmacology and Pharmaceutical Sciences School of Pharmacy University of Southern California

**Submission Type:** Individual

**Format:** Laboratory-based Research

**Abstract:**
Alzheimer’s Disease is a multifactorial disorder that induces language impairment, cognitive dysfunction, and limits verbal comprehension and reasoning. The distinguishing hallmark of AD is the formation of senile plaques from the aggregation of the neurotoxic amyloid beta peptide. High neuronal membrane cholesterol is implicated in the formation of amyloid beta. The purpose of this study is to determine the signaling functions of amyloid beta and its role in cholesterol trafficking and homeostasis. Discovery of the mechanisms by which amyloid beta regulates cholesterol homeostasis in neurons may contribute significantly to understanding AD neuropathology as well as lead to new candidates which may reduce amyloid load and plaque burden in vivo. We hypothesize that amyloid beta, the product of high membrane cholesterol, is the signal that initiates neuronal metabolism and clearance of cholesterol thus leading to dysregulation of cholesterol homeostasis. To test this hypothesis we plan to treat neurons with increasing concentrations of Ab for 24 hours and determine the changes in protein expression and we further plan to determine the age-dependent changes of cholesterol homeostasis in an Ab overproducing mouse compared to an aging normal mouse. We found that amyloid beta dose-dependently increased cholesterol metabolism and efflux while having minimal effects on cholesterol uptake in neurons. We further found that the aging 3xTG mouse which overproduces amyloid beta with age dose-dependently increases cholesterol metabolism and efflux with minimal effects on uptake. These data suggest that amyloid functions as a cholesterol metabolizing and clearing signal in neurons.

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**Title:** Analysis of Hsk1 and Dfp1 Protein Interactions Using a Yeast Two-Hybrid Screen

**Name(s):** Brian Fowler

**Faculty Sponsor(s) and Department(s):** Susan Forsburg, Molecular and Computational Biology

**Submission Type:** Individual

**Format:** Laboratory-based Research

**Title:** Analysis of Hsk1 and Dfp1 Protein Interactions Using a Yeast Two-Hybrid Screen
Abstract:
Schizosaccharomyces pombe proteins Hsk1 and Dfp1 are equivalent to Cdc7 and Dbf1 in Saccharomyces cerevisiae. The Hsk1-Dfp1 complex forms a protein kinase that is essential for DNA replication initiation by phosphorylating the MCM proteins, replication checkpoint initiation, cohesion, alkylation damage response during S phase, and induction of meiotic dsDNA breaks. Dfp1 acts as the regulator for the complex and directs the activity of the catalytic subunit Hsk1. Though many of the interaction partners of these two proteins are known, there are still many possible avenues for which this protein complex can act within the yeast nucleus. To help elucidate these possible interactions we will be conducting a yeast two-hybrid screen for the full-length and truncation mutants of these two proteins. The proteins will be screened against both vegetative and meiotic cDNA libraries. The goal is to ultimately gain a greater understanding of the network of interactions occurring inside of the S. pombe nucleus, especially as it pertains to DNA replication and damage response.

Category: Life Sciences
Name(s): Amy Hurwitz
Submission Type: Individual
Faculty Sponsor(s) and Department(s):
Steve Finkel, Computational and Molecular Biology
Format: Laboratory-based Research
Title: Bacterial Aging: the cause of death phase in E. coli
Abstract:
The study of human aging is an increasingly prevalent topic as researchers attempt to understand mechanisms of cellular aging and to explain the causes of death and factors determining human life expectancy. The bacterium E. coli serves as an ideal model organism for experiments relating to humans due to its many parallels with human biochemical pathways. Over just a few days, E. coli cell populations expand exponentially during growth phase, but drastically decrease in number after reaching death phase until they reach a new cell population equilibrium. To date, the cause of the shift into death phase has not been explained. However, by conditioning the growth media, the viability and lifespan of cells during this shift can be manipulated. Specifically, the addition of ethanol, weak detergents, buffers and age-conditioning can each delay the onset of death phase by prolonging stationary phase. It was also found that filtered media that has aged for five days while carrying cells provides the most favorable conditions for the growth and survival of new cells. This result implies that a factor in the media must induce or inhibit cell viability and growth and is more active in some phases of the bacterial life cycle than others. Ultimately, a greater understanding of the effects of molecules in such media environments could explain the mechanistic cause of phenomena such as death phase and apoptosis and give insight into understanding human life expectancy.

Category: Life Sciences
Name(s): Barbara Jenkins, Karlton Wong
Submission Type: Group
Faculty Sponsor(s) and Department(s):
Mike Jakowec, Neuroscience HSC; Brett Lund, Neurology; John Walsh, Gerontology
Format: Laboratory-based Research
Title: CNS immune response to MPTP lesioning and the benefits of exercise in recovery
Abstract:
The CNS, like the rest of the body, has its own immune response to disease and injury, in the form of pro-inflammatory stimulations. The CNS immune response, which mostly comprises of activated
microglia and astrocytes, can act beneficially by phagocytosing cellular debris, releasing neurotrophic factors, and synthesizing extracellular proteins. However, previous research describes the deleterious effects of the immune response, mainly via the overstimulation of pro-inflammatory molecules that act as neurotoxins. In Parkinson’s disease, the inflammation is characterized by microglia activation and reactive astrocytes that damages dopaminergic-neurons found mainly within the substantia nigra and striatum. Microglia, which is the predominant CNS immune cell, is expressed in various phenotypes depending on its microenvironment and can be categorized based on their CD45 expressions. While traditionally the activated microglia is usually associated with an increase in MHC class II expression, this study dissected the different microglia subpopulations, distinguishing the different roles of each microglia subset. By differentiating the function of individual microglia population, we would have a better idea of treating the negative effects of inflammation, while sustaining the benefits of the CNS immune response. In this study, we analyzed the CNS immune response in the MPTP-induced toxicity in the C57Bl/6J mouse model of Parkinson’s disease, specifically looking at the recruitment of different mononuclear cells to the basal ganglia and their possible roles in repair and plasticity. Further, we examined the therapeutic effects of exercise in improving the recovery of MPTP-lesioned areas, and its role in modulating the overall CNS immune response.

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Category: Life Sciences  
Name(s): Dieuwertje (DJ) Kast  
Submission Type: Individual  
Faculty Sponsor(s) and Department(s): Suzanne Edmands, Biological Sciences  
Format: Laboratory-based Research  
Title: Ecotoxicology study in the toxin sensitivity of divergent populations of the intertidal harpacticoid copepod Tigriopus californicus  

Abstract:  
Copepods are crustacean invertebrates that occur in almost every freshwater and saltwater habitat on earth. The majority of copepods are planktonic, while others are benthic or intertidal. One species of harpacticoid copepod that lives in high tide pools along the western coast of North America, extending from Baja, California to southeast Alaska, is Tigriopus californicus. Unlike most marine organisms, this species is unique because of its high genetic structuring across its geographic range, with limited gene flow/dispersal among populations, indicating the potential for local adaptation. Because all populations are subjected to regular and extreme fluctuations in environmental stressors due to their specific inhabitance of supralittoral zone, they are not likely going to differ based on exposure to these variables. However, due to T. californicus’ abundance over a broad distance, it is potentially differentially exposed to a range of other environmental factors, namely natural and anthropogenic toxins. For this study, individuals from a "clean" (Catalina) and "contaminated" (San Diego) site were collected and compared following exposure to a range of chemicals at different concentrations. Fitness was measured via acute toxicity tests—96 hr LC50 mortality assays (concentration at which 50% died). The following toxic pollutants were used: copper, cadmium, TBTO, molinate, DDT and endosulfan. TBTO and endosulfan presented a significant difference between the survivorship of San Diego versus Catalina; San Diego dying at a higher
concentration then Catalina did. The tests on DDT, molinate, copper and cadmium did not show the same pattern of differential population sensitivity.

Abstract:
A requirement for the functioning of all organisms is the production of proteins for metabolic, catalytic, and biochemical functions in the body. Transcription of specific genetic sequences results in ribosomal translation which produces a polypeptide that can reconfigure into a tertiary and quaternary structure specific for its encoded function. Ribosomes themselves are complexes of both protein and ribosomal RNA transcribed from rRNA operons, denoted as rrn operons. In Escherichia coli, there are seven rrn operons: rrnA, rrnB, rrnC, rrnD, rrnE, rrnG, and rrnH. The predominant hypothesis accounting for the presence of all 7 naturally occurring rrn operons relies on increased levels of transcription to maintain an rRNA quota that would confer an advantage in long-term survival. However, my experiment explores an alternative hypothesis in that the rRNA transcribed from different operons may be specific for incorporation into ribosomes for specific functions. Therefore the presence of all 7 operons may allow the cell to better adapt to growth conditions by producing genetically variant transcripts that would aid the cell in specific ways. Competing the seven delta-1 strains against WT revealed pronounced differences in survival in WT that indicated a selective advantage conferred by the missing operon (as in rrnA, rrnD, and rrnB) while similar growth patterns suggested greater dispensability of the operon (rrnE and rrnH). Interestingly, while rrnC appeared the least dispensable, the multiplex PCR-based strategy presently employed to compete all seven strains simultaneously reveals rrnC to be the strongest competitor relative to the other strains.


Title: Exploring the Nature of 7 rrn Operons Through Their Effects on Growth Rate and S

Category: Life Sciences
Name(s): Sara Kingston
Submission Type: Individual
Faculty Sponsor(s) and Department(s): Steve Finkel, Molecular Biology
Format: Laboratory-based Research

Title: Fast Scan Cyclic Voltammetry: Studying Dopamine Release in the Brain

Category: Life Sciences
Name(s): Kristie Wang
Submission Type: Individual
Faculty Sponsor(s) and Department(s): John Walsh, Gerontology
Format: Laboratory-based Research

Abstract:
Dopamine is a neurotransmitter that is essential for basal ganglia control of movement with deficits in dopamine underlying the loss of movement seen in Parkinson’s disease. In my study, we explored the regulation of dopamine release by 1) autoreceptors for dopamine and 2) glutamate released by corticostriatal synapses. Data was obtained using a unique electrophysiological/electrochemical technique for measuring dopamine release from live rat and mouse striatal brain slices. The method, called fast scan cyclic voltammetry (FSCV), measures synaptically released dopamine by measuring the flow of current collected by a carbon fiber electrode. A specific voltage wave is imposed upon the electrode that triggers a peak of oxidation for the neurotransmitter dopamine. When dopamine is oxidized it
releases an electron and the carbon fiber electrode detects the electron as a “dopamine current”. A stimulating electrode was positioned in the dopaminergic nigrostriatal pathway to release dopamine from synaptic terminals and a second electrode was placed in the cortex to see how corticostriatal glutamate modulates the release of dopamine from the nigrostriatal terminals. We found clear evidence of dopamine autoreceptor-mediated decreases in dopamine release as well as glutamate-mediated changes, as tested through the addition of CNQX, an AMPA-glutamate receptor specific antagonist, to the brain slices.

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Category: Life Sciences  
Name(s): Taylor Parks, Dustin Tetzl  
Submission Type: Group  
Faculty Sponsor(s) and Department(s): Kathleen Burke, Center for Premature Infant Health and Development, Institute of Genetic Medicine, & Keck School of Medicine; Jack Turman, Center for Premature Infant Health and Development, Institute for Genetic Medicine, & Keck School of Medicine  
Format: Laboratory-based Research  
Title: Growth and behavioral effects of neonatal hypoxic-ischemic brain injury followed by maternal deprivation  
Abstract: Perinatal brain injury is associated with early growth deficits and long term cognitive difficulties. Moreover, the effects of injury on developmental outcomes may be exacerbated by early stressors such as postnatal separation from parents during hospitalization. In the present study we assessed the combined impact of brain injury and severe stress (maternal deprivation) on rat growth and behavioral development. On postnatal day (P) 7, one half of the pups within each of 5 litters underwent right common carotid cauterization followed by 2 hours exposure to 8% O2, or sham surgery followed by 2 hours exposure to room air. On P8-P12, all pups in three litters also underwent isolation from dam and littermates (Maternal Deprivation; MD) for 4 hours daily. These treatments resulted in 4 experimental groups: Sham (n=8), HI (n=7), MD (n=11), and MD + HI (n=9). Growth measurements were collected daily, and behavioral tests were performed at three developmental time points: postweaning (open field test), adolescence (odor habituation), adulthood (elevated plus maze). Repeated measures analyses showed reduced postnatal growth in HI +MD pups as compared to Shams. In contrast, there were few differences in the behavioral performance of HI+MD rats as compared to Shams at all ages tested. Our failure to detect performance deficits in HI+MD rats using standard behavioral tests shows that (1) there is a remarkable sparing of function following early brain injury and stress and (2) more sensitive and specific behavioral tests are needed to detect potential cognitive deficits in this animal model.

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Category: Life Sciences  
Name(s): Amanda Compadre  
Submission Type: Individual  
Faculty Sponsor(s) and Department(s): Roberta Diaz-Brinton, Department of Pharmacology and Pharmaceutical Sciences School of Pharmacy University of Southern California  
Format: Laboratory-based Research  
Title: High membrane cholesterol, activation of amyloid signaling cascade; implication  
Abstract: Alzheimer’s disease is a multifactorial and progressive neurodegenerative disease that leads to short and long term memory loss and a decrease in quality of life. Currently there is no cure for Alzheimer’s, and with
an increasing aging population AD poses a large financial burden on the nation unless more effective treatments are determined. The hallmark of AD is the formation of senile plaques (aggregated amyloid beta (Ab) protein) which are neurotoxic. Although the mechanisms underlying AD pathology are not completely understood, increasing evidence suggests that high intraneuronal cholesterol lipid rafts activate &\#61543;-secretase and Ab production. The purpose of this study is to determine cholesterol's role in Ab production in vivo and the regulation of neuronal cholesterol homeostasis. It was hypothesized that treating neurons with increasing levels of cholesterol would activate &\#61543;-secretase leading to an Ab producing phenotype resulting in increased cholesterol catabolism and that the overproducing Ab mouse (triple transgenic 3xTG) would produce a similar phenotype. To test this hypothesis we treated primary cortical neurons with increasing concentrations of cholesterol for 24 hours and determined the regulation of cholesterol efflux and metabolism and further determined these changes in the 3xTG mouse (Overproduction of &\#61505; &\#61538;) and the non transgenic mouse (NTG). Increasing cholesterol dose-dependently increases cholesterol efflux while decreasing cholesterol uptake and intraneuronal trafficking. These data suggest that cholesterol activates amyloid signaling and that &\#61543;-secretase activation may regulate cholesterol uptake receptors as evidenced in the literature while simultaneously increasing metabolism and efflux.

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Category: Life Sciences
Name(s): Morgan Cross
Submission Type: Individual
Faculty Sponsor(s) and Department(s): Ruth I Wood, Cell and Neurobiology
Format: Laboratory-based Research
Title: High-Dose Testosterone Inhibits pCREB in Mouse Brain
Abstract:
Anabolic androgenic steroids (AAS) are drugs of abuse, but their mechanism of action within the brain is largely unknown. Many drugs of abuse act in the nucleus accumbens (Acb) to affect phosphorylation of cyclic AMP response element binding protein (pCREB). Stimulants increase pCREB in Acb, while levels of pCREB decrease in response to opiates. To better understand how AAS act in the brain, we examined the effect of an acute pharmacologic dose of testosterone on pCREB in brain regions that are androgen receptor dense or known to be involved in drug reinforcement. 10 male C57Bl/6 mice (n=5/group) received 1 mg/kg testosterone sc or an equivalent volume of aqueous vehicle. They were perfused 1 hour later. 40 μm coronal brain sections were cut and stained for pCREB. Additional sections were stained for Fos. Testosterone reduced both the number of pCREB-positive neurons and mean staining intensity compared to vehicle treatment, but had no effect on Fos. In particular, the decrease of pCREB in Acb (1471±210 pCREB-positive cells after testosterone vs 1911±128 with vehicle) resembles the effects of opiates on Acb. Furthermore, reduced pCREB in Acb has been shown to reduce dynorphin, the endogenous ligand of the kappa-opioid receptor (KOR) system. Activation of the KOR system is associated with dysphoria. A reduction in pCREB may alleviate dysphoria, thereby contributing to the reinforcing effect of AAS.

