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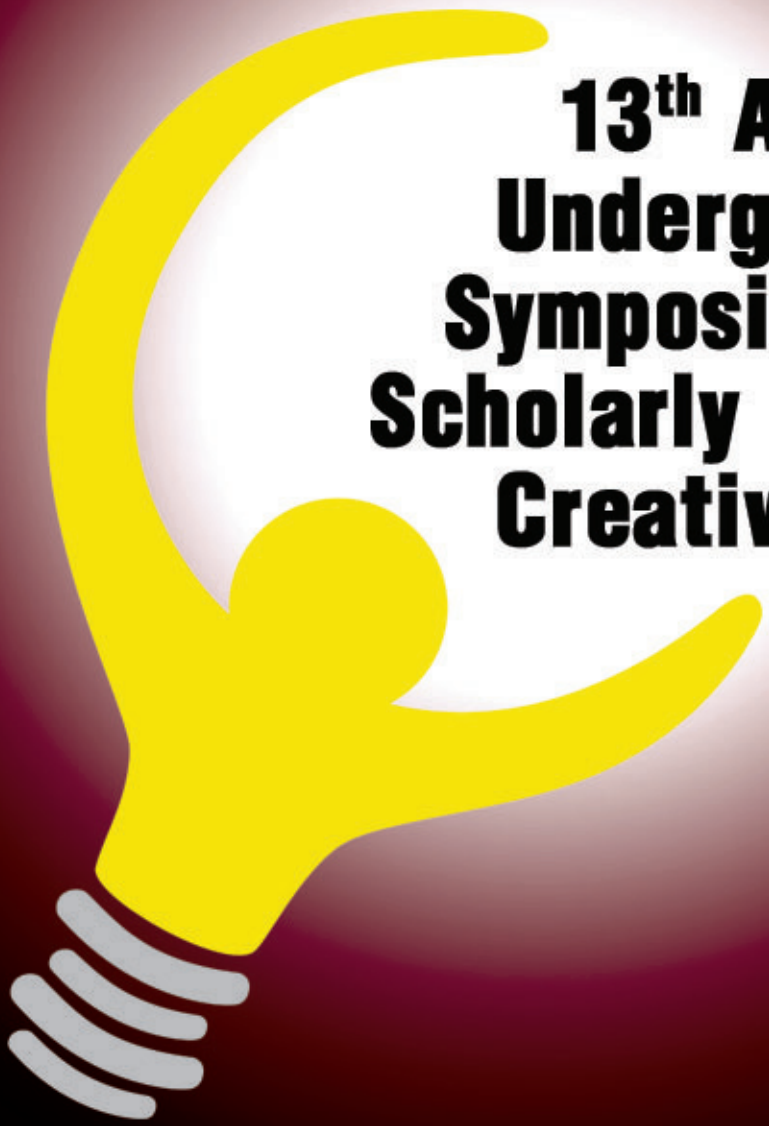

13th Annual Undergraduate Symposium for Scholarly and Creative Work

April 13, 2011

UNDERGRADUATE SYMPOSIUM FOR SCHOLARLY & CREATIVE WORK

SCHEDULE OF EVENTS

Tuesday, April 12, 2011

Symposium Judging
9:00 am – 5:00 pm
Grand Ballroom at Tutor Campus Center
(Judges only – closed to presenters and general public)

Wednesday, April 13, 2011

General Presentations, Exhibits, and Displays
11:00 a.m. - 2:00 p.m.
Grand Ballroom at Tutor Campus Center

Awards Ceremony & Dinner Reception
6:00 p.m. – 7:30 pm
Town & Gown

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April 13, 2011

Dear Members of the USC Community:

It is my pleasure to welcome you to USC's 13th 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 Town & Gown 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
Provost and Senior Vice President for Academic Affairs

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 nearly 140 submissions with participation from over 180 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.

ACKOWLEDGEMENTS

On behalf of the Office of Undergraduate Programs and the Office of the Provost, we graciously thank USC faculty and graduate 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 a warm 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 extraordinary event.

THANK YOU!!!

13th Annual Undergraduate Symposium for Scholarly and Creative Work

Table of Contents

Category: Arts
Name(s): Karen Lee
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
G G Schierle, School of Architecture
Format: Creative Work
Title: Anticlastic Roof Structure
Abstract:

The objective of the project was to create a structural roof system for a sports center that has a main column-free space with a sustainable idea of creating as much natural lighting and ventilation as possible. The intent was to consider the synergy of form and structure, with attention given to the interface between short-, medium-, and long-span systems. The main space had a square plan and in response, we used the midpoints of the square to place two arched prismatic trusses that intersected to create a dynamic skylight in the center. To cover the space, we used a fabric system for ventilation purposes. To resist wind load, an anticlastic curvature was designed into the fabric structure that had both convex and concave curvatures. Because the main structure is the arched trusses, in order to resist the wind load through an anticlastic form, the corner condition had to be elevated in a way that resisted the horizontal shear. So our strategy was to design a column that was both aesthetically beautiful and met the structural requirements. The fabric structure allowed for light penetration through the prismatic trusses and the main space was illuminated by natural lighted rather than being dependent on artificial lighting.

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Category: Arts
Name(s): Jake Bloch
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Lisa Bitel, History and Religion
Format: Senior Honors Thesis
Title: Awe
Abstract:

Awe is a fascination with the infinite. Awe is humility. Awe pushes people beyond themselves. It is often this Awe that motivates religious fervor and even incites religious extremism in certain circumstances. Awe is often felt towards a God or gods and fosters identity. Some people, however, find Awe in the stars. During my sophomore year at USC, I became enthralled in a class called "The Universe" with professor Nick Warner. Warner's students journeyed through the cosmos to the beginning of the universe, learning about the evolution of stars, planetary systems, galaxies, and the creation of the universe. Throughout this journey, one notices the remarkable similarities between life in the universe and on earth—celestial beings have a beginning and end of life in much the same way that earthly beings do. Even more fascinating, however, is the cyclical process through which celestial beings are born. The dust of dead stars fuels the birth of new ones,

and some stars collapse into entirely different, powerful entities, like black holes. Here, one finds a unique parallel to the transcendent element of Awe that resides within most religious traditions; the notion of eternity on an unimaginable scale. In this sense, the universe provides the ultimate view of the infinite in its physical reality—all people have access to the stars and can feel awe about the vast and transcendent nature of the cosmos, as well as the physical principles that describe them. The universe, after all, is not exclusive, and its beauty is available to all people regardless of their identity. The Awe one finds in the universe, then, functions as the source of Awe that all human beings can share that is beyond their own beating hearts, brain synapses, and mortality.