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**Category:** Life Sciences  
**Name(s):** Stephanie Hudiburgh  
**Submission Type:** Individual  
**Faculty Sponsor(s) and Department(s):** Samantha Butler, Biological Sciences  
**Format:** Laboratory-based Research  
**Title:** Investigating the Role of Smads in Commissural Neuron Specification  

**Abstract:**  
As the spinal cord develops, diverse populations of neurons arise from their undetermined precursors within the neural tube. These different types of neurons consistently form in separate and distinct locations along a dorso-ventral axis and are specified by signals released from the roof plate and floor plate. One class of signal molecules, the Bone Morphogenetic Proteins, or BMPs, are released by the roof plate and have been shown to play an important role in defining different dorsal cell types, including the most dorsal population of cells known as commissural (C) neurons. BMPs act on C neuron progenitor cells by binding a BMP receptor complex to initiate the Smad pathway. This cascade of second messenger signaling leads to the changes in transcriptional regulation necessary for cell fate specification.

Despite our general understanding of the Smad pathway, the importance of individual Smads in the BMP-mediated specification of C neurons has not been established. To better understand the role of different Smads in this pathway, the effect of disrupting the Smad-signaling has been investigated. The Smad pathway was disrupted through the overexpression of either Smad6 or Smad7, both of which are inhibitory Smads believed to block BMP-signaling. Smad7, but not Smad6, overexpression has been found to produce significant defects in cell fate, suggesting that these inhibitory proteins play different roles in the BMP-mediated specification of C neurons.

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**Category:** Life Sciences  
**Name(s):** John Joseph, Negar Kahen, Michael Mesa, Victoria Vuong  
**Submission Type:** Group  
**Faculty Sponsor(s) and Department(s):** Sergey Nuzhdin, Molecular and Cell Biology  
**Format:** Laboratory-based Research  
**Title:** Isolating novel genes that rescue loss of function mutation in l(2)gl  

**Abstract:**  
Many human diseases such as Parkinson’s and Alzheimer disease have been studied using drosophila as model organism. Since Drosophila Lethal giant gene (l(2)gl) acts just as a homolog for Human giant larvae-1 (Hugl-1), we will use drosophila genome to understand genes that have compensatory interactions.

The proposed research project will focus on the Lethal Giant gene l(2)gl and other genes that may participate in cancer pathway leading to formation of tumors.

The goal of this research is to identify loci that interact with l(2)gl by combining traditional approaches (QTL-mapping) and cutting edge bioinformatics approaches (microarrays analysis). This work includes introgression of deficiencies in l(2)gl into multiple out-bred genetic backgrounds in an experiment akin to mutation interaction genetic screens. Following introgression for five generations, we will extract DNA and RNA from the introgression lines as well as the original lines and hybridize the samples to a whole genome Affymetrix microarray. The DNA hybridization will identify all single nucleotide polymorphisms (SNPs) in the different lines. These SNPs will be our markers. The RNA hybridization will provide transcription levels for all of the expressed genes and will be our phenotypes. We will then use bioinformatics to connect the marker variation with the phenotypic variation to identify novel interactions.
between our introgressed areas and other portions of the genome.

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Category: Life Sciences
Name(s): Jennifer Sasaki, Alexandra Smith, Karlton Wong
Submission Type: Group
Faculty Sponsor(s) and Department(s):
Mike Jakowec, Neuroscience HSC; Marta Vuckovic, Neuroscience PhD candidate; John Walsh, Gerontology
Format: Laboratory-based Research
Title: Lasting changes in the dendritic spines of neurons caused by chemical hypoxia

Abstract:
Over the course of our research we studied the physiological and morphological effects of chemical hypoxia created by an injection of 3-nitropropionic acid (3-NP), a mitochondrial poison, in rats. A single, low dose injection of 3-NP had immediate and lasting consequences on the connections made between cortical and striatal neurons in the rat. The first 24 hours post 3-NP increased the level of corticostriatal excitation, with the strength of this synapse returning to normal by 48 hours. However, over time there was clear evidence for a decrease in signal strength occurring at this synapse up to a month after the 3-NP injection. Interestingly, the connections recovered by 3 months post injection. Synapse strength was evaluated by single cell, glass electrode intracellular recording. The electrodes also contained a molecule called biocytin, which was injected into the recorded cell. The tissue was then fixed in formaldehyde and the biocytin (a conjugate of biotin and lysine) was located via a chemical reaction, which created a biotin-avidin complex (ABC reaction). The avidin molecule was also tagged with a horseradish peroxidase molecule (HRP). The HRP served as a catalyst for reacting H2O2 with diaminobenzidine, which formed a permanent dark label of the injected neuron. Analysis of the injected neurons demonstrated that the site of synaptic contact, the dendritic spines, decreased in number after 3-NP poisoning and required 3 months to recover from this toxic event. These changes all occurred at the synaptic level without any evidence of cell death.

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Category: Life Sciences
Name(s): Philip Vittozzi Wong
Submission Type: Individual
Faculty Sponsor(s) and Department(s):
Mike Jakowec, Department of Neurology; Giselle Petzinger, Department of Neurology; John Walsh, Davis School of Gerontology
Format: Laboratory-based Research
Title: Molecular Basis of Neurotoxicity in the Basal Ganglia

Abstract:
The basal ganglia is important for normal motor function. Diseases of the basal ganglia are common and lead to neurological disorders, such as Parkinson’s disease and Huntington’s disease. These two disorders share in common significant impairment in motor function. The medium spiny neuron is the predominant cell in the basal ganglia and in the caudate putamen and its role is critical for normal motor function. The physiology and the function of the medium spiny neuron is dictated in turn by its relationship to the glutamatergic system that consists of the glutamatergic cortical striatal system, and its dysregulation is thought to underlie the motor impairment of both PD and HD. Both the MPTP and the 3NP animal model of PD and HD respectively have been extremely valuable in helping us understand this dysregulation of the glutamatergic cortical striatal system. Using the MPTP model the role of BDNF overexpression in modifying glutamatergic dysregulation was examined using behavioral, neurophysiologic and molecular studies. Using the 3NP animal model the
effects of dopamine depletion on medium spiny neuron function using neurophysiologic and molecular techniques were performed.

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Category: Life Sciences
Name(s): Hillary Gregg, Eric Rohman
Submission Type: Group
Faculty Sponsor(s) and Department(s):
Jesus Dominguez, Biokinesiology and Physical Therapy; Jack Turman, Biokinesiology & Physical Therapy
Format: Laboratory-based Research
Title: Neonatal hypoxic-ischemic brain injury impacts postnatal metabolism, growth, and neural development in rats
Abstract:
There is an association between acute growth deficits and poor neurodevelopmental outcomes following neonatal hypoxic-ischemic (HI) brain injury. HI-induced growth deficits may result from the disruption of feeding behaviors, neural regulatory centers, and/or dysregulation of metabolic processes. On P7, treated rats (n=17) underwent a HI injury, shams (n=12) underwent the same surgical procedure without cauterization or exposure to hypoxia. On alternate days between P2-14, growth measures were recorded and metabolic parameters in individual pups were examined. Rats were sacrificed on P15 and gross histological examination was performed on brain sections. HI animals weighed less and had shorter snout-rump (SR) and snout-crown (SC) lengths compared to shams (p<.01). There was a significant day x condition interaction between groups on P14 (p<.01), with HI animals exhibiting higher VO2, VCO2, and energy expenditure values relative to shams. Analysis of the histological data revealed that the right hippocampal and right cerebral hemisphere areas were significantly smaller than the left in the injured animals (p<.05). Our findings suggest that altered metabolic function contributes to growth deficits following neonatal rat HI injury during an important maturational period for neural circuitry related to homeostatic regulation. Furthermore, these growth deficits are associated with a reduction in hippocampal area, a brain region that has been implicated in the regulation of consummatory behavior. Funding: CPIHD funds to JET.

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Category: Life Sciences
Name(s): Tiffanie Nham
Submission Type: Individual
Faculty Sponsor(s) and Department(s):
Arshad M Khan, Biological Sciences
Format: Laboratory-based Research
Title: Novel co-localization of phospho-ERK 1/2 with the hypocretin/orexin system of the lateral hypothalamic area (LHA)
Abstract:
Since its exclusive localization to the LHA, it is now known that neurons expressing hypocretin/orexin (H/O) regulate wakefulness, feeding, reward/stress, and breathing. Given their widespread influence, our laboratory has recently begun developing methodologies to track H/O activation in vivo. Mitogen-activated protein (MAP) kinases of the ERK (extracellular signal-regulated protein kinases 1 and 2) subfamily are involved in diverse biological functions but have not yet been observed in LHA neurons. Therefore, I hypothesized that phospho-ERK1/2 may be a useful tracker of H/O neuronal activation within the LHA.

Brain sections obtained histologically from eight adult male Sprague-Dawley rats receiving insulin (2 U/kg/ml) and four controls receiving saline were used for single- and double-label immunohistochemistry experiments. Briefly, I incubated brain sections with a goat
polyclonal H/O antibody and a rabbit phospho-ERK1/2 antibody to examine phospho-ERK1/2 expression in H/O neurons. Staining was analyzed under a Zeiss fluorescent microscope by tagging the anti-H/O with a red Cy3 fluorophore and the anti-phospho-ERK1/2 with a green streptavidin-Alexa 488 conjugate.

I observed elevated phospho-ERK1/2 levels in suprafornical LHA neurons that also stained robustly for H/O across control and hypoglycemic conditions. Moreover, dorsally and medially located LHA neurons appeared to demonstrate greater co-localization with phospho-ERK1/2 signal than more laterally located H/O neurons.

These findings demonstrate the presence and activation of phospho-ERK1/2 in the LHA, particularly its localization in a specific sub-group of H/O neurons. The high levels of phospho-ERK1/2 under both control and hypoglycemic conditions suggest that other temporal and stress factors may be amplifying phospho-ERK1/2 expression.

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Category: Life Sciences  
Name(s): Cara Bickers  
Submission Type: Individual  
Faculty Sponsor(s) and Department(s): Susan Forsburg, Biological Sciences  
Format: Laboratory-based Research  
Title: Novel Mutants link DNA Replication and Centromere Function in the Fission Yeast, Schizosaccharomyces pombe  
Abstract: The centromere is a region on each chromosome that connects it to the mitotic spindle, which will pull the duplicated chromosomes apart during mitosis. My hypothesis is that there are novel genes that link chromosome segregation and centromere function to the replication of the chromosomes. To isolate mutations in these genes, I am isolating yeast strains that are sensitive to both hydroxyurea (HU) and thiabendazole (TBZ). These anti-proliferative agents arrest the cell cycle by interrupting two separate phases. HU functions by depleting the supply of nucleotides in the cell so that DNA replication cannot occur and the S phase arrests. TBZ functions as a spindle poison and so disrupts the proper segregation of chromosomes during anaphase.

I performed a genetic screen in which I mutagenized wild type S. pombe cells using ultraviolet radiation that yielded 50% death of the initially plated colonies. The surviving colonies were screened for both HU and TBZ sensitivity. Initially, 46 candidates were identified in the primary screen and analyzed more closely. Upon closer inspection, only 5 showed strong phenotypes. Currently, I am performing genetic analysis on these 5 mutant strains. First, I am performing complementation testing to determine whether the mutations are dominant or recessive. Then I will carry out linkage analysis (recombination) to verify that both drug sensitivity phenotypes are due to a single mutation. I will also cross them to one another to determine how many different genes are represented by this collection of mutations.

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Category: Life Sciences  
Name(s): Miriam Lassiter  
Submission Type: Individual  
Faculty Sponsor(s) and Department(s): Chong Pyo Choe, Center for Stem Cell and Regenerative Medicine; Gage Crump, Center for Stem Cell and Regenerative Medicine  
Format: Laboratory-based Research  
Title: Pharyngeal Pouch Development in Zebrafish  
Abstract: A deeper understanding of mechanisms
underlying facial structure development in zebrafish will prove to be an invaluable tool in the treatment of various genetic skeletal defects and the regeneration of deformed or missing skeletal tissue caused by injury. Creating transgenics that label different tissues with different colors allows the visualization of interactions and migration patterns through fluorescent microscopy and time-lapse imaging. These tissue-specific drivers also make it possible to alter certain cell populations by ablation or misexpression of genes to further study their roles. The goal of this project was to explore how endoderm develops into the pharyngeal pouches, both at a molecular level by studying specific receptors and signaling transduction pathways, and also at a cellular level by looking at how different tissues communicate and move in relation to each other. The receptor protein tyrosine phosphatase LAR2 is expressed in the endoderm and may be a mode of communication between endoderm and mesoderm, facilitating pouch formation. Further suggesting this, LAR2 morpholino injections done in this project showed skeletal defects in the HM plate and first-pouch formation. Communication roles between endoderm and mesoderm in pouch development was also studied due to their close proximity and similar migration patterns during embryonic development. Transgenic lines labeling the paraxial mesoderm were created by tagging a paraxial mesoderm-specific gene, fsta, to a blue fluorescent protein, cerulean and will be used for future experiments as a mesoderm marker and driver to further study pouch development.

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**Title:** Primate Surveys and Biological Sampling in Northeastern Costa Rica: Implications for Wildlife Conservation

**Name(s):** Darcy Ebentier, Nicole Hernandez, Brian Schneiderman

**Faculty Sponsor(s) and Department(s):** Robert Delgado, Anthropology & Biological Sciences

**Submission Type:** Group

**Category:** Life Sciences

**Format:** Field Research

**Abstract:**

To evaluate the conservation status of species and act to minimize the loss of biodiversity, accurate and reliable data on population abundance and habitat use are needed. We aimed 1) to determine the status of non-human primate populations in fragments of tropical lowland rainforest, 2) to collect vegetative data for describing forest structure and resource availability, and 3) to identify habitats of high conservation value. For three sympatric species of Mesoamerican primates—black-handed spider monkeys (Ateles geoffroyi), black mantled howling monkeys (Alouatta palliata), and white-faced capuchins (Cebus capucinus)—we conducted systematic line transect surveys, collected behavioral data on ranging, feeding and habitat use, and measured resource availability across three small and distinct forest fragments at La Suerte Biological Field Station in Northeastern Costa Rica. Encounter rates and estimated densities tended to be highest for all three species in the largest of the forest fragments surveyed. Across all fragments, capuchins were encountered most frequently (3.51 ind/km), followed by howlers (2.79 ind/km) and then spider monkeys (1.24 ind/km), though the relative inactivity of howlers may have led to underestimating their abundance. Furthermore, there were significant differences in resource availability between the largest and smallest fragments, as measured by the average basal area of potential food tree species (t-test, p =
0.033), suggesting that local wildlife conservation efforts should target preserving the largest forest fragments possible.

Title: Protein Receptor Trafficking of GluR2 in an Animal Model of Parkinson’s Disease
Name(s): Brandyn Castro
Faculty Sponsor(s) and Department(s): Mike Jakowec, Neuroscience HSC; Giselle Petzinger, Department of Neurology
Submission Type: Individual
Category: Life Sciences
Format: Laboratory-based Research
Abstract:
Parkinson’s Disease (PD) is a debilitating neurodegenerative disease affecting approximately 1 million people over the age of fifty in North America. The disease leads to overall slowness in movements, tremor, and walking difficulties due to cell death in the substantia nigra pars compacta neurons of the brain, which produce the neurotransmitter dopamine. This loss of dopamine leads to dysfunction of the movement control center of the brain, called the basal ganglia.

Studies using the 1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine (MPTP) animal model of PD show that exercise may change the way a parkinsonian brain compensates for the deficiency of dopamine. Exercise is thought to alleviate parkinsonian symptoms by increasing dopamine production and dopamine targeted receptors in the remaining living cells. Dopamine has the ability to influence the glutamatergic system of the brain which helps maintain long term depression. One important role of dopamine in the brain is to regulate the number, type, and trafficking of glutamate receptors, causing a normal firing rate of medium spiny neurons (MSNs) in the basal ganglia. Immunocytochemistry and electrophysiology have shown that in the MPTP animal model of PD, exercise leads to an increased expression of AMPA channel subunit GluR2 and increased number of GluR2 positive cells. This study will further investigate these findings using biotinylation to target the GluR2 surface receptor and determine whether the changes in the levels of protein expression occur at the level of the cell membrane.

It is hypothesized that mice lesioned with MPTP show a decrease in expression of GluR2 receptors located on cell membrane as compared to controls. Exercise increases those levels in observing MPTP+exercise mice.

Title: Real-time optical detection of the Harmful Algal Bloom species Pseudo-nitzschia
Name(s): Karli Herzog
Faculty Sponsor(s) and Department(s): Burt Jones, Marine Environmental Biology
Submission Type: Individual
Category: Life Sciences
Format: Laboratory-based Research
Abstract:
Pseudo-nitzschia spp. is a phytoplankton species that is known to form blooms along the Southern California coast that produces and often releases the harmful toxin Domoic Acid (DA) into the coastal ocean. While research has been done on Harmful Algal Blooms (HAB) of Pseudo-nitzschia, in situ and real-time detection is limited to very complex instrumentation that is not commonly available. With this experiment, a multidisciplinary approach was taken using both laboratory and fieldwork to identify ways to track Pseudo-nitzschia blooms. Laboratory measurements of spectral backscattering, chlorophyll and Colored Dissolved Organic Material (CDOM) fluorescence were done using Pseudo-nitzschia spp., and other local isolate algal cultures. The ratio of spectral
backscattering to chlorophyll of the Pseudo-nitzschia spp. proved to be 2-4 times higher than for other local species. In February 2009, an underwater glider was deployed in the San Pedro Shelf area, measuring different biogeochemical parameters, including spectral backscattering, chlorophyll and CDOM fluorescence. Parallel discrete water sampling revealed the high abundances of Pseudo-nitzschia spp. and DA in the water column. Laboratory findings and data collected in the field were compared in order to develop a more efficient and real-time detection of the toxic Pseudo-nitzschia spp.

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Category: Life Sciences
Name(s): Emma Freeman, Hannah Mansky
Submission Type: Group
Faculty Sponsor(s) and Department(s): Daryl Davies, Molecular Pharmacology and Toxicology
Format: Laboratory-based Research
Title: Sites of Ethanol Action in P2X4 Receptors
Abstract:
Pharmacological strategies for alcoholism treatment are presently limited by our understanding of how alcohol acts in the Central Nervous System on a molecular level. One group of CNS receptors being studied is the P2X group of receptors, a family of ligand-gated ion channels widely distributed throughout the nervous system that are activated by extracellular adenine triphosphate (ATP). Ethanol modulates P2XRs, however, sites of ethanol action in P2XRs are not known. Recent findings suggest that ectodomain regions from the TM domains of P2XRs play an important role in determining the action of ethanol. The present study extends these findings to another P2XR subtype, P2X4R, and investigates the role of amino acids within the ectodomain region near the TM domains in the action of ethanol. We mutated single amino acids in the regions of interest to alanine because it is the smallest and most workable amino acid and expressed the mutated receptors in Xenopus oocytes. Using two-electrode voltage-clamp we tested the effects of ethanol (10-200mM) in mutant receptors. We found that mutating residues at positions 331 and 336 in the ectodomain region near the TM2 domain of P2X4Rs significantly reduced ethanol inhibition. Mutating the amino acids in positions 331 and 336 to non-polar significantly reduced ethanol inhibition, while substituting both the 331 and 336 amino acids with a polar residue did not alter the ethanol inhibition. Taken together, our results suggest that physical-chemical properties of Asp331 and Met336 are important determinants for ethanol modulation in P2X4Rs.

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Category: Life Sciences
Name(s): Joshua Lang
Submission Type: Individual
Faculty Sponsor(s) and Department(s): Kenneth Nealson, Earth Sciences
Format: Laboratory-based Research
Title: Some Like it Cold: Microbial fuel cell applications using the cold loving microbes Shewanella frigidimarina NCIMB 400 & Shewanella baltica OS155
Abstract:
Bacteria of the genus Shewanella are facultative anaerobes that possess some particularly fascinating characteristics including the ability to thrive in anaerobic environments utilizing various substances as terminal electron acceptors. When the Shewanellae transfer electrons onto a metallic surface, it is then possible to utilize the electron gradient to generate electricity. Thus from this researchers, including, Dr. Nealson at USC, have become fascinated with the development of MFCs powered by the Shewanella
bacteria. In my experiments I sought to explore the application of coldwater strains of this bacterial genus in the fuel cell apparatus. I selected two of the most robust cold-water strains including *S. frigidimarina* NCIMB400 (which I will refer to from here as FM) and *S. baltica* OS155 (Bal). I ran the experiments first using lactate as the carbon source and then used a more relevant carbon source N-acetyl glucosamine (NAG), a soluble derivative of chitin, which is abundant in marine settings. Overall my experiments elucidated a complex picture of cold-water fuel cells, demonstrating at least some potential capabilities for application. Both FM & Bal ran efficiently with lactate, and although FM was the more robust strain aerobically, Bal out performed FM in the fuel cell by several orders of magnitude with comparable current production to *Shewanella oneidensis* MR-1 (the prototype strain). Using NAG was slightly more complex and necessitates further exploration.

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**Title:** The Effect of Retinal Degeneration on the Morphology of Neurons in the Superior Colliculus

**Name(s):** Diana Cholakian, Tara Matsuda

**Faculty Sponsor(s) and Department(s):** Biju Thomas, Opthamology

**Submission Type:** Group

**Format:** Laboratory-based Research

**Abstract:**

The effects of retinal degeneration (RD) on the morphology of the superior colliculus (SC) are profound. We hypothesized that the retinal degeneration in 500-600 day old rats would cause their neurons to look morphologically different from their normal counterparts. Line 3 RD rats were bred to age with retinal degeneration. By sagittaly cross sectioning the right and left superior colliculi of (3?) normal rats and (5?) RD rats, both which were 500-600 days old, we obtained 18 sections total of 100 micrometers each. Following this, we analyzed each section under visual light/bright field images using a Nikon TI inverted light microscope. We then compared corresponding images from...
normal and RD rats. Doing this, we saw a significant difference between normal SCs and RD SCs. There were specific changes in the number, density, and shapes of neurons in the rat visual system. There was also a difference in the size and neuron density in the layers of the SC. These differences in the SC were significant between normal and RD rats. Because of that, we have reason to believe that retinal degeneration can alter neurons dramatically, causing the remaining neurons to over-compensate for the neurons that were left. A study of this kind, looking at rats of such old age, was not found.

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Category: Life Sciences
Name(s): Sonya Hanson
Submission Type: Individual
Faculty Sponsor(s) and Department(s): Lin Chen, Biological Sciences
Format: Laboratory-based Research
Title: The Hydrophilic Core of the nAChR
Abstract:
The nicotinic acetylcholine receptor (nAChR) is an ion channel that transmits neuronal signals throughout the central nervous system. It is crucial to everyday function, and is targeted in many diseases such as myasthenia gravis, Alzheimer’s, and schizophrenia. When acetylcholine binds to the nAChR a pore opens and ions can pass through the lipid membrane of a neuron, propagating the neuronal signal. In 2007, the Chen lab obtained a high resolution crystal structure of the extracellular domain of one of the five subunits of the muscle nAChR, and found a peculiar water molecule embedded inside. The water molecule is stabilized by a couple of hydrophilic residues that surround it. It is unusual to find hydrophilic residues in the interior of proteins because the folding of that protein becomes less thermodynamically favorable. A snail protein of similar structure binds acetylcholine without opening a pore. This snail protein does not have the group of hydrophilic amino acids that the nAChR does. Our prediction, therefore, is that the otherwise unfavorable existence of the hydrophilic amino acids in the interior of the nAChR makes the protein just flexible enough to open and close its pore upon binding of acetylcholine. In this project we studied the differences between the wildtype nAChR and a mutant nAChR in which we replaced the hydrophilic residues with the hydrophobic residues of the snail protein to show that the wildtype is indeed just unstable enough to allow for the opening of the ion channel.

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Category: Life Sciences
Name(s): Melissa Brizuela, Reem Itani, Christopher Suffridge
Submission Type: Group
Faculty Sponsor(s) and Department(s): Melvin Lyon, Biological Sciences; William McClure, Biological Sciences
Format: Laboratory-based Research
Title: The Mozart Project
Abstract:
Great works of music withstand the tests of time: they are still performed and lauded years and years after their creation. As technology improves, many find that those individuals that composed those works were mentally troubled. For example, virtuoso Robert Schumann is known to have suffered from bipolar disorder, Alexei Stanchinsky was a schizophrenic, and Wolfgang Mozart was thought to have had Tourette’s Syndrome. With our experiment, we analyzed numerous musical pieces of both “sane” and mentally distressed composers to see if there was a correlation with the predicted psychosis of the composer and the number of recurring time patterns within their works. The musical works were all chosen to be of the same style, and were analyzed under a standard tempo with temporal-behavioral
software THEME and statistical program SPSS.

Title: The RCAN1 Gene and its Protection Against Huntington’s Disease
Name(s): Kevin Chang
Faculty Sponsor(s) and Department(s): Kelvin Davies, Gerontology; Gennady Ermak, Gerontology
Submission Type: Individual
Category: Life Sciences
Format: Senior Honors Project
Abstract:
Huntington’s disease, a progressive neurodegenerative disease, is characterized by a trinucleotide repeat expansion of more than 30 glutamine codons, which results in a defective huntingtin protein that accumulates in neurons, leading to neuronal death. Previous studies have demonstrated that phosphorylation of the mutant huntingtin protein has protective effects against the Huntington’s disease. One way to promote the phosphorylation of the huntingtin protein is through the inhibition of the phosphatase calcineurin. The RCAN1 gene family and its gene products present a highly-specific way of inhibiting calcineurin in neurons affected by Huntington’s disease. Previous studies have shown that of the 3 isoforms of RCAN1, RCAN1-1L expression is diminished in brains of patients with Huntington’s disease, and so RCAN1-1L was the isoform we focused on. Using a mouse ST14A striatal cell model for Huntington’s disease, we have demonstrated that the overexpression of RCAN1-1L can protect against the toxic effects of mutant huntingtin protein. We have also demonstrated that increased levels of phosphorylated huntingtin protein via calcineurin inhibition is the most likely pathway through which this protective effect is manifested. These findings suggest the overexpression of the RCAN1-1L isoform may have therapeutic potential in treating Huntington’s disease, as well as other polyglutamine diseases.

Title: The Roles of Oncogene Homolog Sch9 and Rev1 Polymerase in Age-Dependent Genomic Instability
Name(s): Valerie Yuan
Faculty Sponsor(s) and Department(s): Valter Longo, (PhD), Gerontology
Submission Type: Individual
Category: Life Sciences
Format: Laboratory-based Research
Abstract:
Cancer is the second leading cause of death in the United States, accounting for nearly half a million deaths each year. Notably, the great majority of cancer deaths are observed in patients above the age of 40, suggesting that aging is the major risk factor for cancer. Overwhelming evidence points to a central role for DNA damage and mutations in cancer. In previous research, Longo and colleagues found that genomic instability was increased by SCH9 over-expression and decreased in sch9Δ mutants, suggesting that there is a relationship between the oncogene homologs and age-dependent spontaneous mutations, which is observed in both dividing and non-dividing cells. REV1, a gene that codes for an error-prone polymerase of a translesion repair system, appears to be involved in the generation of these mutations.

In previous research, Longo and colleagues found that genomic instability was increased by SCH9 over-expression and decreased in sch9Δ mutants, suggesting that there is a relationship between the oncogene homologs and age-dependent spontaneous mutations, which is observed in both dividing and non-dividing cells. REV1, a gene that codes for an error-prone polymerase of a translesion repair system, appears to be involved in the generation of these mutations.

Using Saccharomyces cerevisiae yeast cultures as “test tube” models for aging and cancer, the deletion of the REV1 gene in combination with long lived mutants (sch9Δ) and transcription factors (eg. gisΔ) led to fewer DNA lesions such as point mutations (trp 1-289 reversions) as compared to the wild type strain. However, larger lesions such as gross chromosomal rearrangements (GCRs) occurred more frequently in REV1 deficient cells,
suggesting that with increasing age, the Rev1 polymerase is essential to preventing large DNA error mutations, but is largely responsible for the increase in base substitutions. Therefore, both Sch9 and the error-prone polymerase Rev1 appear to be responsible for age-dependent genomic instability.

Category: Life Sciences
Name(s): Sarah Takimoto
Submission Type: Individual
Faculty Sponsor(s) and Department(s): John Tower, Molecular and Computational Biology
Format: Laboratory-based Research
Title: The Temporal Effects of Hydrogen Peroxide Exposure on Life Span in Drosophila

Abstract:
The accumulation of oxidative damage by reactive oxygen species (ROS) during aging has provoked much speculation on a possible aging mechanism. Studies have demonstrated extended life span with overexpression of superoxide dismutase (SOD) via a conditioning hormesis response that upregulates many metabolic-related genes. This response is theorized to proceed through a retrograde signal resulting from an increase in the product of SOD, H2O2 (Curtis et al., 2007). H2O2 is known to function as a signaling molecule (Giorgio et al., 2007), and it may be that SOD overexpression and the resultant H2O2 production is stimulating endogenous cellular signaling pathways. Moreover, recent work has suggested a link between the processes of ROS detoxification and circadian rhythms. The circadian clock is known to control the periodicity of many metabolic processes in Drosophila. Previous studies have demonstrated rhythmic expression and activity of redox-regulatory enzymes as well as daily fluctuations in oxidative damage to lipids and DNA (Kondratov, 2007). The primary goal of this study was to investigate the temporal effects of H2O2 exposure on life span in Drosophila based on the circadian rhythm. Our results demonstrated only neutral or negative effects on male life span. However, female life span was extended when H2O2 was administered only during the first ten days of life, or only during the dark period of the circadian cycle. Our findings confirm the ability of H2O2 to extend life span and demonstrate its potential role in restoring normal daily fluctuations in oxidative processes to counteract the mechanisms of aging.

Category: Life Sciences
Name(s): Cara Magnabosco
Submission Type: Individual
Faculty Sponsor(s) and Department(s): Douglas Capone, Biological Sciences
Format: Laboratory-based Research
Title: Utilization of methylphosphonate as a growth substrate for the nitrogen-fixing marine cyanobacterium, Trichodesmium

Abstract:
The earth’s atmosphere is a very abundant source of nitrogen (N2); however phytoplankton and other living organisms cannot utilize N2 until it has been “fixed” by diazotrophs. Throughout the nutrient-poor open ocean, the key player in nitrogen fixation is the marine cyanobacteria Trichodesmium spp., which is responsible for supplying over half of the tropical ocean’s supply of nitrogen used in primary production. Uniquely, Trichodesmium is capable of fixing nitrogen while performing photosynthesis making it an integral part of both the nitrogen and carbon budgets. The dual roles that Trichodesmium plays in both nitrogen and carbon cycling makes it an important and ideal model for examining the constraints of nutrient cycling throughout the marine system. Previously, phosphonates were not considered to be bioavailable to marine
diazotrophs like Trichodesmium, yet recent research, like that of S.T. Dyhrman, has identified phosphorus as a limiting nutrient and key element in nitrogen and carbon cycling performed by Trichodesmium. However, the extent, pathway, and diversity of Trichodesmium’s ability to utilize phosphonates has not been well characterized. Thus this experiment was meant to determine whether or not Trichodesmium is limited to growth on pure phosphonates or if, and to what extent, it can utilize other phosphorus containing compounds.