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Category: Arts
Name(s): Rachel Porter
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Jervey Tervalon, Department of English
Format: Creative Work
Title: Beauty in Low Places
Abstract:
Depression often results in a disconnect between the outside world and the world inside one's head. What is the healthiest way to deal with this? How can individuals find a healthy balance so that a self-destructive cycle doesn't overwhelm their life? In a collection of three stories, I address these questions by exploring the relationship between creativity and depression.

In the first story, "Remember," I communicate the impossibility of living a normal life after a traumatic experience. I focus on cyclical thinking that is somewhat cathartic but leaves the character in the same place as she started. Written as a sort of stream of consciousness from the point of view of a character whose child has recently died, "Remember" is intended to provoke questions about whether attempting to create something (in this case a piece of writing) helps the character to combat her depression. My point of view is that creativity is often therapeutic, but not necessarily healing.

In the second story, "The Worst Thing In The World," I address the disconnect between reality and perceptions of reality through a symbolic story about innocence and the often overwhelming terrors of the world. Written at one of the lowest points of my own depression, this story was my way of trying to use creativity to communicate what I couldn't put into words: the helplessness of discovering that the world is not what I thought it was.

In the final story, "Smile," I explore a new kind of creativity: human interactions, and the effect they have on depression. My conclusion is that, although symbolism and therapeutic writing can help with depression, the best kind of healing occurs with human interactions. Hopefully, these three stories will provide context to one of the most debilitating sicknesses: depression.

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Category: Arts
Name(s): Victoria Le
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Kristin Calabrese, USC Roski School of Fine Arts
Format: Creative Work
Title: Bro-Nation
Abstract:
The purpose of this painting is to capture the spirit and energy of what it may stereotypically mean to be a " bro" in an all-male environment. It is meant to be a humorous look into this lifestyle and the social interaction and group dynamic of

these characters. It is also meant to be ironic that this subject matter would be so carefully rendered in a stylistically traditional fine art oil painting, with the intent to be displayed in a gallery setting.

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Category: Arts
Name(s): Sarah Romanoff
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Jennifer Phelps, Roski School of Fine Arts
Format: Creative Work
Title: Contours of me
Abstract:
While studying abroad in Florence, Italy, I became riveted to the challenge of creating art with a heightened conceptual idea. Working independently, I would explore my internalized and intuitive artistic abilities. In working with Marble and Bronze, both mediums I had never encountered before, I would also ensure a learning process through hands-on trial and error.

I chose to name my piece Contours of me, because I felt drawn to the curves of my feminine figure. I wanted to capture the essence and movement of my own body, as I perceived it. When creating the Bronze sculpture, I first created a clay sculpture that I cast in plaster. Next, I filled the mold with wax to unveil a replica of the original clay figure. I found a cigarette lighter and a metal rod that I used to manipulate the wax to create the spine, shoulder blades, belly and breasts. This sculpture was sent to the foundry to be turned to Bronze. To create the Marble sculpture, I traveled to the quarries of Carrara, Italy in search of the perfect stone. I wanted to produce every aspect of the work myself. Back at the studio, I found a chisel and hammer and began freeing the figure within the stone. It took two weeks to train my arms to use the chisel properly. I found working on such a small scale even more challenging when trying to create a unifying texture for the skin. In the end I fell in love with the chisel marks themselves, creating a piece totally unique to my creative process. I believe both sculptures are successful as embodiments of my own artistic explorations, as honed by the skills developed within The Roski School of Fine Arts and from a developing understanding of my own internal art discourse.

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Category: Arts
Name(s): Nicholas Brice, Jonathan Carmel, Katelyn Endow, Daniel Lum, Andrew Ogden, Blade Olson, Raunak Roy, Lawrence Sequino, Patrick Shay, David Sommer
Submission Type: Group
Project Sponsor(s) and Collaborator(s):
Chris Swain, USC Cinema - Interactive Media Department; Michael Zyda, USC Viterbi - GamePipe Laboratory
Format: Creative Work
Title: Dance Pad - social iPad game
Abstract:
Interactive entertainment is moving steadily toward a player-to-player, contribution-focused design philosophy. New relationships are being formed and expanded beyond the developer-to-audience interaction pipeline to encourage players to use a video game's tools to entertain their fellow audience, transforming players into entertainers themselves. Dance Pad seeks to innovate in this area and entertain players through different levels of player involvement. Dance Pad, in its simplest form, is a visually appealing rhythm game on the iPad that has users PERFORM dance moves with their fingers. If players appreciate the game, we allow them to CREATE their own moves with a gesture-recorder. Moves created by players can be quickly uploaded to a server that stores all user dances and can be accessed by any owner of the Dance Pad

application with wireless connectivity. Finally, to encourage user-creation and creativity, we've incorporated the YouTube API into the app to allow players to WATCH how others have performed on original dances in the game or dances they've created. Players can record and submit their own videos to our WATCH mode through YouTube and have their videos appear inside the Dance Pad application.

Players are encouraged to explore the WATCH and CREATE modes of the game through achievements and trophies that unlock small, fun prizes as rewards. However, because each mode requires slightly more involvement than the last (PLAY being the simplest, CREATE being more time-consuming, and WATCH requiring the most dedication) players may limit their interaction with the game at any level and decide how they'd like to experience Dance Pad. Together, these different methods of interaction will foster a social community of players and content contributors that will feed entertainment to itself after the application has been released.

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Category: Arts
Name(s): Robert Foster
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Vicki Callahan, Institute for Multimedia Literacy
Format: Creative Work
Title: filmstudie.2011++
Abstract:
Utilizing the ever increasing power of computing technology, my installation piece explores the unique position of video art within our increasingly digital age. Drawing from the early twentieth century avant-garde filmmaker Hans Richter, who explored the formalist construction of film by constructing completely abstract films and mid-century pop artist Andy Warhol, who repossessed the images that surrounded him, the piece explores these concepts within a digital framework. This framework also includes the poignant development of audience participation in our digital world, by utilizing a video feed that allows the user to be the center piece of the artwork. Though the piece features four similar looking video feeds, an homage to Warhol's screen prints, each exists with unique manipulations of time. One frame contains the original video feed manipulated in real time, a second contains the feed delayed by a second, a third contains the feed delayed by 5 seconds, and the last is a randomized progression through the time. The juxtaposition of these time manipulations serve as a commentary on the imprint we leave on our digital world.

The project is realized through a program I created myself, utilizing the multimedia graphical programming interface Isadora.Therefore, the project is a mixture of programming and modern art history.

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Category: Arts
Name(s): Yuan-Yu (Henry) Chang
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Lee Olvera, Architecture
Format: Creative Work
Title: For Your Eyes Only
Abstract:
The genesis of the project began with an attempt to transform a single, homogenous material to something it does not appear to be, the goal being to explore the property limits of materials and how materials can be applied in new, innovative ways on a larger scale. Styrofoam was the material of choice because of its ease of handling.

After experimentation, the first discovery was that Styrofoam boards could be

thinned down to an almost-translucent level (especially with good lighting conditions). The second discovery was that sanding the material with sandpaper of the appropriate grit produces a soft, unidirectional texture. These two discoveries lead to the idea that the material can be transformed to look like flower petals. The challenge that followed was how to create several layers of petals – such as roses' – without the use of explicit binding elements in order to preserve the elemental quality of a single material. An interlocking system that allowed the petals of each piece to interlock with the other pieces was devised, resulting in the contrasting aesthetic between solid and void.

Therefore, to create weight (contrasting lightness), a unidirectional texture was applied to the original, porous surface of Styrofoam through sanding that aimed to create the perception of a different, denser material than Styrofoam.

To create flexibility (contrasting brittleness), numerous parts of the components were hand-pressed for increased density and malleability and then slowly folded, starting away from the fold line and then slowly towards the fold line. This was also a discovery not previously known.

To create translucency (contrasting opacity), the edges of the petals were tapered to create the illusion of thinness but also to create actual translucency on the edges of the petals, where light passes through the material itself.

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Category: Arts

Name(s): Chaitanya Bhatia, Alexander Dimento, Calvin Lee

Submission Type: Group

Project Sponsor(s) and Collaborator(s):

John Frane, School of Architecture

Format: Creative Work

Title: Furniture Study: Materials Exploration

Abstract:

Our task was to create a piece of furniture that would seat three people. After exploring a variety of materials ranging from tires to cables we decided on using wiffle balls and zipties. The plastic wiffle ball we chose is 3" in diameter and has certain attributes we thought were necessary such as durability and its high tensile strength. We used the holes in the wiffle balls as our method of connecting one unit to the next. The primary reason was to chose a material that symbolises an inversion of comfort - to create furniture that seems uncomfortable but in essence is the opposite. In addition, the wiffle ball as a unit we aggregated did not need to be edited in any manner, by simply finding a connecting unit, the ziptie, we were able to create a final product that brought together numerous wiffle balls. This final product is hung as a swing and is made up of three 'tear-drop' shaped loops. These loops can be used in a variety of seating positions which can be chosen by the user. We felt that allowing flexibility in seating was a key goal in our project as well the fact that a swinging chair could be hung almost anywhere. The idea that standard objects may be put together in innovative methods was the key object of our project, this was difficult in certain situations because it had to hold the weight of three people. However, by investigating the method of putting the wiffle balls together we found an ideal outcome that allowed the swing to be structurally sound. Irregular fabrication techniques is what we carried out, uncommon materials were used and yet, the general public understood the

function of the project.

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Category: Arts
Name(s): Michael (MJ) Caselden
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Keith Chugg, Electrical Engineering
Format: Creative Work
Title: Gracie Gets Roxy
Abstract:
Gracie Gets Roxy is a live, interactive demonstration of electronic artwork. The project features the TR-505, which is a drum machine that was sold by Roland in the 1980's. I soldered more than 50 wires to the internal circuit board of this device, and attached these wires to external connectors on a front panel. Viewers are encouraged to experiment with wires on this panel. By connecting and disconnecting cables, the viewer is essentially connecting and disconnecting different nodes of the drum machine's circuit board.

These modifications to the circuitry result in deviant machine behavior and curious audio distortions. Try crossing wires that are connected to the machine's RAM pins, and the machine will play new drum rhythms that no human has programmed. This project is an opportunity for the beginning electronics enthusiast to enjoy a first-hand experience of "hardware hacking".

There is a second component to the project: The robotics of a toy dog crossed with the grotesque skin of an old Furby, culminating in red and gold paper maché horns. Yes, it's Gracie. I sculpted her from old toy parts and acrylic paint, and I'm now using digital pulses from the circuit board of the aforementioned TR-505 (see above) to control the robot's motions. So by sequencing a beat on the drum machine, one can actually sequence movements for Gracie. She not only waggles her horns, but can also bark to the music! This is Gracie's first demo with live viewers, so be sure to look for my table and show support as Gracie Gets Roxy!

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Category: Arts
Name(s): David Alvarez
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Taj Frazier, Annenberg School of Communications
Format: Creative Work
Title: Grapes
Abstract:
I have taken a variety of items, mostly trash, with no value, and composed a piece that re-appropriates the meaning and symbolism of these worthless items.

Over the past couple of months, I collected these objects as I walked through the various parts of the USC campus and the surrounding areas.

Some of the objects of "Grapes" were intercepted on the way to the trash can such as bottle tops, an old toothbrush, pen pieces, and straws.

The non-golden grapes represent hope for change and the efforts of the few who truly respect and preserve their natural environment. Ironically, the grapes are artificial as well.

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Category: Arts
Name(s): Bernice Ngo
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Erik Mar, School of Architecture
Format: Creative Work
Title: Housing and Medical Facility in Floating Village of Tonle Sap Lake
Abstract:
The projects are located in the Tonle Sap Lake in Cambodia, which is known as the largest lake in Southeast Asia. Every year, during the monsoon season, the great lake expands and floods the land in the surrounding area. As a result, the people living in the area need to move out every time there is a flood. However, they rely on the lake for all their resources, which includes rice and fish, so they continue to return only to leave again once there is a flood.

The concept for this project is to create a prototype house and medical facility so that the people may use and adapt it to both flood and non-flood conditions. In either condition they will be able to operate so people do not need to leave the area. The house and bridge both float so that it rises with the changing water.

The project also introduces new systems and technology to the site to provide people with a better living condition. These systems includes collecting and purifying water, composting human waste, and generating energy from watermills and solar voltaic fabrics. The project solves issues that the people living in Tonle Sap Lake face. Instead of moving out and having their homes destroyed every time there is a flood in the region, the house and community facility will be able to adapt with the changing water levels. This project shows how architecture may adapt to its environment to meet the needs of its user and also provides them with a better living condition.

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Category: Arts
Name(s): Joel Kropinski
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Robbert Flick, Roski School of Fine Arts
Format: Creative Work
Title: Insert Token
Abstract:
Up. Down. Left. Left. Right. Smash the A button. Bash the B, faster -- faster!

There's reality. And, then there's virtual reality. As we enter into a new decade of the 21st century, the line between life in the real world and life lived virtually, whether it be through a mobile phone, an entire music library carried around in the pocket, computers, or social networking sites, is becoming a fact of...well, life. Via an ever growing and unstoppable technological presence, cultures are experiencing a schizophrenic split between ourselves and our digital selves.