Title: Vitamin D Deficiency in Tuberculosis Patients and their Family Members
Name(s): Karina Ledezma
Faculty Sponsor(s) and Department(s): Brenda Jones, Department of Infectious Diseases
Submission Type: Individual
Category: Life Sciences
Format: Field Research
Title: Vitamin D Deficiency in Tuberculosis Patients and their Family Members
Abstract:
Tuberculosis is a major global problem, responsible for two million deaths a year. In the preantibiotic era, vitamin D was used to treat tuberculosis, but gradually it became a discontinued therapy with the concern of Ultraviolet Radiation (UV light) and its effects on skin cancer. However, new information about the immunomodulatory properties of 1 alpha, 25, dihydroxy-vitamin D has rekindled interest in vitamin D as an adjunct to the treatment and prevention of tuberculosis. This a pilot study to determine the frequency of vitamin D deficiency in patients with tuberculosis (Tb) disease and latent tuberculosis infection (LTBI). We are hoping find a relationship between the effects of vitamin D levels on TB infected patients, and therefore supply more vitamin D to the family members who are in contact with active TB patients.

Vitamin D is synthesized in the skin during exposure to ultra-violet light and is also available in the diet, primarily from oily fish. It is metabolized in the liver to 25-hydroxy-vitamin D; then further metabolized to its biologically active metabolite, 1, 25-dihydroxy-vitamin D (1).

Vitamin D supplementation might be important for the prevention and treatment of tuberculosis. Patients with active TB who are vitamin D deficient might benefit form vitamin D supplementation. Vitamin D supplements might also prevent persons with latent TB infection from progressive to active TB disease.

Out study will examine information regarding the effects of vitamin supplementation, diet and sun exposure on TB infected patients and their family members.

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**Category:** Physical Sciences & Engineering

**Title:** "The Grand Challenge" - Documenting the SCEC UseIT Interns of 2008

**Name(s):** Andrew Whitesides

**Faculty Sponsor(s) and Department(s):**
Thomas Jordan, Professor Director of Southern California Earthquake Center

**Format:** Creative Work

**Abstract:**
The Undergraduate Studies in Earthquake Information Technology (UseIT), an internship program of the Southern California Earthquake Center (SCEC), brings together a variety of undergraduate students from around the nation in order to help communicate earthquake science and risk reduction. Each summer, the UseIT interns work in collaborative teams to tackle a scientific “Grand Challenge”. The 2008 Grand Challenge presented was to communicate the value and content of the Uniform California Earthquake Rupture Forecast (UCERF) to end-users and the public at large through software development, animation, and digital archiving.

The ability to communicate this new information was also facilitated by the production of this short, seven-minute film illustrating the processes and interactions between each of the intern groups in better communicating the content of the UCERF report. This short film depicts an in-depth look into how the UseIT interns played a central role in enabling and furthering scientific research and education relative to earthquakes.

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**Title:** An Investigation of the Quaking Sun During Different Levels of Solar Activity

**Name(s):** Juan Lora, Patrick McFaddin, Brittney Miller, Jorge Rodriguez, Jin Yoo

**Faculty Sponsor(s) and Department(s):**
Edward Rhodes, Physics and Astronomy

**Format:** Laboratory-based Research

**Abstract:**
This research project is a study of the structure and dynamics of the solar interior through the measurement and analysis of the periodic oscillations of the photosphere of the sun, caused by acoustic waves. One of our objectives has been to determine the relationship between changes in these oscillation frequencies and corresponding changes in the levels of solar activity during the eleven-year solar activity cycle. To research this question, we have been processing observations obtained in 1998, 1999, and 2000 with the Michelson Doppler Imager (MDI) instrument onboard the NASA/ESA SOHO spacecraft. Previous results obtained by the group found an unexpected signature of the frequency changes, and we are interested in
extending those results with data obtained between 1996 and 2001. During the current semester, we have been employing time series for which the missing data points had been replaced with estimated data points using a gap-fitting technique developed at Stanford University. We have generated sets of power spectra from 31 different sets of 3-day time series, and then fit all of the peaks contained within these spectra. Additionally, we have also fit all of these power spectra using both symmetric and asymmetric profiles. Our plans now are to inter-compare these different sets of frequencies and perform linear regression analyses in which we will regress the frequency differences upon the differences in various activity indices. We hope to determine if the slopes of these analyses will fall midway between our 1996 and 2001 results, and whether or not our use of the gap-filling routine has resulted in less-noisy analyses.

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**Title:** Applying Machine Learning Techniques to Problems on a Robotic Sensor Network

**Name(s):** Prateek Tandon

**Faculty Sponsor(s) and Department(s):** Milind Tambe, Computer Science

**Submission Type:** Individual

**Abstract:**
My work focuses on applying machine learning techniques to better solve Distributed Constraint Optimization Problems (DCOPs) on a robotic sensor network. A DCOP involves maximizing global properties on a network of agents utilizing local constraints on agent pairs and local actions. Many algorithms exist that address solving the DCOP within certain bounds. The test bed we have is a robotic sensor network of iCreates where the robots are utilizing local, small scale movements to maximize the signal strength over the entire network given a time horizon. When applying DCOP algorithms to the robotic sensor network, we notice that the algorithms have different properties and perform optimally under different parameter settings. Some algorithms perform better on certain graph types (i.e. full, chain), with different numbers of robots, and for different time horizons than others.

My goal is to apply machine learning techniques to mine information about the nature of parameter spaces on our robotic sensor network. Knowing about which algorithms perform better on different parameter spaces can help us do two things. First, we can use learned information to predict which algorithm would be best to use on a new parameter space. Second, we can construct hybrid algorithms that take into account the situations in which each existing algorithm performs optimally. I have a couple such hybrid algorithms in the work that show promise for beating the performance of the even best DCOP algorithms on the robotic sensor network problem today.

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**Title:** Assessment of Online Student Discussions through Speech Acts Analysis

**Name(s):** Meera Srinivasan

**Faculty Sponsor(s) and Department(s):** Jihie Kim, USC Information Sciences Institute

**Submission Type:** Individual

**Format:** Analytical Paper

**Abstract:**
As web-enhanced and distance education approaches become increasingly integrated in engineering courses, discussion boards offer a promising avenue for supporting collaborative interaction and reflective problem solving. However, existing systems...
for on-line discussion are often not fully effective in promoting learning in undergraduate courses, and pedagogical interventions can be necessary to keep collaborative discussions focused and productive. Pedagogical Discourse is a study aimed at scaffolding and assessing student interactions within online discussion boards. We are working to develop software tools that aim to support instructors handling many student requests and questions. Initial analysis of roles individual messages play in student discussion is currently done by human annotation of key cues and phrases, a process we aim to soon automate. Annotating is done through speech acts, which define roles that a message plays with respect to previous messages. This paper discusses the challenges that we currently face as we analyze discussions and annotate common phrases.

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**Title:** Comparison of Solar Internal Dynamics using Ground- and Space-Based Observations  
**Name(s):** Benedikt Riedel  
**Faculty Sponsor(s) and Department(s):** Edward Rhodes, Physics and Astronomy  
**Submission Type:** Individual  
**Category:** Physical Sciences & Engineering  
**Format:** Laboratory-based Research  
**Abstract:**
One of the primary goals of modern solar physics is an improved understanding of the mechanism underlying the solar activity cycle, which is essential in order to develop improved methods for predicting solar activity. Solar activity is thought to originate within the convection zone in the outer interior of the sun. The generally-accepted theoretical models of solar activity involve a complicated interplay between zonal (East-West) and meridional (North-South) flows and vertical convection motions—the Dynamo Model. Within the past five years the tools of local helioseismology have been used to produce the first subsurface flow maps during Solar Cycle 23.

Our project focuses on the measurements of the meridional and zonal flow patterns at different depths during Solar Cycle 22. Our primary contribution lies in the investigation of a possible instrumental misalignment at the 60-Foot Solar Tower at Mt. Wilson Observatory (MWO) and an increase in capacity to process MWO and SOHO Michelson Doppler Imager data. This paper presents the analysis of the observed misalignment of the MWO and flow patterns produced using corrected data. We have compared images taken during the transition between Solar Cycle 22 and 23, to develop a difference in flows between cycles and develop a correction for the instrumental misalignment.

Our goal is to increase the accuracy of the correction and number of flow maps for Solar Cycle 22. These results will allow us to analyze solar internal flows back to the beginning of the MWO observations in 1988.

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**Title:** Comparison of the Biocatalytic Ability of Shewanella Strains in the Reduction of Hexavalent Chromium  
**Name(s):** Shelly Masuda  
**Faculty Sponsor(s) and Department(s):** Massoud Pirbazari, Civil and Environmental Engineering  
**Submission Type:** Individual  
**Format:** Laboratory-based Research  
**Abstract:**
This work explores the bioremediation of hexavalent chromium in microbial fuel cells (MFCs) with the evaluation of the Shewanella genus as biocatalysts for the cathode. Recent studies have indicated that various Shewanella strains differ in power production when placed at the anode. In
previous MFC studies, employing MR-1 at the anode required an inorganic catalyst to drive the oxygen reduction reaction at the cathode. The use of such catalysts, such as platinum, is costly and limits the variety of electron acceptors that can be utilized. S. oneidensis MR-1 has been chosen for use at the anode because of its established role as an anodic biocatalyst. Evaluation of strains at the cathode included S. oneidensis MR-1, S. species MR4, S. species W3-18-1, S. species ANA3, S. iohica PV-4, and S. amazonensis SB2B. Strains were evaluated on relative power output and coulombic efficiencies as well as the ability to reduce Cr (VI) to low ppb levels. High performance liquid chromatography was used to identify organics and metabolites produced in the anodic compartment while ion chromatography was used to quantify Cr (VI) levels in the cathodic supernatant. Additionally, electron micrographs of electrode surfaces show the efficiency of biomass attachment and biofilm growth.

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Category: Physical Sciences & Engineering
Name(s): Leah Wickstrom
Submission Type: Individual
Faculty Sponsor(s) and Department(s):
Najmedin Meshkati, Civil and Environmental Engineering
Format: Analytical Paper
Title: David Besse 2002: Examining Safety Culture in the Nuclear Energy Industry

Abstract:
The U.S. Nuclear Energy Industry has been fortunate enough to only experience near-miss accidents. Unfortunately, the two most prominent ones—Three Mile Island & Davis-Besse—were completely preventable. The incidents didn’t occur because of a technical foul up, but rather were the product of human error. At Davis-Besse Nuclear Plant located in Toledo, Ohio the assignable cause of the second biggest near-miss accident was an absent Safety Culture within the utility organization. The near accident at Davis-Besse had far reaching implications in both plant culture and regulation. The reactor with a hole in its head became the poster boy in the rally which declared Safety Culture as a key factor in overall organizational health. Safety Culture is often dismissed as a performance parameter because it cannot be readily measured or quantified. However, in the midst of technological advances that occur at the speed of light, it is critical that we remember who continues to run and maintain technology. Human knowledge is fallible and human greed is pervasive. It is important that each is checked by an organizational system that puts the safety of the public above all else. Luckily, it didn’t take an accident for the Nuclear Industry to heighten their sensitivity to the reality of innate human fallibility—it only took an almost accident.

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Category: Physical Sciences & Engineering
Name(s): Ashley Maker
Submission Type: Individual
Faculty Sponsor(s) and Department(s):
Andrea Armani, Chemical Engineering and Materials Science
Format: Laboratory-based Research
Title: Design and Fabrication of Waveguide Sensors

Abstract:
Despite continuous advances in the medical and pharmaceutical fields, an immense need remains for biosensors – devices capable of accurate detection and analysis of biological and chemical analytes at nanomolar concentrations. If made widely available, biosensors could dramatically improve medical research, food/water supply monitoring, and the quality of healthcare in developed and rural areas worldwide. Unfortunately, existing biosensing methods have significant disadvantages and limitations. Fluorescent-
based techniques require complex probes and detection instrumentation which are not suitable for environments outside the laboratory. Current optical waveguides lack the high interaction length and low optical loss required for the high-sensitivity, low-detection limit measurements in biological applications.

To overcome these problems, the Armani group is utilizing silica’s inherently low optical loss to develop a silica waveguide with greater interaction length for significantly improved sensitivity and detection limits. The development cycle of the silica waveguide has three major steps: design, fabrication, and characterization. Simulations are used to design the size, configuration, and geometry of the waveguide to optimize the interaction length and minimize optical loss. Various configurations, including linear, bent, and spiral designs, are under investigation. The waveguides are fabricated on SiO2/Si wafers using standard photolithographic techniques. To characterize the loss of these devices, the waveguides will be integrated with fiber v-grooves and coupled to tunable lasers with wavelengths ranging from the visible through the near-IR. We are currently in the process of fabricating and characterizing the silica waveguides and will have more results in the coming months.

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Category: Physical Sciences & Engineering
Name(s): Christine Epperson
Submission Type: Individual
Faculty Sponsor(s) and Department(s): Emine Boz, Postdoctoral Fellow; Andy Y Chang, Pediatrics; Travis J. Williams, Locker Hydrocarbon Institute
Format: Laboratory-based Research
Title: Development of a Smart MRI Contrast Agent for Pediatric Imaging
Abstract: We are developing “smart” MRI contrast agents. Particularly, we’re interested in a diagnostic tool to test for the presence of vesicoureteral reflux, the improper flow of urine from the bladder, through the ureter, to the kidneys. Vesicoureteral reflux can cause kidney infection, scarring, renal failure, and the need for dialysis, kidney transplant, or necessitate reimplantation of the ureter-ureteroneocystostomy. Between 200,000 and 400,000 children are diagnosed with vesicoureteral reflux every year in the U.S. The gold standard for diagnosis is the voiding cystourethrogram (VCUG), which entails catheterization. Catheterization is extremely traumatic for children and their parents. This has led physicians to limit the number of diagnostic tests that are given and to seek a non-invasive alternative.

In an interdisciplinary collaborative effort to solve this issue, urologist Dr. Chang and chemists Dr. Williams, Dr. Boz, and I are synthesizing paramagnetic nanoparticles that consist of a masked MRI contrast. We envision that the particle will enter the bloodstream and, through natural excretion, arrive in the bladder. Once in the bladder, the MRI agent will be activated. We are unaware of any current technology that matches this description. Any backflow of urine will then be made evident through MRI. This diagnostic agent will allow children with vesicoureteral reflux to be properly diagnosed and monitored in a catheter free manner.

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Category: Physical Sciences & Engineering
Name(s): Ryan Berti
Submission Type: Individual
Faculty Sponsor(s) and Department(s): Thomas Jordan, Earthquake Center
Format: Laboratory-based Research
Title: Earthquake Shake Velocity Visualization
Abstract: Visualization of complex data has the ability
to convey large amounts of complex information simultaneously. This is the case with earthquake visualizations where the process involved is daunting, yet the output is elegant and informational.

Supercomputers are used to calculate the millions of vectors that represent earthquake velocity over time, a process that would take a single processor thousands of hours. These sets of files are then displayed and updated on a timer to show the “shake” waves produced by an earthquake. Screen shots are taken at every time step and strung together to produce an informational video individual to an earthquake.

The visualization of velocity data during an earthquake is informative on different levels. To students it shows the magnitude of an earthquake and the propagation of its “shake” velocity across a topography. To geologists, the visualization of “shake” data highlights contrasting regions of the earth’s crust and their response to the quake. To engineers, visualization of large data sets is a matter of efficiency and can be preformed in many ways with differing algorithms. To all, earthquakes are a natural phenomena with the potential to do huge amounts of damage to our daily lives. The more we know about them, the better.