But, while the presence, the sometimes near obsessive need to maintain the digital self, can be taken on the go, intuited from the home or nearly anywhere, there are still pockets of places that represent the last clash between reality and the virtual world we can inhabit, arcades.

Arcades, a seeming relic from the 80s culture, can be holes in the wall in a Downtown Jewelery district, nestled in small shopping malls, be places of amusement at parks, or cult like dens, dark and lonely where the only source of light is emitted from the screens of game cabinets. No matter the style of arcade, though, these are still places that exist in the world yet allow us to depart from it for a short while. In studying the faces and mannerisms of people intuiting these games there is a look of blank enthusiasm. Is this the face of the future?

Regardless, arcades are that dying vestige of the place between our world and that of machines, of technology. And all you need is a quarter or two to enjoy.

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Category: Arts
Name(s): Nicole Laureola
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Susan Segal, English
Format: Creative Work
Title: Love and Death and Death and Love: a collection of truths, written and revised

Abstract:

Woody Allen wasn't the only one fascinated by it. The universal truths of love and death have and always will be some of the greatest mysteries to be posed to the human race. Attempted explanations of these absolutes reveal personal truths that can then be extrapolated into collectively-experienced thoughts, feelings and situations. Just like storytelling itself, some things last forever.

This collection seeks to display one view on the themes of love and death that may hopefully be related to by those who come across it. Showcasing a single voice emerging from the din, the portfolio presented here strives to tap into its viewers' primal instincts using experimental structures and unconventional narrative modes.

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Category: Arts
Name(s): Emily McPeek
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Kristin Calabrese, Roski School of Fine Arts
Format: Creative Work
Title: Massacre at El Mozote

Abstract:

In each drawing I visually describe a very real scenario that happened during this massacre. The government ordered death squads to pillage villages where communism was allegedly running amuck. El Mozote is especially famous because the people killed were promised a certain oasis in El Mozote where food and water would be provided, so many families gathered there, only to be murdered in the most gruesome of ways, half buried in the dirt of a place people would now label as "El Mozote Nunca Mas." This is a crucial part of Salvadoran history, and my own history, which stories I have heard much about from my father and from friends of mine who currently live in El Mozote. This is a story that I hope to tell to the rest of the world, just as I have been told it.

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Category: Arts
Name(s): Jayson Kellogg
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Caroline Clerc, Roski School of Fine Arts
Format: Creative Work
Title: Memento Mori

Abstract:

I spent six days shooting portraits of students walking on campus, soliciting them to interact with a real human skull. I was interested in how people would relate to an object that symbolizes among other things that of one's own mortality.

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Category: Arts
Name(s): Tiffany Pereira
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Xavier Fumat, Roski School of Fine Arts
Format: Creative Work
Title: Nothing is Black and White: Depicting an Environmental Case Study through Scientific Illustration

Abstract:
When it comes to Science people tend to believe that answers are right or wrong, black or white. Environmental Studies, by its definition, is the science that it deals with people and their interactions with the environment. Thus, for any of the environmental problems we face, there will be a set of people who carry out research with numerical results that are as concrete as the textbooks I study from. However, the grey area arises in the human element, the interpretation and the implementation of solutions. Environmental Studies issues all have different perspectives be it cultural, ethnic or racial.

Thus, the key problem facing Environmental Scientists is communication. How can scientific data be presented in a way that engages and impacts an audience, especially those hard to reach individuals? As an Environmental Studies Major and a Fine Arts minor, I believe I have found a solution. Science and Art do not exist on separate planes, polarized by different processes. I have found that creative mediums can powerfully convey scientific fact. In "Nothing is Black and White" I sought to call upon the discipline of Scientific Illustration to discuss a pertinent yet overlooked issue at the heart of my home city of Los Angeles. The L.A. River is known to many as little more than a drain in its current state. Nearly completely channelized this concrete wasteland is of little concern to most Angelinos. And yet, the River still contains life, it's riparian ecosystem still exists in the northern reaches of the River, giving birds, fish and even humans on the fringe of society a safe haven. The History of the L.A. River is complex, multifaceted and deserves attention. Thus, I journeyed to the River myself to photograph and document its story as the focus of "Nothing is Black and White."

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Category: Arts
Name(s): Junxian Poon
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Christopher Barnard, Roski of Fine Art;
Karen Koblitz, Roski of Fine Art
Format: Creative Work
Title: Ouijadiexian

Abstract:
Perfect artworks in terms of aesthetic and mimicry should be attractive; they express beauty through the forms of the pieces and talents through the skills of the artists, but when we look at these artifacts, such as dolls and hyperrealist sculptures, we can sense an eerie feeling from them. That eeriness repels us. Therefore, attraction and repulsion happens simultaneously. However, they are bipolar effects; they should not imbed in a same object. My work is to address this paradox and to discover what the perfect art is. I create an installation composed of a drawing and five sculptures. The drawing is depicting a fake demonic ritual that tries to convince spectators that it is real. All the sculptures are hand sculpted clay sculptures finished with acrylic paint; they are a chopped off hand and four burnt out candles with five point star bases. All the artifacts are tried to be as realistic and as elegant as possible. This way of executing the objects is aiming to present a perfect artwork that includes both beauty and eeriness. After seeing the work, lots of spectators receive an eerie feeling but attracted by its complexity and prettiness at the same time. They are attracted to approach and look at the work but also repelled by its scariness. Most of

the audiences are frightened by the hand instead of the drawing while the hand is more realistically and beautifully created. In conclusion, this work addresses the paradox of a beautiful and perfect artwork: it presents beauty and horror at the same time. In addition, the spectators' reactions tell that the more perfect the object is, the scarier it will become. Therefore, the perfect art, in terms of both aesthetic and mimic skill, would be pretty and scary at the same time.

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Category: Arts
Name(s): Simon Fink
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
David Maquiling, School of Cinematic Arts
Format: Creative Work
Title: Out of Hand
Abstract:
Some assembly is required, some desired. This is the story of a robot, its hand actually, and its journey to find itself or at least as many pieces as possible. At a more visceral level, it is about finding acceptance in a community and wondering at our world from a new perspective. During the robotic hand's search it encounters hands connected to human bodies, hands holding each other, hands texting and playing instruments before arriving at a junkyard where it hopes to find its own body and purpose.

Behind the scenes, this project contains many technical nuances. The special effect of the disembodied hand was achieved in post-production through rotoscoping and motion tracking. All the sounds in the film were recorded and added to the picture after it was shot, using a mix of library sound effects and sounds recorded on a foley stage, where various objects and materials were recorded to mimic the sounds that the audience would expect to hear on the screen. A sound was created for everything in the film from the background to the movements of each finger. The hundreds of sounds were then condensed and mixed down from 26 tracks to 1 track.