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**Title:** Earthquake triggering and interaction at a shear zone off Eureka, California

**Name(s):** Chris Rollins

**Faculty Sponsor(s) and Department(s):** Charles Sammis, Earth Sciences

**Format:** Analytical Paper

**Title:** Earthquake triggering and interaction at a shear zone off Eureka, California

**Abstract:**
The Gorda deformation zone, a region of tectonic shear off the coast of northernmost California, has been the site of 15 M>5.9 earthquakes since 1980, the highest rate of large earthquakes in the lower 48 states. These earthquakes have occurred on a diverse array of faults which features five different fault orientations within 100 km. Our study of the Gorda deformation zone hinges on the hypothesis that an earthquake imparts changes in stress to the surrounding crust which increase or decrease the stress on nearby faults depending on their orientation, thus affecting the likelihood of nearby future earthquakes. We calculate the distribution of static stress changes imparted by each M>5.9 earthquake since 1980 and determine whether they are correlated with the locations and focal mechanisms of subsequent earthquakes. We find that this correlation has occurred at a high rate for earthquakes separated by less than one year: four of the fifteen M>5.9 earthquakes occurred at locations where static stress was significantly increased by earthquakes less than one year prior. An additional three earthquakes occurred on faults which were favored to rupture by an earthquake 11 years prior. We also find that a M=7.3 earthquake in 1980 imparted a stress decrease on all nearby left-lateral faults which is consistent with an absence of large earthquakes within 75 km for at least 15 years. That earthquake also imparted stress increases on a fracture zone and subduction zone which are consistent with increased seismicity rates on each.

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**Title:** Easy Synthesis of Pure Chiral Aminophosphonic Acids and Derivatives

**Name(s):** Gabriel Inda

**Faculty Sponsor(s) and Department(s):** Surya Prakash, Chemistry; Sergio Meth, Chemistry; George Olah, Chemistry

**Submission Type:** Individual

**Format:** Laboratory-based Research

**Title:** Easy Synthesis of Pure Chiral Aminophosphonic Acids and Derivatives
Abstract:
The main goal of this project is to find an efficient synthetic route to the production of enantiomerically pure α-aminophosphonic acids and their derivatives. In particular we would like to find routes to fluorne containing derivatives. These α-aminophosphonic acids and their derivatives have multiple applications, many of which are in the biological field. The phosphonic acid group serves as a good transition state analog for several enzymes, meaning that these compounds could serve as effective inhibitors. There is also evidence that they are effective as antibiotic agents. One of the secondary goals of this project is to create catalytic antibodies for the synthesis of these compounds by injecting these compounds into living biological specimens and recovering the products (catalytic antibodies) of their immune responses.

As of right now we are researching synthetic techniques in the literature and either combining certain aspects from different procedures or modifying existing procedures in order to come up with efficient synthetic routes. We hope to be able to find an efficient, low cost synthetic route to enantiomerically pure compounds to create a library that will be available for biological and pharmaceutical tests.

Category: Physical Sciences & Engineering
Name(s): Elizabeth Parks
Submission Type: Individual
Faculty Sponsor(s) and Department(s): Tzung Hsiai, Biomedical Engineering & Cardiovascular Medicine

Title: Electrocardiograms to Study Post-Ventricular Amputation of Zebrafish Heart

Abstract: The zebrafish (Danio rerio) is an emerging model for cardiovascular research. The zebrafish heart regenerates after 20% ventricular amputation. However, assessment of the physiological responses during heart regeneration has been hampered by the small size of the heart and the necessity of conducting experiments in an aqueous environment. We developed a methodology to monitor a real-time surface electrocardiogram (ECG) by the use of microelectrodes, signal amplification, and a low pass-filter at a sampling rate of 1 KHz. Wavelet transform was used to further remove ambient noises. Rather than paralyzing the fish, we performed mild sedation by placing the fish in a water bath mixed with MS-222 (tricane methanesulfonate). We recorded distinct P waves for atrial contraction, QRS complexes for ventricular depolarization, and QT intervals for ventricular repolarization prior to, and 2 and 4 days post amputation (dpa). Sedation reduced the mean fish heart rate from 149±18 to 90±17 beats/min. The PR and QRS intervals remained unchanged in response to ventricular apical amputation (n=6, P > 0.05). Corrected QT intervals (QTc) were shortened 4 dpa (n=6, P < 0.05). In a parallel study, histology revealed that apical thrombi were replaced with fibrin clots and collagen fibers. Atrial arrhythmia was noted in response to prolonged sedation. Unlike the human counterpart, ventricular tachycardia or fibrillation was not observed in response to ventricular amputation 2 and 4 dpa. Taken together, we demonstrated a minimally invasive methodology to monitor zebrafish heart function, electrical activities, and regeneration in real-time.
Emanation Rates of Radon and Radium from Coastal Sands: A tool for estimating seawater circulation rates through permeable sediments

Name(s): Harris Talsky
Faculty Sponsor(s) and Department(s): Douglas Hammond, Earth Sciences
Submission Type: Individual
Format: Laboratory-based Research
Abstract:
Naturally occurring radon and radium are useful tracers for determining mixing rates in coastal waters, if their release rate from coastal sands can be defined. The mechanism releasing most radon and radium is recoil of the isotope during the alpha decay of the parent, often called emanation. My objectives were to (1) measure emanation rates for 222Rn, 223Ra, and 224Ra, (2) determine their efficiencies of emanation (emanation rate/total production), and (3) evaluate reasons for differences in efficiencies. My findings indicate the measured efficiencies for these sands to be 2-10%. The variations in efficiencies are due to complex factors. First, 223Ra emanation efficiency is greater than that of 222Rn. This is most likely due to the chemistry and half-life of the parent isotopes. In the 238U decay chain intermediate isotopes are somewhat soluble and are lost before 222Rn is produced by alpha decay, whereas for the 235U decay chain producing 223Ra, the intermediate isotopes are virtually insoluble. The loss of intermediates leaves relatively less of the 222Rn parent available to cause emanation. Second, 224Ra emanation efficiency is comparable to that of 222Rn, as predicted from simple recoil models. Finally, it is likely that grain size plays a role in emanation efficiency of all isotopes, which will be a topic for future research.

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Examination of a volcanic-plutonic contact in a magmatic arc crustal section

Name(s): Holly MacGillivray
Faculty Sponsor(s) and Department(s): Scott Paterson, Earth Sciences
Submission Type: Individual
Format: Senior Honors Project
Abstract:
Much of Mongolian geology represents a large collage of collided crustal and oceanic fragments, called the Central Asian Orogenic Belt. In the remote southwestern corner of Mongolia, the Gobi Tienshan Intrusive Complex (GTIC), one of these collided fragments, represents a tilted magmatic arc crustal section from the paleo-surface to 12 km depth. I focused on mapping the surface volcanic sequence and sub-volcanic plutons in this section and examined samples collected along transects across their contact believed to be an intrusive relationship along the eastern contact and a gradational relationship in grain size and composition along the southern contact. Two main subvolcanic rock types are rapikivi porphyries and K-feldspar rich syenogranites. The syenogranite was compositionally similar, but displayed grain characteristics that implied a faster cooling period which is consistent with their structural concordance with the adjacent volcanics. Similar compositions over a range of grain size suggest similar source magmas of both the subvolcanics and some volcanics. Whole rock geochemical analyses displayed that the volcanic unit has multiple sources over time, including, but not limited to, the currently exposed subvolcanic chamber. However, rare earth element patterns display similarities between the subvolcanic and volcanic units, possibly indicating a geochemical filtering process in the subvolcanic system which may have implications for the conceived impact of subvolcanic chamber processes on volcanic geochemistry. Isotopic data shows us that
crustal sources are tapped throughout the complex including the subvolcanics and volcanics, providing evidence for a continental margin tectonic setting for the GTIC.

Category: Physical Sciences & Engineering
Name(s): Meredith Hankins
Submission Type: Individual
Faculty Sponsor(s) and Department(s):
Kristian Jessen, Mork Family Department of Chemical Engineering and Materials Science
Format: Laboratory-based Research
Title: Experimental Investigation of Non-Wetting Phase Entrapment In Counter-Current Subsurface Flows

Abstract:
As the effects of CO₂ emissions on global warming have become better understood, efforts have been made to capture emissions from point sources, such as coal-fired power plants, and “trap” the CO₂ below-ground, in saline aquifers. Although computer simulations are routinely performed to estimate how much CO₂ can be immobilized in aquifers, many of the existing simulations assume co-current flow, when the injection of CO₂ into an aquifer should actually result in counter-current flow, as buoyancy causes the CO₂ to move upwards. Accordingly, experimental observations are needed to ensure that the simulations are accurate.

In order to validate the counter-current computer simulations being run by a graduate student in the department, a column was designed and built for experimentation. First, the absolute permeability and porosity of the bead packs was determined. Next, iso-octane (IC₈, used as a substitute for CO₂) and brine (wetting phase) were injected into the glass beads in order to mimic more closely the actual subsurface conditions of a saline aquifer. Imbibition and drainage curves are now being created by injecting varying fractional flows of IC₈ (non-wetting “CO₂” phase) and brine (wetting phase). From this, the relative permeabilities will be determined. Concurrently, the saturation profiles are being investigated using resistivity measurements along the column. Next, the effects of capillary pressure and capillary trapping will be investigated.

The goal of this research is to contribute to a better understanding of CO₂ immobilization in saline aquifers by experimentally confirming counter-current simulations.

Category: Physical Sciences & Engineering
Name(s): Joseph Lubinski, Kedar Naik
Submission Type: Group
Faculty Sponsor(s) and Department(s):
Tait Pottebaum, Aerospace and Mechanical Engineering
Format: Laboratory-based Research
Title: Heat Transfer from a Cylinder undergoing Streamwise Oscillations in a Cross-flow

Abstract:
Cross-flow heat exchangers are widely used in heating and cooling applications. These devices are comprised of long tubes embedded in a moving fluid. Though designed to remain steady, unanticipated external forces often cause the tubes to experience some type of oscillatory motion. The resulting heat transfer within the heat exchanger is different from its design intent. Indeed, fully understanding the physics behind the heat loss from a cylinder will allow more efficient heat exchangers, which either dampen this oscillation or take advantage of it, to be engineered.

To reduce the scope of this multifaceted problem, the goal of the present study was limited to exploring the effects of streamwise oscillations (parallel to the freestream) on the heat transfer from a
A set of experiments was conducted to investigate the effects of streamwise oscillations on the heat transfer from a cylinder in a cross-flow. The study was performed in a heat transfer water tunnel using a Reynolds number of 747. The convective coefficient of heat transfer was calculated for 77 distinct oscillation conditions. Notable enhancements in heat transfer were observed while driving the cylinder at the Strouhal frequency and its second harmonic. A dependence on the amplitude of oscillation was seen as well. The experimental results were discussed and used to make recommendations for future study, with specific attention given to considerations of peculiarities in the wake structure.

### Category: Physical Sciences & Engineering

**Name(s):** Marie Anne Cuevas

**Submission Type:** Individual

**Faculty Sponsor(s) and Department(s):** Richard Brutchey, Jr., Chemistry

**Format:** Laboratory-based Research

**Title:** Low Temperature Synthesis of Perovskite Nanocrystals and their Applications to Nanocomposite Dielectrics

**Abstract:**
Perovskites exhibit a wide range of electrical properties with applications such as piezoelectric transducers and high-power density capacitors. Traditionally, perovskites are synthesized through high-temperature, solid-state routes; however, the successful low-temperature synthesis of perovskite nanocrystals is necessary for incorporation into future miniaturized technologies.

Our research focuses on the low-temperature synthesis of the BaTiO₃ and SrTiO₃ perovskite nanocrystals. BaTiO₃ is one of the most significant ferroelectric materials due to its high dielectric constant and SrTiO₃ is often mixed with BaTiO₃ to create BaₓSrₓTiO₃; varying the Ba: Sr ratio can tune dielectric properties.

A low-temperature synthesis of BaTiO₃ nanocrystals has recently been discovered which produces well-defined, 6-nm nanocrystals of BaTiO₃ at room temperature through the vapor diffusion of water into a BaTi(O₂C₄H₉)₆ solution. Hydrolysis at the vapor-solution interface leads to nucleation and nanocrystal growth. We have extended this approach to SrTiO₃ nanocrystal synthesis, and have produced well-defined 6-nm nanocrystals of both SrTiO₃ and BaₓSrₓTiO₃ at 80 °C. Dielectric measurements of the solid solutions are currently in progress.

Our work has also been applied to the production of BaTiO₃-polyimide nanocomposites for high-power density thin film capacitors. The BaTiO₃ nanocrystals were surface-functionalized with n-hexylphosphonic acid to improve dispersability in the polymer matrix. Preliminary data shows that the dielectric strength (210 MV m⁻¹) of the polymer is unaffected by 10 vol% nanocrystal incorporation – suggesting good dispersion. Alkyl chain end modification of the phosphonic acids with azide groups is currently in progress to provide an avenue for “click” chemistry with extensions to SrTiO₃ and BaₓSrₓTiO₃ nanocomposite incorporation.

### Category: Physical Sciences & Engineering

**Name(s):** Thomas Cummins

**Submission Type:** Individual

**Faculty Sponsor(s) and Department(s):** Richard Cote, Pathology

**Format:** Laboratory-based Research

**Title:** Microfilter Device for Tumor Cell Capture
Abstract:
Early stage cancer detection is now possible using a novel microfilter technology. Size-based separation of circulating tumor cells from other cells in blood has many times the sensitivity of today’s leading detection methods. This technology is being developed in Dr. Richard Cote’s lab at the Keck School of Medicine here at USC. While working in Dr. Cote’s lab, I helped develop this novel technology into one that is now undergoing full clinical trials and will potentially become commercialized in the near future. As amazing of a technology as this filter was, the device that housed it and facilitated the processing was difficult to assemble and malfunctioned frequently. The majority of time spent processing each clinical sample was dedicated to assembling and disassembling the housing device. I designed and oversaw the manufacturing process for the new microfilter-housing device. This new design has become the standard device used in this multinational research project because of how efficient it has made processing the clinical samples. Labs in the Netherlands, Germany and at Sloan-Kettering Cancer Center in New York will be using the new filter device based on my prototype design as part of an ongoing R01 grant.

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Title: Molecular Dynamics Simulations of Silica Glass Crack Propagation
Name(s): Dayton Thorpe
Faculty Sponsor(s) and Department(s): Aiichiro Nakano, Computer Science and Physics and Astronomy
Format: Laboratory-based Research
Abstract:
Silica is the primary molecule in most forms of glass. A well-documented but poorly understood characteristic of silica glass is that the presence of water significantly reduces silica’s structural integrity. In dry samples of silica under a critical stress value, the silicon-oxygen bonds are stable. However, when moisture builds up on the surface, even if little stress is applied, Si-O bonds will spontaneously break. Under stress, Si-O bonds near water break at a much faster rate than those in dry samples. Understanding the chemical reactions that cause this failure of silica glass is an important challenge to materials scientists. Current theories do not closely match experimentally observed rates of reaction. This study compares molecular dynamics simulations of crack propagation in wet and dry samples of silica glass to determine which chemical reactions account for the difference in crack propagation rate. Once it is known why water accelerates the rate of reaction, modifications can be made to the structure of glasses to slow crack propagation.

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Title: Nanoparticle-Coated Filters for Providing Safe Water For All Nations
Name(s): Mariah Gill, Hannah Gray, Cara Magnabosco
Faculty Sponsor(s) and Department(s): Massoud Pirbazari, Civil and Environmental Engineering; Roger Ravindran, Civil and Environmental Engineering
Submission Type: Group
Abstract:
The United Nations and World Health Organization have recognized the intense need to provide biologically-safe drinking water for impoverished people in developing nations across the globe. Our research addresses this issue by studying the colloidal silver nano-deposition on ceramic filters for providing bacteria-free water. Although these ceramic systems are considered capable of removing pathogenic bacteria, our research has demonstrated that they are often fragile, temperamental
and ineffective. They harbor indigenous microorganisms and can remove as little as 30% of pathogens. Our work investigates the deficiencies of ceramic pots and candle filters in removing Escherichia coli (E. coli) bacteria, commonly used as indicator organisms for establishing biological purity of potable waters. It evaluates the transport and filtration of E. coli through ceramic filters with and without nano-coatings of colloidal silver, assesses other invasive microbial species in filters that contribute to contamination, and examines the biocidal activity of colloidal silver nano-coatings for bacterial disinfection. In general, colloidal silver coatings greatly improve the ability of the filter to remove bacteria and provide safe water. Furthermore, the study evaluates the cleanability and maintenance of ceramic filters using three cleaning methods, and the effect of flow rate on filtration efficiencies for bacterial removal. Our presentation shall include results from scanning electron microscopy for observing the pore-structure and morphology of ceramic materials, and x-ray energy dispersion spectroscopy for determining elemental compositions of nano-deposits.

Title: Pioneering a digital archive for the importation, preservation, and accessibility of Southern California Earthquake Center records
Name(s): Brittney Miller
Faculty Sponsor(s) and Department(s): Thomas Jordan, Earth Sciences
Submission Type: Individual
Category: Physical Sciences & Engineering
Format: Creative Work
Title: Pioneering a digital archive for the importation, preservation, and accessibility of Southern California Earthquake Center records
Abstract: As computer-based technology is readily becoming more available and digital material is continuously being created, the need for a digital library emerges. The purpose of the digital library for the Southern California Earthquake Center (SCEC) is to communicate the Uniform California Earthquake Rupture Forecast (UCERF), Version 2 report, as well as to digitally preserve its contents and related materials. SCEC’s digital library was created during the summer of 2008 and is supported by the University of Southern California (USC) Libraries system, from which assets and metadata records are accessible to the public. An asset is a document or item that is to be digitally archived in one or many formats and is described by a metadata record. A metadata record is a brief overview that includes such information as a title, the author(s) name(s), the extraction of the asset’s key concepts, and the internal and external review necessary to preserve the integrity of the asset itself. The retrieval of pertinent information from an asset is required to prepare an accurate description of the document at hand. Internal review among the archiving individuals, as well as the collaboration with the authors and other persons familiar with the materials, ensure an honest representation of the assets being digitally archived. Currently, the digital library consists of over 200 metadata records of the UCERF report, which are very near to publishing after intensive editing and revision during the past academic year.

Title: Positive Train Control - The Answer to the Rail Safety Calamity
Name(s): Leslie Koehn
Faculty Sponsor(s) and Department(s): Najmedin Meshkati, Dept. of Civil/Environmental Engineering and Dept. of Industrial and Systems Engineering
Submission Type: Individual
Category: Physical Sciences & Engineering
Format: Analytical Paper
Title: Positive Train Control - The Answer to the Rail Safety Calamity
Abstract: In the fall of 2008 Southern California witnessed the worst rail travesty in recent memory when a Metrolink train collided
head on with a freight train killing twenty-five people in Chatsworth. This catastrophic calamity could have been avoided had Metrolink employed new state-of-the-art Positive Train Control (PTC) Technology. This technology has been thrown around the rail industry for the past twenty years and has recently become not only a reality, but a feasible cost effective safety alternative. It may seem strange that more rail companies do not have this vital safety technology, but unfortunately there are many issues standing in the way of fully integrated PTC implementation. It may seem most of the opposed arguments to PTC lack validity and substance.

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Category: Physical Sciences & Engineering
Name(s): Panthong Wangperawong
Submission Type: Group
Faculty Sponsor(s) and Department(s): Michael Crowley, Computer Science
Format: Field Research
Title: Project Mind Ctrl - Increasing Accessibility to the Computer and Internet
Abstract:
The computer and internet is increasingly becoming beneficial resource in people's lives. However, due to necessary motor capabilities, people with disabilities may not have access to the computer and internet. This concern gave rise to Project Mind Ctrl, which consist of software that allows a neural impulse actuator (NIA) device to control mouse movement, desktop user interface that allows users to select applications to be enlarged, and a Firefox add-on that allows user to select links with less proximity. Through the use of Project Mind Ctrl software and the NIA device, people are able to navigate the computer with their minds.

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Category: Physical Sciences & Engineering
Name(s): Hubert Lau, Balyn Zaro
Submission Type: Group
Faculty Sponsor(s) and Department(s): Surya Prakash, Chemistry
Format: Laboratory-based Research
Title: Solvent-Free, One-Pot Synthesis of Alpha-Aminonitriles Using Acid Catalysts
Abstract:
Alpha-Aminonitriles, precursors of alpha-aminoacids, are important classes of compounds that show interesting pharmaceutical and therapeutic properties. Use of metal based reagents and catalysts for the synthesis of these compounds are undesirable in pharmaceutics. A successful one-pot, three-component Strecker reaction of a series of aldehydes and a few ketones has been achieved using trifluoroethanol, hexafluoroisopropanol, and silica supported tetrafluoroethanesulfonic acid as metal-free acid catalysts. These reactions are simple, clean and minimal work up-purification steps are required. Products are obtained in high yield and high purity.

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Category: Physical Sciences & Engineering
Name(s): Henry Yuen
Submission Type: Individual
Faculty Sponsor(s) and Department(s): Aiichiro Nakano, Computer Science and Physics and Astronomy
Format:
Title: Spatio-Temporal Event Miner: Atomistic Event Detection from Graph Time Series
Abstract:
Large datasets are commonly found in molecular dynamics (MD) simulations, which model materials as a set of atoms and provide atomic coordinates and velocities as a function of time. State-of-the-art MD simulations generate a time
series of graphs consisting of multibillion nodes (atoms) and edges (bonds between atomic pairs), and it is a challenge to extract information from such simulation results.

We have developed a Spatio-Temporal Event Miner (STEM) framework that automates the process of knowledge discovery in MD simulations. Given a definition of an atomistic event provided by material scientists, STEM correlates spatio-temporally proximate atomistic events into macro-events, which are likely regions of interest for the material scientists. To reduce the search space of potentially significant events, we have designed a Quality Threshold (QT) clustering algorithm.

We present the application of STEM to a 1536-atom dataset generated from MD simulation of silica glass under shear deformation. Here, the atomistic event is defined as a sharp drop in the stress time-series for each atom, and our STEM framework identifies clusters of atoms in “interesting” space-time regions and visualizes them. To quantify the significance of the clusters, we compare the degree of non-affine transformation (which signifies plastic deformation) of each cluster region with that of the total system. The cluster regions are found to exhibit much greater non-affine shear deformation than the total system average, indicating greater plastic activities in those space-time regions.

### Abstract:

**Background:** An extensive survey of current and future energy storage technologies was completed with a focus on different types of batteries. Battery technologies including but not limited to lead acid, lithium ion, silver zinc, and nickel cadmium were studied in addition to other current alternative energy storage technologies such as compressed air energy storage, flywheels, and pumped hydro. Future technologies such as MIT’s water hydrolysis or Stanford’s nanowire lithium ion battery are also included. A table compares the relative strengths, weaknesses, and applications of the energy storage technologies. Then the role of these technologies within the categories of grid energy, automobiles, and portable electronics are explored. The role of the new administration and the economic stimulus package is also examined.

**Conclusions:** Batteries and other energy storage advances do not follow any rule or law (such as Moore’s Law) so changes can happen quickly or lag. It seems that the portable electronic and automobile industries will continue to rely on batteries such as lithium ion or silver zinc. Grid energy storage is much more complicated as it can be solved on a micro (individual houses storing energy) or macro level (power plants storing energy). Either way, grid energy will probably depend on batteries while exploring new technologies with a focus on MIT’s hydrolysis project. The overall trend should be gradual improvements in all battery technologies. Eventually, there will be a breakthrough that hits the market (like MIT’s hydrolysis) that will revolutionize energy storage.
Research has recently shown that Los Angeles is denser than New York City and Chicago. The geography of Los Angeles has allowed the area to develop a high flat density instead of New York, Boston, Chicago, or other old growth cities. In order to improve congestion and increase mobility, the Los Angeles Taxi system needs to be put into consideration. Los Angeles has a franchised Taxi system that is inefficient for the mobility needs of the resident because it does not allow every taxi service within the county to pick up customers within any of Los Angeles County’s 88 cities. This paper will evaluate the problem and recommend alternative resolutions to increase the mobility of Los Angeles County by evaluating systematic alternatives that could increase mobility and allow taxi’s to play a vital role in a multi-modal solution for Los Angeles’ congestion problems.

In the application of the quasi-steady-state approximation, it is generally assumed that there is an initial transient during which the substrate concentration remains approximately constant while the complex concentration builds up. In this project, we address the assumption that the substrate concentration does not change significantly during this initial transient and name it the reactant stationary approximation. For the single enzyme, single substrate reaction, the reactant stationary approximation is generally considered a sufficient condition to apply the quasi-steady-state approximation. Studying the dynamic behavior of this reaction with an initial complex concentration, we show that the quasi-steady-state approximation and reactant stationary approximation are two available for many medical diagnoses. One of the problems is that strain is non-uniformly distributed, making it difficult to measure properly. The aim of this project is to produce a small, implantable device that can measure strain within the environment of a living organism. A photolithographic process was used to create the features of the device, which was then encapsulated in a medical-grade silicon polymer to enable safe implantation. The device is being tested on cats whose bladder control functions have been disabled. Positive results may lead to future testing and applications in other areas such as the skin, stomach, or even the eye.
separate approximations. We discuss the
consequence of this result for the
determination of reaction parameters in
enzyme catalyzed reactions.

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Category: Physical Sciences & Engineering
Name(s): Jeannette Chang, Jonathan Chang
Submission Type: Group
Faculty Sponsor(s) and Department(s):
Shrikanth Narayanan, Electrical Engineering
Format: Laboratory-based Research
Title: Understanding Differences between
Child-Human and Child-Computer
Interactions
Abstract:
As technology use has become prevalent
among young children, improving the
quality of child-machine interactions has
become a topic of increasing significance.
Successfully integrating machines into
useful applications, however, requires that
we understand the differences between
child-human and child-computer
interactions. Analyzing these dissimilarities
give us insight into how to design
more natural and effective machines. It
may also shed light on child psychology
and the intrinsic advantages of child-
computer interactions for certain
applications. We have collected a rich
audiovisual corpus with about 50 subjects
aged 4-6 years. In the data we consider,
each subject interacts with both a human
moderator and embodied computer agent
in briefing and debriefing sessions. We
hypothesized that we could differentiate
between these child-human and child-computer
interactions using visual,
auditory, and lexical cues. The cues range
from visual cues,
such as head orientation and hand
gestures, to lexical cues, such as richness of
vocabulary. We annotated these
multimodal cues with time stamps for both
types of interactions. We plan to extract
information from our annotations and run
tests to determine which of these cues are
most significant in determining the differences
between child-humans and child-machines.
Eventually, we hope extend
our research to help us design better child-
machine interfaces, including those
targeted to children with cognitive
impairments.

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Category: Physical Sciences & Engineering
Name(s): Sharla Shimono
Submission Type: Individual
Faculty Sponsor(s) and Department(s):
Scott Paterson, Geological Sciences
Format: Field Research
Title: U-Pb Zircon Age Constraints on the
Tectonic Evolution of the Northern
Margin of the North China Craton
and Southern Margin of the Central
Asian Orogenic Belt
Abstract:
The Precambrian North China Craton (NCC)
is the old continental core of China with
published ages ranging from 1 to 2.6
billion. Along its northern edge it is in
contact with the collided ~400-500 Ma
Bainaimiao volcanic arc and other crustal
fragments in the Central Asian Orogenic
Belt (CAOB). Along this margin, the NCC is
overlain by a passive margin sequence
dominated by quartzites. I obtained U/Pb
detrital zircon analyses on four samples
from these quartzites and on two samples
from sandstones in a molasses-filled basin
farther south in the NCC. We also dated
zircons from plutons intruding the NCC,
overlying quartzites, and Bainaimiao arc.
The analyses of zircons were conducted at
the Arizona using the Laser-Ablation
Inductively Coupled Plasma Mass
Spectrometer, which enables a quick age
determination of multiple zirconiums in
samples providing clues about maximum
depositional age and provenance of
sedimentary units and emplacement ages of plutons. The four quartzites display minimum zircon ages of 1.2 b.y. and maxima at 1.6 to 2.5 billion. The southern sandstones have minimum zircon ages of ~270 Ma and older maxima at 400 Ma and 1.9-2.0 to 2.4 billion years. Two plutons had 400 to 500 Ma ages and all others had ages of ~262 Ma. These data suggest that the NCC craton remained a passive margin until ~500 Ma, during which it largely received sediments from the NCC. Subduction, magmatism and volcanic arc formation occurred between 500-400 Ma, southern basin formation between ~270-260 Ma and final collision between the NCC and CAOB and intrusion of post collision granites by ~260 Ma.
Title: A Meta-Analysis on the Effectiveness of Employment-Related Programs for Delinquent Youth

Name(s): Ishwar Bridgelal
Faculty Sponsor(s) and Department(s): Stan Huey, Psychology
Submission Type: Individual
Format: Laboratory-based Research

Abstract:
Previous research suggests that employment may curb recidivism among delinquent youth who experience difficulty re-entering their communities. Past reviews and meta-analyses provide a limited perspective on the effectiveness of employment-related programs for these delinquent youth, however. This meta-analysis extends previous work to provide more appropriate coverage of the literature, broadening eligibility criteria to include individuals who meet the upper age of jurisdiction of the juvenile justice system. The present work reviews 48 employment-related programs for delinquent youth, considering both experimental and quasi-experimental designs. Results reveal that the effects of employment-related programs on recidivism are small. During a one-year follow-up, approximately 43 out of 100 youth in employment-related programs recidivate compared to 50 out of 100 in control conditions—a 14% reduction. Twenty-four potential moderators of program effects are examined. Moderator analyses indicate that the effectiveness of employment-related programs is significantly related to scientific rigor and publication year.

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Title: A Question of Reproductive Freedom

Name(s): Noelle Miller
Faculty Sponsor(s) and Department(s): Nancy Lutkehaus, Anthropology
Submission Type: Individual

Abstract:
The project, completed in Ghana during the Spring 2008 semester, provides a feminist evaluation of population reduction and family planning programs in the country. Working under the premise that such programs can either empower or oppress women based on their implementation and working ideologies, the researcher attempted to gauge the effect of the national family planning initiatives on women in the city of Tamale in Northern Ghana. The researcher conducted observations for one month at two different family planning clinics. In addition, she interviewed family planning patients, practitioners, and policy makers. Based on this information, she assessed the level of empowerment or oppression of the policies within four evaluative categories set forth during a UN discussion of population and human rights in 1989: birth control promotion and distribution, economic incentives/disincentives, propaganda/psychological pressure, and
coercion. The researcher found that since Ghana is a traditionally pro-natal country where large families are greatly valued, population reduction and family planning programs were met with resistance. Ghana Health Services compensated for cultural resistance to birth control by counseling the use of long-term, clinician-controlled, and discreet methods of birth control. The researcher also observed a psychological pressure placed on citizens by from the government and international aid agencies to reduce population in order to increase personal and national wealth. In order to greater empower women, the researcher recommends that the government educate citizens about reproductive and sexual health and encourage male responsibility in family planning.

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Category: Social Sciences
Name(s): Shiwei Wu, Mengzhe Zhao, Chenli Zhou
Submission Type: Group
Faculty Sponsor(s) and Department(s): Iris Chi, School of Social Work; Ling Xu, School of Social Work
Format: Analytical Paper
Title: An Unprecedented Study: The underlying Relationship Between the First and Third Generation of Chinese Immigrants

Abstract:
Our project involves analytical questionnaire and focus group to analyse the underlying relationship between the first and the third generation of Chinese immigrants in Los Angeles area. We consider ourselves a pioneer in this research topic, concentrating on Chinese ethnicities. The objective of our research project is to study the grandparent-grandchildren relationship of the Chinese immigrant grandparents. We are specifically interested in four aspects, whether or not the relationship is harmonious, and what are the factors affecting this relationship, and would this relationship affect grandparents’ health physically and psychologically, and finally what is the role of the link parents.