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Category: Arts
Name(s): Rowan Belden-Clifford, Benjamin Bharier, Brandon Forrest, Bryan Forrest, Jared Greiner, Clark Kromenaker, Jordan Limor, Matteo Marjoram, Travis McLain, Stuart Rodriguez, Colin Windmuller
Submission Type: Group
Project Sponsor(s) and Collaborator(s):
Jackie Karira; Aadarsh Patel, Computer Science (Game Development); Michael Zyda, Viterbi, Computer Science (Games), GamePipe
Format: Creative Work
Title: Paradox Shift
Abstract:
Paradox Shift is a video game project currently in development for the course CTIN 491 "Advanced Game Project." The game is a 3D adventure where players will use only a Time Transport Tool (T3) to instantly shift yourself and tagged objects back and forth between two time periods as you traverse levels and solve puzzles. With no traditional weapons at your disposal, evade and distract enemies across time as you stop them from destroying the dam.

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Category: Arts
Name(s): Richelle Gribble
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Bob Alderette, Roski School of Fine Art;
Margaret Lazzari, Roski School of Fine Art;
Ron Rizk, Roski School of Fine Art
Format: Creative Work
Title: Parts per Million
Abstract:

My series consists of five pieces that are made up of multiple canvases and materials, and draw upon my experience living in both rural and urban environments. Having grown up in a small mountain town called Idyllwild, CA most of my artwork was influenced by natural colors and patterns. Now, as a sophomore at USC, I wanted to examine my reaction to urban areas by focusing on pattern through populations. I'm incredibly fascinated by the ways in which an individual component becomes anonymous - a piece of a pattern - when placed in a larger group.

Parts Per Million is a series of paintings that examine the role of an individual within any given system. In a collection, whether containing objects, people, or places, a viewer's overall interpretation of the collection is necessarily influenced and shaped by each individual component. However, the reverse is also true; an individual exists within a context, and therefore its neighboring entities, whether consistent or vastly different, influence the way the individual is perceived.

To examine these multi-part systems, in this case, the ways in which populations are recognized and defined, my main influence was imagery from an aerial perspective. Housing tracts, expansive farmlands, and coastal stretches reflect the ways that populations shape our landscape – each individual house and roadway paves the surface as a single component but is recognized within a larger arrangement.

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Category: Arts
Name(s): Savannah Trevino
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Margit Omar, Roski School of Fine Arts
Format: Creative Work
Title: Permanence
Abstract:

The portraits I decided to paint are in honor of a select few individuals here at USC whom I feel have made an impact on me, and who I find to be truly inspirational. Although they aren't my best friends, nor are they people I've known for many years, they've come to represent the importance of being involved in the world around you and the people you encounter within that world. Whether they were the first to reach out and befriend me, to tell me unexpected and heartwarming stories, or to teach me how to build my first canvas, they each demonstrated that no matter how big and crazy the world gets, we must always remember that it's the small things that count. They remind me in their own way, that no kind gesture is ever too small, nor does it rarely go unnoticed. Small gestures can make a difference in someone's life, and these paintings try to capture the permanence someone can create for you in a world where everything seems fleeting. The presence of today will be gone tomorrow, so I find that its important to make sure you do your best to be there, and be present in your everyday encounters, because it might make a world of difference for someone you barely know. This series simply tries to capture and hold the viewers attention on a few people who have caught and held mine.

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Category: Arts
Name(s): Madison Orgill
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Xavier Fumat, Roski School of Fine Arts
Format: Creative Work
Title: Shadow
Abstract:
When asked, "Who are you?" to almost any person you meet you will often hear the words "friendly, nice, outgoing, funny..." which are overused words that explain nothing about the individual. Then they will go on to explain what type of movies they enjoy, their occupation, and/or how many siblings they have. These answers are not wrong but do they really tell who they are? So I began thinking, what characterizes the "who?" Who am I? What would I say that would really tell a person who I am? What makes me different? My study at USC is not necessarily answering these questions but exploring them and the human condition. In theater I have learned how important it is to be specific with emotions and actions, having a reason behind everything I do. It is amazing how much I found myself and others going for stereotypical emotions like sadness, anger, or joy. There are millions of possibilities but we all went to the safe zone of the general. These actions in and of themselves are incredibly interesting to me to the point where I began questioning almost everything I do or believe, becoming a child always asking "why?" What I have come to realize so far in my search for unanswerable questions is that we all have a specific personality and character that changes by who we interact with, other peoples beliefs, traditions, etc. until our individuality and character is nothing but a shadow, sometimes behind us, leading us, or lost in the dark.

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Category: Arts
Name(s): Michael Coursey, Robert Foster
Submission Type: Group
Project Sponsor(s) and Collaborator(s):
Vicki Callahan, Institute for Multimedia Literacy; Helen Kim, Roski School of Fine Arts
Format: Creative Work
Title: Shakespeare^3
Abstract:
Our project arises from the intersection/influence of

Picasso's cubist exploration of sight in traditional oil paint which expanded perspectives within the frame of a single painting, 1905 onward
=>
David Hockney's resulting exploration of human perspective(s) + photographic process within a single photo collage, 1982-85
=>
Shakespeare's exploration of perspectives framed within a single theatrical narrative and within the mind of a single character, early 1600s onwards

We will synthesize the above into:
our own exploration of the multiplicity of human perspectives and theatrical performance in a digital context, digital manipulations

Perspectives: The single frame will be divided into nine subframes which will combine into a single composite face (in closeup). This aesthetic grid will allow us to simultaneously play nine unique takes of an actor reading a selection from Shakespeare's Hamlet. The combination of separate takes will subtly demonstrate the multiplicity in both cinematic performance and the portrayal/potential readings of character thereby challenging the linear or stable conceptions of the contemporary cinema audience

The project will therefore seek to challenge

cinema's traditional narrative, aesthetic, performative and temporal representations in a way similar to the explorations of visual representation and human consciousness by Hockney, Picasso, and Shakespeare.

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Category: Arts
Name(s): Andrea Vancura
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Morten Lauridsen, Composition-Thornton School of Music
Format: Creative Work
Title: Sound Design and Underscore for "Japanese Garden" Slot

Abstract:
At first glance, a slot machine game is based on a very simple premise: the player inserts money, the reels spin, and the outcome of the bet is determined; this process takes but a matter of seconds and can be taken in in a glance. While the premise is simple, the game itself is a complex entity; each play has a different randomized outcome, and every event that occurs in the game has its own accompanying sound effect, engaging the player by providing sensory feedback. In addition to the individually triggered sound effects, background music and atmospheric ambient sounds serve to create a sound world for the player, creating an impression of the game's tranquil garden setting, securing and maintaining player interest as they play through the bonus games, and adding to the excitement when they win big!

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Category: Arts
Name(s): Mario Leon, Yoon Ji Nam, Li (Leo) Yu
Submission Type: Group
Project Sponsor(s) and Collaborator(s):
Eric Nulman, School of Architecture
Format: Creative Work
Title: TANGLED

Abstract:
This project explored innovative ways in order to create an object that can hold people, driving away from the original form of the typical bench. One of the most important aspects is to make people enjoy social communication and get privacy at the same time while they are resting on our "bench." Inspired by braiding and an Asian knotting system, we did several experiments on diverse materials to find one that is flexible enough to easily change the form and is rigid enough to hold many people. The final material chosen was polyethylene pipe insulation foam, which is soft and flexible enough to braid and knot, and able to provide comfort in a way that people can relax while they are seated on it. We used penetration with strings to reinforce the joining strategy in order to get a single strip of multiple braiding systems. By knotting, we have a central courtyard to promote social communication and an extending tail for privacy. This is the result of knotting the layered braids in such a way to provide flexible seating; which would allow for different configurations if necessary. Using seemingly mundane pipe insulation units we managed to create a both interesting and innovative bench, relying on a specific module. On a larger scale, the project conveys our notion of architecture, creating forms that are both sculptural and functional in both private and public realms.

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Category: Arts
Name(s): Aneesh Chaganty
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Bill Yahraus, USC School of Cinematic Arts
Format: Creative Work
Title: The MAD Challenge
Abstract:
I began the MAD Challenge on September 13, 2010 because it was on that day I came to the conclusion that not a single cinematic figure I deeply respected did not have a dense knowledge of the medium. Furthermore, but it was precisely this knowledge that they were able to draw from and create the works of art we all know.

The MAD Challenge is a response to the idea that, as an aspiring filmmaker, practice alone cannot fuel passion, but education and personal research should garner as much, if not more, attention. The Challenge requires that I watch one film every day for the next year and maintain an active blog to keep me accountable.

This Challenge, more than anything, is meant to educate. My short-term goal is that by the time it is over, my filmic knowledge will have tripled and that this challenge will inspire me to continue watching numerous films as study tactics as well as for entertainment purposes. But through the Challenge, I also hope to reach out to movie enthusiasts all around the world. My aim to is create a private internet forum, outside of advertising influences and financial incentives, where average filmgoers and cinephiles, alike, can express their views about film.

From a long-term standpoint, I hope to draw upon this knowledge, as many successful filmmakers have, in the films I am to make in the future. I hope it begins a journey (maybe never to complete) that immerses myself in film, in its theories, in its analyses, and its critical studies.

When all it takes to be a filmmaker today is a camera, what separates 'professional' and 'amateur'? The MAD Challenge is a creative response to fill the void of what is missing in today's filmmaker: a dense knowledge of the medium.

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Category: Arts
Name(s): Lauren Taniguchi
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Jennifer Floto, Public Relations; Ana Lee, Spanish and Portuguese
Format: Creative Work
Title: The Perception of Normality
Abstract:
People already have preconceived notions about certain aspects of life—what is just or unfair, what is beautiful or ugly, what is acceptable or not, and what is normal or obscure. However, there are never any definite answers as to what qualities characterize those traits. A poisonous apple, a genie in a bottle, and mystical-looking creatures are all objects of the imagination. To the practical minds, the prior items are not real. Yet a sign and a bus stop bench are objects of existence. Those shadows are the ones visible; in other words, common sense tells the mind that only actual items have shadows. However, it is really the lurking shadow of perception that blocks out the bizarre in order to focus on the verifiable.

Vincent van Gogh once stated, "I wish they would only take me as I am." While perfection is impossible, the feeling of invisibility is not. The drawing portrays a stagnant situation—at a bus stop, the girl awaits movement from the man and the man searches for something in the distance. That something is change. The man is the object of change and the sign is his calling for something to be done. Yet when no action takes place, people are left

with the situations they were dealt. Each person and object has unique and distinctive features, yet society tends to overlook those qualities. There are so many unwritten social contracts, and society forces us to abide them or otherwise pay the consequences that harm us; we are not accepted for being different. Currently, people wait for change but when nothing is done, the cycle of immediate judgment continues. Items that exist are the ones that leave marks— physically, shadows could be an indication; psychologically, any figment can be a perception of normality.

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Category: Arts
Name(s): Michelle Khazaryan
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Trisha Tucker, Thematic Option
Format: Creative Work
Title: The Sweetest of Pomegranates
Abstract:
If home is where the heart is, what happens when you lose your connection to your home? How does a person cope with alienation in a foreign country, and can a true sense of belonging ever be reached? In my short story, I explore the connections between an immigrant and her Armenian homeland, and how the difficulties of life in America deteriorate the link between the heart and the home. Through both the joyous and painful moments of a new American life, the protagonist revisits her link to her mother country, through the memory of a pomegranate. Many situations that Armenian women face, either in Armenia or in America, are depicted as well— depression, domestic abuse, and the tensions between generations. If a tree is uprooted from its native land and replanted in foreign soil, only one of two things can happen— it can either thrive, or waste away. In the end, the protagonist must ask herself whether her life in America has allowed her to live joyously or whether she remains forever distant from a sense of home.

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Category: Arts
Name(s): Na Young Kim
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Jennifer Siegal, Architecture
Format: Creative Work
Title: Unidentified Rush-hour Object
Abstract:
The project is name U.R.O. stands for 'Unidentified Rush-hour Object'. The U.R.O. occupies and utilizes residual spaces in the city, particularly found in the freeway systems.

We, Angelinos, live most of our morning sitting in a slow moving traffic during morning rush hour on LA freeway systems. Looking at Los Angeles as its current popular site for food truck industry, this project aims to rethink mobile food and food truck while asking a radical question: 'What if a food truck serves breakfasts on the freeway system during morning rush hours?' LA freeway systems are known as most congested freeway system in the United States. For frustrated LA commuters sitting in their car during morning rush hours on the freeway, the project U.R.O. offers donuts and coffee serving down from the overpass. Because of its unprecedented figure and functionality, U.R.O. will become a phenomenon to Los Angeles.

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Category: Arts
Name(s): Eli Joteva
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Erika Vogt, Roski School of Fine Arts
Format: Creative Work
Title: Web Release
Abstract:
Bound within our own webbed systems of beliefs, values and perceptions, can we ever fully attain a clear grounding of social de-conditioning?