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Category: Social Sciences
Name(s): Nicole Moody
Submission Type: Individual
Faculty Sponsor(s) and Department(s): Jo Ann Farver, Psychology; Thomas Lyon, Law and Psychology
Format: Senior Honors Project
Title: Are We There Yet?: Preschool Children’s Understanding of Approximation Using the Word “Almost”

Abstract:
Language acquisition becomes more refined with age, but no research to date addresses about children’s ability to approximate (i.e. how children use language to distinguish between multiple items which differ in degrees of similarity and differences) or at what age this cognitive ability surfaces. This study investigates children’s ability to approximate using the word “almost.” Subjects aged 3-0 to 5-5 were shown a target image and asked to identify which of three images was “almost the same” and “really different” from the target. Six categories were utilized in this study: number, size, color, location, schematic facial appearance, and realistic facial appearance. The results indicate that the ability to approximate similar and different items is acquired by age three for all tasks. Overall, younger children seem to have an understanding of “same” and “different.” However, when it comes to the concept of “almost the same” and “really different”, the younger children are simply performing at chance. This skill begins to emerge at age 3-6, as children demonstrate with relative accuracy their ability to use the word “almost.” The findings shed light on children’s language development, including
verbal capacity and comprehension concerning approximations during the preoperational stage.

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**Category:** Social Sciences  
**Name(s):** Jessika Tuazon  
**Submission Type:** Individual  
**Faculty Sponsor(s) and Department(s):** Jo Ann Farver, Psychology; Robert Gore, Psychology  
**Format:** Senior Honors Project  
**Title:** Attributions of Trustworthiness and Expertise to Mental Health Experts (Analysis of Media Mental Health Experts’ Ethical Behavior)  

**Abstract:**  
This study will add to the existing knowledge about psychologists, ethics and public perception, and their combined impact on public mental health. The public’s perception of this professional field is an important part of the overall legitimacy of psychology. As such, it is important to study how the public attributes expertise (credibility) and trustworthiness to mental health experts. Survey data were collected for 227 college-aged participants regarding their perceptions of mental health experts, specifically their attribution of trustworthiness and expertise (credibility) to different credentials within the field. These data were examined in terms of the participants’ ability to identify proper professional behavior, the degree to which they perceived each credential to be trustworthy and credible, and their exposure to relevant college-level psychology courses and psychology-related media (television, radio and books). Preliminary analysis shows an interesting pattern of findings. Exposure to relevant college-level psychology courses was positively correlated with attributions of both expertise and trust to Clinical Psychologists, Licensed Clinical Social Workers, and Licensed School Psychologists. There is a positive trend between the attribution of expertise to Marriage and Family Therapists and previous exposure to popular media. The results of this study can be added to existing information to better understand their combined importance and impact on public mental health, and may be used to help develop programs aimed to improve the interaction between mental health experts and the public.

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**Category:** Social Sciences  
**Name(s):** Aditya Prasad  
**Submission Type:** Individual  
**Faculty Sponsor(s) and Department(s):** Lisa Aziz-Zadeh, Neuroscience; Jo Ann Farver, Psychology  
**Format:** Senior Honors Project  
**Title:** Can humans learn to navigate spatial environments through observation of others?  

**Abstract:**  
Vast literature exists on the use of cognitive mapping among human beings to represent and navigate spatial environments. Socially mediated learning; learning through observation of an organism demonstrating a specific behavior, has also been well-documented in both human and non-human primate populations. Unfortunately, there is not much research on whether humans or animals can bridge these two abilities and learn cognitive concepts through observation of others. The aim of the current study is to determine whether or not adult human beings can acquire a cognitive map of a spatial environment by observing a naïve subject exploring that environment using trial and error and subsequently navigate the environment more efficiently. Humans are known to be expert imitators therefore it is hypothesized that those allowed to observe naïve participants exploring a spatial environment using trial and error method will be able to
successfully navigate the same environment faster while committing fewer errors. This research is significant because it will further our understanding of how we navigate spatial environments and possibly provide clues as to how we can improve our acquisition of internal spatial environments.

Title: Central Alaskan Yup’ik: A Linguistic Research Project
Name(s): Lydia Green
Faculty Sponsor(s) and Department(s): Bruce Zuckerman, Religion
Format: Field Research
Abstract: This project makes use of a website to present recordings of native speakers of Central Alaskan Yup’ik in a way that makes them accessible to the Alaskan community and to the linguistic community, while bringing attention to language endangerment as a global issue which is culturally and scientifically significant. Specifically, the recordings are approximately six hours of video footage with high quality audio of elders relating songs, myths, poems, hymns, and stories from their childhood. Some of the informants spoke English and provided translations as they were recorded, but in most cases a translation is given for those who spoke only Yup’ik. Biographies with linguistically relevant information are provided for each informant. The website highlights language endangerment as a broader issue, goes into detail about how the research was conducted, showcases some of the most interesting properties of the Yup’ik language, and presents the recordings in a dynamic way. It also provides informational resources for others who may be inspired to document dying or endangered languages.

Title: Communicating Financial Meltdown to Shareholders: A Cross-Cultural Analysis of CEO’s Letters to Shareholders
Name(s): Jason Carver, Sui Nga Chow, Dianna Dai, Jonathan Goldford, Kimberly Smith
Faculty Sponsor(s) and Department(s): Jolanta Aritz, Center for Management Communication
Format: Analytical Paper
Abstract: The annual report is one of the most important means of communication between big companies and their shareholders, potential investors, and general public. Most annual reports begin with a single important document, CEO’s letter to shareholders, which is used by the chairperson to reinforce the corporate image of the company and his or her own leadership. Our interdisciplinary study focuses on 40 CEO’s letters in 2008 annual reports in four different regions throughout the world, China, Europe, Japan, and the United States. Our project asks the following questions: (1) how do companies across the world communicate with their shareholders during times of financial crisis? and (2) how do they maintain their confidence in light of uncertainty and fear in the financial markets? In order to answer the first research question we used quantitative methods of analysis to investigate the use of Plain English. Previous research has shown that the readability ease of corporate reporting decreases during times of financial difficulties. As a result, the consumer confidence also drops. Our analysis confirms previous findings and also documents cultural differences in CEO’s letters. In order to answer the second research question, we used qualitative methods of analysis to determine the use such linguistic features as personal and
possessive pronouns, nonhuman agents, and passive voice and how they are used to communicate externalities, establish confidence, and maintain relationships in times of financial meltdown. Our findings discuss cultural differences found across CEO’s letters of Chinese, European, Japanese, and American companies.

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Category: Social Sciences  
Name(s): Joshua Lang  
Submission Type: Individual  
Faculty Sponsor(s) and Department(s): Nancy Lutkehaus, Anthropology; Cheryl Mattingly, Anthropology  
Format: Field Research  
Title: Cuban Health Care: First Class Public Health on a Third World Budget  
Abstract:  
On New Year’s Day, 2009, Cuba celebrated the 50th anniversary of the communist revolution that brought Fidel Castro to power. Following the momentum of an activist and political career that viewed health as an issue of social justice, Castro nationalized healthcare reform. Today, Cuba represents a paradox as it ranks among the poorest of nations but boasts one of the healthiest populations in the world. How does a country with dilapidated facilities, lack of access to medicine, and obsolete technology claim first world health statistics? Few Americans have conducted fieldwork in Cuba because of a US travel ban, which may partly explain why there is little scholarship on this phenomenon.

In my independent study I examine the state of healthcare in Cuba with attention to infrastructure, the role of the family physician, continuity of care, and the doctor-patient relationship. By revolutionizing the way patients interact within a system of health and disease and stripping barriers to care, Cuba has found a unique remedy to the adversity of economic distress and hegemonic opposition. Worldwide, several countries have socialized medicine but in these four categories, Cuba is unique.

Starting in Havana and then moving east across the island, I traveled through Cuba in the winter of 2009, conducting the majority of my research in neighborhood family clinics called Consultorios. Drawing from both the medical literature and my personal experience interviewing doctors and patients, I examine the system of primary care in Cuba.

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Category: Social Sciences  
Name(s): Nicole Hummel  
Submission Type: Individual  
Faculty Sponsor(s) and Department(s): Amy Parish, Anthropology/Gender Studies  
Format: Analytical Paper  
Title: Deconstructing Sex Tourism: Imperialism, Patriarchy, and Women’s Bodies  
Abstract:  
“We are a society of people living in a state of post-traumatic shock: amnesiac, dissociated, continually distracting ourselves from the repetitive injuries of widespread collective violence”
-Aurora Levins Morales, Medicine Stories

The global sex industry is worth over $20 billion, according to the Economist, and dealing with the issue from a policy-making perspective is difficult, given the fact that most intervention strategies end up hurting the woman who is prostituting herself - whether she is a victim or voluntary participant. While the state must figure out policies that criminalize those who harm the women in any way, from an anthropological perspective many other problems that are deep-seated in the practice manifest themselves when analyzing sex tourism. Global sex tourism has in a large part developed as a result of
the political-economic advantage of wealthy men from developed countries, and their culture’s fantasy of the exotic woman who is liberated from the sexual inhibitions of women in their own society. I will begin my discussion with the historical development of the marketing of sex within the tourism industry, and follow with an exploration of the idea that women’s bodies have become objects up for sale in a world that has been strongly impacted by capitalist consumer culture. Throughout this piece I focus on specific cases, including Brazil, where I spent a semester as a student and researched the phenomenon even more critically.

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Title: Effects of Dialogic Reading on Preschool Spanish-English Language Learners’ Emergent Literacy Skills

Name(s): Irene Campos

Faculty Sponsor(s) and Department(s): Jo Ann Farver, Psychology

Submission Type: Individual

Abstract: This secondary data analysis examined the effects of dialogic reading on preschool Spanish-speaking, English-Language Learner’s emergent literacy skills in both English and Spanish. The sample was composed of 400 preschoolers. 188 children participated in a dialogic reading intervention, aimed at increasing expressive language skills, while 212 children were assigned to the control group. Children’s emergent literacy skills (expressive oral language, print knowledge and phonological awareness) were assessed both at the start of their preschool year and at the end of the year. Children in the intervention group had significantly higher Spanish expressive oral language scores than did the control group. The scores of both groups improved across the preschool year (i.e., from Time 1 to Time 3 assessments) for Spanish expressive oral language, English print knowledge and Spanish print knowledge.

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Category: Social Sciences

Name(s): Jonathan Ortega

Submission Type: Individual

Faculty Sponsor(s) and Department(s): Jo Ann Farver, Psychology; Thomas Lyon, Law

Format: Senior Honors Project

Title: Effects of Narrative Rapport and Putative Confessions on Children’s Disclosure

Abstract: This study examined the effects of open-ended narrative rapport practice and putative confessions on 156 4- to 9-year-old maltreated children’s disclosure of a minor transgression. The child was left alone while the interviewer retrieved some papers. In the interim the child played with a confederate. Two toys appeared to break and the confederate asked the child to promise to keep the breakage a secret. The interviewer returned and asked either closed or open-ended questions during rapport building, and for half of the children, claimed that the confederate “told me everything that happened and wants you to tell the truth.” The interviewer then asked free recall and recognition questions about the child’s interactions with the confederate. We hypothesize that participants in the open-ended narrative rapport condition, as well as the putative confession condition will exhibit increased rates of disclosure. Additionally, we expect the open-ended narrative rapport condition to have the strongest effect on the youngest children. Preliminary analyses suggest that putative confessions have a significant effect on children’s personal disclosure of toy breakage as well as increasing children’s disclosure while in the close-ended narrative rapport
condition. Open-ended narrative rapport practice does not appear to have a significant effect on children’s rate of disclosure.

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Category: Social Sciences
Name(s): Theodore De Beritto
Submission Type: Individual
Faculty Sponsor(s) and Department(s): Eileen Crimmins, Gerontology; Aaron Hagedorn, Gerontology
Format: Senior Honors Project
Title: EKG Abnormalities and Their Relation to Age, SES, and Education Level
Abstract: Socio-economic status (SES) is a very powerful predictor of old age health outcomes, like cardiovascular disease, but the mechanisms behind this observation are not well understood. One approach to understanding the mechanisms behind SES is to investigate how socio-economic status is linked to individual clinical measures of health, often referred to as biomarkers of aging and health. This study focuses on measures of heart functioning, and is meant to show how education influences lifestyle decisions that have consequences for old age health.

This study uses data from the Third National Health and Nutrition Examination Survey (NHANES) to examine measures of cardiac function, as measured by an electrocardiogram (EKG), and investigates how SES is linked to abnormal EKG results amongst different age groups, and for males and females. Socio-economic status is measured by level of formal education completed. Analysis is shown on specific EKG measures such as T-Wave, QRS, QT abnormalities, and major abnormalities defined as severe deviations in the normal wave-length pattern.

The results suggest that Education is associated with major EKG abnormalities, particularly at older ages. There does not appear to be any link between education and more minor abnormalities. The results suggest that the heart is sensitive to the stresses associated with a low SES lifestyle, and EKG measures in surveys may be a useful tool for measuring potential health risks.

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Category: Social Sciences
Name(s): Jessica Erberich
Submission Type: Individual
Faculty Sponsor(s) and Department(s): Tok Thompson, Anthropology
Format: Field Research
Title: Happily Ever After: A How-To Manual
Abstract: Working within the paradigm of Proppian syntagmatic analysis, we will apply these theories and methodologies to a comparative analysis of two to four folktales from Japan, Germany, and India respectively, examining particular cultural context in terms of motif variation and larger cross-cultural parallels in terms of tale-type. By comparing the morphology of tales that conclude successfully for the protagonist and those that conclude unsuccessfully, we may be able to arrive at a categorical definition to differentiate the two in terms of structure. The majority of folktales (as per William Bascom’s description of the term) end in a successful conclusions, but what this success entails can vary drastically across regional icotypes, allowing for analysis of the cultural context in which a given tale is performed.

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Happiness Levels as Related to Oil Prices

Claire Zeigler
Jeffrey Nugent, Economics
Senior Honors Project

Abstract:
Recently, the economics of happiness has become a subject of interest as researchers attempt to determine what makes people and countries happy. It is interesting to look at oil prices as a determinant of happiness given the media's attention to and fluctuations in the price of oil. The intention of this study is to explore the relationship between oil prices and happiness. As oil prices rise, we might expect that the consumers of oil (oil importing countries) will become unhappy, and the producers (oil exporting countries) will become happier. This assumption is evaluated through regression analysis of data from the World Values Survey (1982-2004) on aggregate happiness levels for a number of countries. Results show that increases in oil prices do seem to negatively influence happiness in oil importing countries. For oil exporting countries, however, the results are mixed. It might be interesting to repeat this study over a longer period of time and with a larger data pool if it becomes available.

Power Does Not Corrupt But I’d Prefer If It Did; How The Powerful Decide and How We Judge Their Reasoning

Abbie Wazlawek
Jo Ann Farver, Psychology; Jennifer Overbeck, Management and Organization
Senior Honors Project

Abstract:
This study examines how powerful targets are judged for making unethical decisions based on whether targets employ consequential or deontological reasoning. After reading vignettes describing targets and ethical dilemmas they face, participants rated the level of personal control they would feel if the target were in a position of power over them and the target's ethicality, predictability, and concern for utility. We also used vignettes and a power prime to examine whether high-powered individuals are more likely to reason consequentially or deontologically when faced with an ethical dilemma. Findings were contrary to our predictions, indicating that observers prefer powerful individuals who reason consequentially and that powerful individuals are more likely to employ deontological reasoning.

Rhythm in Second Language Speech
Amanda Bogart, Ashley Flor
María Luisa Zubizarreta, Linguistics
Analytical Paper

Abstract:
This study investigates the effects of the first language (L1) on the rhythm of the second language (L2) and vice versa. We examine Spanish and English, which differ
typologically with regards to rhythmic classification (Romance vs. Germanic rhythm, respectively). This classification is grounded in differences in vowel duration (eg. duration between stressed and unstressed vowels is greater in English than in Spanish) and syllabic complexity (eg. English has complex consonant clusters not found in Spanish; Spanish has predominantly open syllables). These characteristics give rise to a difference in the consonantal to vocalic ratio in the speech stream, which is higher in English than in Spanish. Data were collected from adult monolingual English and Spanish speakers, as well as second language speakers of English. Subjects were recorded reading a standard, phonetically-balanced passage; sound files were subjected to program analysis that extracted and measured the consonants and vowels in the speech stream. Results indicate not only that the rhythmic classification distinction between English and Spanish holds, but also that the rhythm of the L1 does have an influence on the L2 rhythm. Furthermore, results show that the rhythm of the L2 also influences the rhythm of the L1. Specifically there was a difference in the consonantal to vocalic ratio between the Spanish of monolingual speakers and the Spanish of L2 English speakers.