Taking on the meaning of social and psychological structures, the net's engulfment of the physical body ranges through symbolic arenas,-- touching on self-imposed limitations, battle with internal and external perceptions, and struggle to balance the internal feminine under a social system of patriarchal domination. While the material impacts of an imposed structure can be physically observed, piece observes the lingering traces of its cultural and behavioral shadows even when the structure itself is gone.

Ideally, the piece would be installed with the net-swing suspended on the side of the video projection, allowing the space for artistic performance as well an opportunity for participatory engagement with the web on an number of personal levels. Thus, while this video is a personal exploration of dealing with structural systems of beliefs and behaviors, it also transgresses into the social realm in that participants can host their own personal release journey.

Playing on Jungian ideas of embracing the shadow as well as ritualism of psycho-magic, the piece proposes that the ritualistic act of art be utilized as a constructive means of addressing destructive issues; by active and conscious co-operation with the process of resolving internal struggles, and an involved embracing transmutation of both personal and collective shadows into productive light.

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Category: Humanities
Name(s): Parin Patel
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Lynn Swartz Dodd, Religion
Format: Laboratory-based Research
Title: Archaeology and the Literary Narrative: Using Written Language to Understand Material Culture in the Buddhist World

Abstract:

Archaeologists attempt to understand the human past through analysis of material culture. Material culture pertains to any physical remains that were used by humans. This can include pottery and cultivated crops as well as literary texts and human remains. Archaeologists analyze material culture to develop a clearer understanding of past civilizations. In certain situations, the material culture of a society depicts stories, images, characters and events that are included within the literary or religious or political domains of society. This is the case for a series of stone sculptures that reside in USC's Archaeology Research Center. Through my analysis of Aśhva·ghosha's "Life of the Buddha", I am "deciphering" a group of Buddhist artifacts that depict early versions of the Buddha's life. In fact, the Buddha was regularly represented because of the cultural influence of the Greeks who accompanied Alexander the Great to the Indian subcontinent. Hence, my research concerns important, rare and early depictions of the Buddha that were found in the ancient region of Gandhara, located in modern-day Afghanistan.

The "Life of the Buddha" biography chronicles the life of Siddhartha Gautama, an ancient king who renounced everything he had in order to gain enlightenment and end suffering. Gautama eventually became known as the Buddha. The artifacts in the USC Archaeological Research Collection are directly associated with the Buddha's biography and depict scenes from his life. My research combines literary and scientific analysis in order to provide a thorough explanation of not only what these artifacts represent, but also to understand their composition, age, and the methods of creating the artifact. Additionally, in preparation for publication, I am creating Internet-accessible images of these artifacts using a technique called Polynomial Texture Mapping (PTM), which allows remote users to move artificial lights around high-resolution images of these artifacts.

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Category: Humanities
Name(s): Cara Polisini
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Lynn Swartz Dodd, Religion
Format: Field Research
Title: Archaeology Matters

Abstract:

ArcSmart is a partnership between USC's Archaeological Research Collection, the USC international Museum Institute, and the Los Angeles Unified School District's Art and Antiquities Collection. My research helped launch this successful and

substantive archaeology outreach program to LAUSD's sixth grade classrooms this past year. Specifically, I investigated best practice principles of presenting original, multi-sensory, extensible archaeology lessons in schools that can no longer afford field trips for their students and whose teachers are working hard to improve student performance on state tests.

For five consecutive weeks each semester, USC "ARC Smart educators" (student volunteers) visit the same classroom and teach five different, original lesson plans all designed to support California state curricular standards. Students are able to "get their hands on the past" by handling real artifacts; they learn archaeological field methods with a simulated excavation; and discover how to investigate ancient places and artifacts through Google Earth and InscriptiFact's image database. By the end of the fifth ARC Smart session, we assess the students through a fun game that allows students to demonstrate their increased knowledge.

The curriculum research I did, and the state standards mapping that was undertaken by USC grad student Candace Weddell, were foundations for the development of ARC Smart. Because of this program, USC students get hugs, high fives and thank you letters from LAUSD students and teachers who enjoy having their classroom transformed into an exciting learning experience about archaeology. Additionally, the outreach work done by USC students is an important "hands-on" demonstration for us of the importance of communicating to the public and of the ethical importance of stepping outside the "ivory tower" of academic research in order to engage with diverse audiences.

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Category: Humanities
Name(s): Rebecca Ferdman, Alyssa Ortez
Submission Type: Group
Project Sponsor(s) and Collaborator(s):
Robert Delgado, Anthropology
Format: Laboratory-based Research
Title: Behavioral flexibility among three sympatric non-human primates in Southeast Asia

Abstract:

Through field work and direct observation of gibbons, langurs, annd orangutans, the team compiled resesarch on the behavioral flexibility of non human primates in Southeast Asia. Collecting data in the field consisted of following groups throughout a post logged jungle habitat, acquiring samples of prrimate diet, annd calculating homerange. In the labratory, Rebecca and Alyssa gathered data regarding the three types of non human primates witthin alll of Southeast Asia. The information gathered included previous studies in the same jungle Alyssa and Dr. Delgado were in, as well as academic journals of surrounding areas. The poster aims to present the distribution of langurs, gibbons, and orangutans within Indonesia as well as the variants of their behavioral characteristics.

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Category: Humanities
Name(s): Jason Lipshin
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Andreas Kratky, Institute for Multimedia Literacy + Interactive Media Division (School of Cinematic Arts); Mark Marino, Writing Program
Format: Senior Honors Thesis
Title: Communicable Disease: Towards a Political Ontology of the Computer Virus

Abstract:

"Emergence is always produced through a particular stage of forces."

-Michel Foucault

Mirroring the complexity of an emergent, networked topology, defining the term "virus" necessitates multiple movements and intersections across disciplinary lines. The term virus can encompass both a set of things and a set of concepts: it can define such widely disparate materials as nucleic acids and computer programs, and can equally operate as the cultural object of fear and paranoia during times of crisis and "too much connectivity." In both its organic and inorganic instantiations, it is often considered a vital form: a semi-autonomous agent that seems to propagate, pervert, and expose on its own. As such, it is imagined to represent a non-human, yet uncanny, threat to human agency and boundaries on many scales, as bodies, machines, and nation-states are all perceived to be under attack.

Drawing on the diverse bodies of literature concerning viruses in computer science, biology, media studies, and critical theory, "Communicable Disease" uses the figure of the computer virus to investigate broader historical and theoretical trends within modernity and network culture. Seeking to supplement traditional humanistic inquiry with a technical understanding of how machines operate, it implements a hybrid, materialist-cultural analysis in order to place technological design within wider discursive structures of power and ideology. In attempting to tackle such questions, this project also takes a multimedia approach by incorporating videos, images, and simulations into more traditional scholarly argumentation. Built in the electronic book platform, Scalar, it thus seeks to demonstrate what multimedia scholarship can contribute to the digital humanities.