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Category: Social Sciences
Name(s): Sasha Marie Orfano, Alexandra Sinnott, Tiffany Tsai
Submission Type: Group
Faculty Sponsor(s) and Department(s): Lynn Swartz Dodd, Religion
Format: Laboratory-based Research
Title: Ritual Rock: Application of Laser Cleaning Techniques to Native American Sacred
Abstract:
Lines of charcoal, ocher, and animal fat branch out into a barely visible maze on a Riverside County granite face, one of the few sacred sites that the Pechanga and San Luis Rey tribes still use for community ceremonies considered central to tribal ideology. Unfortunately, these sites fell victim to graffiti defacement in 2006, joining the rapidly rising number of vandalism casualties across the nation. Chemical solvents have been deemed culturally inappropriate; as an alternative, we are researching laser ablation methods to achieve precise and controllable cleaning. We have undertaken studying and summarizing past articles on laser paint removal as well as observing the frequency, media, and location of graffiti in the urban Los Angeles area. We create test rocks by covering granite with spray paints of various colors and bases. Under the supervision of Professor Lynn Swartz Dodd (Religion/Archaeology), Prof. Hannah Reisler (Chemistry) and graduate researcher Blithe Casterline, we operate a Nd:YAG laser in the Reisler Lab to expose our test samples to variable powers and wavelengths, then use macrophotography to analyze the amount of paint removed and reveal any damage incurred by the substrate. In addition, we have consulted faculty from the Earth Sciences department to determine effects of rock composition and are preparing to analyze our samples through X-ray diffraction in collaboration with UCLA. This research will provide guidance to tribes and preservation and conservation professionals who need to remove paint from ancient sites; it promises to regenerate sacred landscapes anywhere in the world.

§§§§
Category: Social Sciences
Name(s): Lisa Tran
Submission Type: Individual
Faculty Sponsor(s) and Department(s): Olga Solomon, Occupational Therapy
Format: Analytical Paper
Title: Sensory Integration and Autism: A Cross-over Analysis Between the Clinical Research and Autobiographical Accounts

Abstract:
Problems in sensory integration and processing have been seen in many children with autism, and have been corroborated in clinical research studies (Rogers & Ozonoff, 2005; Blanche, Roley, & Schaff, 2001). Furthermore, sensory integration problems have been described in first-person accounts by highly accomplished individuals with autism (Grandin, 1986, 1995; Williams, 1992; Prince-Hughes, 2004). This study critically analyzes how the clinical research matches against autobiographical accounts of autism, examining comparisons and contrasts between the two. For this cross-over analysis, a review of the literature was conducted that investigated sensory integration and processing issues in autism. In addition, two autobiographical accounts, Emergence: Labeled Autistic and Thinking in Pictures by Temple Grandin, a high-functioning person with autism, were critically reviewed and evaluated for sensory integration and processing issues. By analyzing both the clinical research and autobiographical accounts, a better understanding of the conceptualization of sensory experiences in autism was established. Seeing sensory integration problems from the eyes of an individual with autism provided an empirical view that was lacking from the clinical research. This cross-over analysis study emphasizes the importance for researchers in this field to look at both clinical research and autobiographical accounts to gain a better conceptualization of sensory processing issues that is characteristic of autism.

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Category: Social Sciences
Name(s): Natalie Abrahamian
Submission Type: Individual
Faculty Sponsor(s) and Department(s): Mara Mather, Gerontology
Format: Senior Honors Project
Title: Spontaneous Suppression, Incidental Forgetting, Relational Memory Binding, and Depression Level Discrepancies Among Both Younger and Older Adults

Abstract:
The study investigated and determined whether the binding of an individual’s memory and attributed memory processes are influenced by –(a) the emotionality of a picture stimulus and/or (b) the valence (positivity or negativity) of the picture stimulus presented to the observer. The objective of this experiment was to distinguish whether these aforesaid conditional factors serve as contributory influential determinants on an individual’s ability to remember a picture as an associated segment of a learned pair. In the study, both younger and older adults observed and tried to encode various versions of numerous face-scene paired pictures in four-block sequences (equally dispersed and graded in regards to valence and intensity/neutrality), after which they were only shown the associated face and were told to describe the matching scene that was specialized to the respective face-scene picture pair. We specifically tested for the ways in which the degree of depression level and exposure to repeated reminders of a scene might affect memory and its affiliated binding processes by incorporating a face-questions task into the study. During this task, the participant consecutively sees and answers subjective questions about only the faces from the earlier encoding portion of the study. By presenting the faces alone with a subsequent question, we are trying to
discover and ascertain whether the repeated exposure of singly the neutralized portion of the learned pairs (the face) has the potential of impacting one’s memory. We anticipate that the depression level of the participant, emotional content, and number of repetitions of the images will influence both younger and older individuals’ memory of the pairs.

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**Category:** Social Sciences  
**Name(s):** Diana Bennett  
**Submission Type:** Individual  
**Faculty Sponsor(s) and Department(s):** Gayla Margolin, Psychology  
**Format:** Senior Honors Project  
**Title:** Stress and the Body: Can School Help?  
**Abstract:**
Aversive life events can have profound psychological and physiological effects on the people who experience them. Research has shown that the experience of negative life events is related to the development of health and emotional problems. However, it is unclear how life events manifest these effects, and why some people may be more vulnerable while others show resilience in the face of aversive occurrences. In determining how life events are related to psychological and physiological outcomes, this study investigated the role stress plays in response to negative life events. Using data from two waves of a longitudinal study of Los Angeles area families, the present study focused on how aversive life events in a little-studied adolescent population impact the physiological reactivity of the hypothalamic-pituitary-adrenocortical (HPA) axis, specifically salivary cortisol, a stress hormone. Elevated levels of cortisol have been linked to health effects as broad as weight gain, decreased bone mineral density, and increased blood sugar, as well as cognitive and emotional functioning, therefore serving as an important mechanism in which stress can affect the body. The present study also investigated school connectedness as a potential moderator of the relation between aversive life events and cortisol reactivity, possibly indicating a resiliency factor. Preliminary analyses indicate that adolescents who are well connected to their school fare better in terms of cortisol reactivity to a psychosocial stressor than those who are less connected. This effect is especially prevalent for those adolescents who have experienced high distress from negative events in the prior year.

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**Category:** Social Sciences  
**Name(s):** Tamar Zadiguian  
**Submission Type:** Individual  
**Faculty Sponsor(s) and Department(s):** Robert Gore, Psychology  
**Format:** Senior Honors Project  
**Title:** Study of Celebrity Perceptual Processes as they Relate to Media Commentary  
**Abstract:**
This study investigated how people ascribe credibility to media psychologists based on the speaker’s use of one and two sided messages and speaking styles that vary in linguistic power. It was hypothesized that lay people unwittingly reinforce suboptimal or even unethical practices by being more likely to believe one sided powerful messages if they have no previous knowledge about the subject. This study also attempted to identify a situation where two sided messages can in fact, be more persuasive. Since ethically responsible messages tend to be two sided, this study will add to the literature by developing a descriptive model of decision making. The study was a 2 ×2×2 study where participants responded to messages that were manipulated for message "sidedness" and "speaking styles." Videos were used to simulate a psychologist giving a diagnosis about a hypothetical celebrity in the media. Participants then responded to vignettes.
based on their perceptions about the message content and the speaking style of the psychologist in the video.

Title: The Attribution of Legitimacy and Credibility to Media Mental Health Experts
Name(s): Paul Jansson
Faculty Sponsor(s) and Department(s): Jo Ann Farver, Psychology; Robert Gore, Psychology
Submission Type: Individual
Category: Social Sciences
Format: Senior Honors Project
Abstract: The purpose of this study is to extend the heuristic-systematic and elaboration likelihood model of attitude change to explain ascriptions of legitimacy and credibility to media mental health experts. Using a 2x2 design, undergraduate students at the University of Southern California (N = 227) read four vignettes modeled after celebrity gossip magazine articles. In each vignette, the expert was assigned either a high- or neutral-educational heuristic cue, as well as either a high- or neutral-intangible cue indicating their status. The students then reported the amount of credibility they granted the expert. A Repeated Measures Analysis of Variance indicated a significant effect (p = .016) for the educational cue. The study reviews the current educational and licensure protocols in psychology and discusses current examples of media mental health experts practicing outside of their scope and licensure. Results indicate that further education is needed for the general public to fully understand the role and limits of the mental health commentator, as well as the different levels of licensure and education of mental health professionals.

Title: The Effects of Polyunsaturated Fatty Acids on Impulsivity & Aggression in Twins
Name(s): Kevin Stanek
Faculty Sponsor(s) and Department(s): Laura Baker, Psychology
Submission Type: Individual
Category: Social Sciences
Format: Senior Honors Project
Abstract: Utilizing a longitudinal twin study of children (ages 11-16), the current research investigated the genetic and environmental basis of food intake, as measured through food diaries and has examined the relations of the nutrients to both impulsivity and aggression. The participants are representative of the southern California population and were studied on several occasions (i.e., up to three waves of assessment) from ages 9 to 15. In all, 821 twins’ and caregivers’ data was studied. Genetic predispositions were found to explain some of the individual differences in nutrient levels derived from these diaries, which calls into the question the idea that nutrition may be related to behavioral outcomes for purely environmental reasons. Thus, the modest relationships found between nutrients and behavior might be explained, at least in part, by shared genetic predispositions rather than causal effects of nutrients on behavior. In contrast to the literature, Omega 3 and Omega 6 were not related to decreased impulsivity or aggression in the current study. The current study is unique in that it employs multiple perspectives (child, co-twin, caregiver, and teacher) on psychological variables such as impulsivity and aggression.
Category: Social Sciences
Name(s): Georgia Christodoulou
Submission Type: Individual
Faculty Sponsor(s) and Department(s): Michael Dawson, Psychology
Format: Analytical Paper
Title: The Relation Between Grasp Reflex Inhibition and Prefrontal Cortex Performance
Abstract:
It is well established that primitive reflexes, although present for a short time during infancy, eventually disappear during normal development (Schott & Rossor, 2002). Past research, however, shows that primitive reflexes tend to reappear in individuals suffering from disorders that cause damage to the frontal lobe, specifically the prefrontal cortex. Thus, primitive reflexes become indicators of neurological abnormalities and damage. In more recent studies, researchers have examined additional uses of primitive reflexes within these abnormal populations, including their predictive power over cognitive performance and treatment response. The purpose of this present study was to examine the association between the inhibition of the grasp reflex (a primitive reflex) and prefrontal cortex functioning among normal participants. This study was significant because it pursued a direction in research that has not been addressed, potentially opening up the uses of primitive reflexes to an entirely new population. This study also looked at the relation between the startle response and the Stroop task. Preliminary analyses show modification of the startle response during early and late processing, providing further evidence for the attentional and cognitive modulation of this particular reflex.

Category: Social Sciences
Name(s): Christina Gotuaco, Grace Hwang
Submission Type: Group
Faculty Sponsor(s) and Department(s): Thomas Jordan, Southern California Earthquake Center
Format: Field Research
Title: The Usefulness of Social Networking Sites for Tracking Past Interns
Abstract:
Using the social networking site, Facebook, we conducted a study to research the effectiveness of social networking sites for SCEC, a research institution, to maintain contact with its past interns, gain feedback on the internship program and its effectiveness, build a base of volunteers for future events, potentially reach out to future interns for recruitment, and facilitate relationships between incoming interns and SCEC alumni. We also sought to achieve a way for interns to maintain the relationships they established during the program, reconnect with old friends, and make new connections with interns from other years.

Category: Social Sciences
Name(s): Jonathan Tanis
Submission Type: Individual
Faculty Sponsor(s) and Department(s): Lynn Swartz Dodd, Religion
Format: Field Research
Title: Traversing the Native American Ritual Landscape: Experiences in Liminality
Abstract:
As a cornerstone of the anthropological approach, participant-observation distinguishes ethnography from armchair social science. It emphasizes the tactile and experiential, as opposed to abstract speculation. This spring break I extended that ideal to the Native American Cultural
Landscapes project, where I have been researching liminality in the context of the Luiseno tribe’s puberty rituals. My research had led me to a point at which the theoretical canon regarding the dialectic of social structure and anti-structure felt insufficient; I needed to achieve direct experience of what liminality entails.

Thus I extracted myself as far as possible from my normalized lifestyle, arriving alone in the Utah desert with minimal camping supplies and a notebook. The goal was self-ethnography and the method was the mirroring of certain aspects of the traditional Native American vision quest: living in the desert, fasting, journeying and meditating in solitude, while remaining conscious of my liminal status. My written account takes the form of loosely linked meditations on various experiences, divulging what they revealed about the phenomenon of liminality.

My thoughts eventually coalesced into coherent proposals, the most significant of these being: (1) expansion of Victor Turner’s communitas beyond the social to include greater forces of alienation and unity, and (2) liminality understood as a physical brain state in addition to a symbolic status, opening doors to neuroscientific inquiry. Lastly I attempted to bring spirituality and politics into the discussion, exploring the imminent possibilities and benefits of a temporary or permanently liminal lifestyle.

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**Title:** Voting, Politics, and the 2008 Presidential Election: Explaining Election Outcomes

**Name(s):** Johanna Stulting

**Faculty Sponsor(s) and Department(s):** Richard John, Psychology

**Submission Type:** Individual

**Category:** Social Sciences

**Abstract:**
This study explores the way people explain success and failure in relation to personality variables within the context of the 2008 Presidential Election. Participants were 127 individuals contacted via the University of Southern California undergraduate subject pool, emails, and Facebook messages who responded to a web-based survey administered on the Qualtrics website. The survey consisted of two-parts--the first completed during the week prior to the election and the second completed during the two weeks following the election. In the pre-election survey, participants reported their political party affiliation, candidate preference, voting intentions, and election outcome predictions. Participants then read four scenarios presenting outcomes of the election--McCain wins by a landslide, McCain wins a close election, Obama wins by a landslide, and Obama wins a close election. Following each scenario was a 20-item questionnaire designed to assess the way a person explains the election results. Participants were also assessed on scales measuring personality variables (e.g., extraversion, agreeableness, conscientiousness, neuroticism, and openness). It was predicted that when the participant’s preferred candidate wins attributions would be internal and when the preferred candidate loses, attributions would be external. Furthermore, it was predicted that this tendency be stronger for close elections than for landslides. In the post-election survey, participants were presented with the actual election results followed by the same election attribution measure. Participants’ general style of explaining events. The results of the post-election survey were compared to the responses gathered in the first survey.

§§§§
Title: You Defriended Me!?: The Scope and Prevalence of Interpersonal Aggression

Name(s): Diana Bennett, Lauren Ford, Rachel Rice

Faculty Sponsor(s) and Department(s): Gayla Margolin, Psychology

Submission Type: Group

Category: Social Sciences

Format: Laboratory-based Research

Title: You Defriended Me!?: The Scope and Prevalence of Interpersonal Aggression

Abstract:
This study was designed to assess the prominence of aggressive behaviors within friendships and romantic relationships through research with female and male undergraduate students at the University of Southern California. The study focused especially on aggressive behaviors perpetrated through electronic media (e.g. text messaging, instant messaging, and social network internet sites). The range and emotional salience of these events was determined by assessing the subjective distress reported from both physical and psychological aggression, and by examining psychological and physical reactions that may be associated with interpersonal aggression. The study included a series of online questionnaires administered to USC Psychology Subject Pool participants (undergraduate psychology students) and also utilized focus groups to assess the relevance of questionnaire items.

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# Symposium Participant Index

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## Symposium Participants by Category

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### Humanities

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