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Category: Humanities

Name(s): Jacob Bongers

Submission Type: Individual

Project Sponsor(s) and Collaborator(s):

Elizabeth Arkush, University of Pittsburgh; Ran Boytner, USC/UCLA; Michael Harrower, Johns Hopkins University

Format: Senior Honors Thesis

Title: Landscapes of Death: GIS-based Analyses of Chullpas in the Western Lake Titicaca Basin

Abstract:

The western Lake Titicaca Basin is littered with above-ground funerary towers, known as chullpas, located in a variety of geographical contexts and dating to the Late Intermediate Period, or LIP (AD 1100-1450), and Late Horizon (AD 1450-1532). Over the years, interpretations of these tombs have concentrated upon their roles as loci for ancestral veneration and their abilities to perpetuate memory, delineate social ties and territories, and demarcate access to resources. These views share the implicit or explicit assumption that these mortuary structures were intended to be highly visible. Yet this assumption has never been formally tested. By using GIS-based geospatial tools and statistical analysis, this paper investigates the extent to which chullpas surveyed in the western Lake Titicaca basin visually dominated the landscape. Visibility is revealed to be a strong location determinant for chullpas, thereby suggesting that this landscape of death was deliberately constructed to have an enduring impact on the population.

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Category: Humanities
Name(s): Zachary Lindberg, Samuel Trevino
Submission Type: Group
Project Sponsor(s) and Collaborator(s):
Lynn Swartz Dodd, Religion
Format: Laboratory-based Research
Title: Marash Valley Pottery: Cultural Dynamics of the Ancient Middle East

Abstract:

Our research contributes to the publication of a large, regional archaeological survey the Marash Valley, Turkey. The survey publication project is directed by our professor, Lynn Dodd, who participated in this field research that identified hundreds of archaeological sites in a region that was sometimes independent and fought over by expanding empires. Our focus is the Bronze and Iron Ages, from 2000 BCE through 600 BCE. Our team project has been directed at completing digital reconstructions and illustrations of pottery vessels that are used as a means of dating archaeological sites located in the Marash valley. The pottery illustrations are created from field drawings that have been scanned into the computer. From there, our team uses Adobe Illustrator to construct whole renditions of these pottery fragments. These reconstructions help to paint a picture of daily life at Marash. The vessel types, shapes and clay fabrics tell us a great deal about what kinds of sites we have found and their dates. This allows us to estimate when its population grew or contracted; when its sites were more or less numerous; when new styles or even new people arrived in the region. These digital illustrations and reconstructions allow us to compare the pottery from this region to other areas. These comparisons can be used to see patterns or trends in the historical development of the ancient Middle East. Our illustrations are research productions in the aggregate, allowing us to gain a clear view of the material culture of this region through time. At the same time we comprise a new data set on which conclusions about this landscape and its settlement history can be written for the first time. Our work will contribute to digital publications and databases, as well as a book about this archaeological survey and this ancient landscape.

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Category: Humanities
Name(s): Matthew Broaddus
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
William Handley, English
Format: Analytical Paper
Title: Myth as a Function of Genre in Some Major Examples of Postcolonial Nigerian Literature

Abstract:

Over the last two years I have researched the subject of myth and mythic elements in major works of Postcolonial Nigerian literature. My critical work has focused on three of the most influential authors of the genre: The novelist Chinua Achebe, the poet Christopher Okigbo, and the playwright Wole Soyinka. How do these three authors uses myth, a single convention, across three generic landscapes (the novel, the poem, and the play)? In Things Fall Apart, Achebe is extremely aware of the novel as a "Western" form and so uses myth often to refute and disrupt the "flow" of a typical linear narrative of a Western novel. The myths Achebe employs are often stories within stories used to illuminate the pre-colonial African culture Achebe depicts in Things Fall Apart. Soyinka relies on physical action in the form of rituals as well as ritual drumming and dialogue to create his version of the colonial relationship between native Africans and their English colonizers in his play Death and the King's Horseman. The poet of Heavensgate, Okigbo, on the other hand, uses language in non-traditional ways to emphasize the psychological and physical relationship between god and man in the postcolonial

world. Okigbo is interested in the mythic world as one that both connects cultures (such as the colonizer and the colonized), but he is also unsure about the human mind's ability to connect on a tangible level with the spiritual, the intangible.

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Category: Humanities
Name(s): Bradford Jackson
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Lynn Swartz Dodd, Religion
Format: Laboratory-based Research
Title: Native American Sacred Sites: Laser Ablation as a Culturally Appropriate Method of Graffiti Removal

Abstract:
The ritual practices of the Pechanga and San Luis Rey tribes were violently disrupted in 2006 when ceremonial rock sites were defaced with graffiti. Many conventional forms of graffiti removal conflict with the tribes' beliefs, in which the rocks are viewed as living entities. To the tribes, using chemical or similar techniques to remove graffiti would be analogous to throwing acid on a child's face. In a study done by Claire Dean and Meg Abraham, laser ablation was accepted by most of the tribes as a means of restoring the defaced rocks.

This project involves systematic research aimed at quantifying the effectiveness of an Nd:YAG laser as a means of removing graffiti from sacred Native American sites in southern California. Laser ablation in particular is being investigated for two reasons: ruined, sacred Native American sites in southern California need to be cleaned, and traditional cleaning techniques are abhorrent to many of the tribes. As more and more tribes have funding to purchase portable laser cleaning devices, there is an urgent need to inform tribes and other stakeholders about the limitations and complications of laser ablation – laser ablation is effective, but must be performed carefully to avoid damaging the rocks.

300 rock samples were prepared from Lake Perris granite. The samples were painted with graffiti and ablated. Laser power and exposure time were varied, to determine their effects uniquely. The effect of rock morphology on ablation effectiveness was also investigated.

Trials were performed with the 1st harmonic of a standard Nd:YAG laser. While a range was found for effectively removing black paint, other colors weren't removed as effectively. Initial testing with the 2nd harmonic indicates that it is able to remove other colors of paint much more effectively than the 1st harmonic. Investigation of the 2nd harmonic is still ongoing.

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Category: Humanities
Name(s): Claire Nickerson
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Bruce Smith, English
Format: Analytical Paper
Title: Textual Musicality in Shakespeare

Abstract:
My project focuses on the musicality of Shakespearean text on the stage and how it supports the story from an integrated perspective of phonetics and aesthetics. I concentrate specifically on how the sound of the words he chooses affects how the actor speaks the line and thus what the audience intellectually and emotionally understands the line to mean. Contemporary actors are not accustomed to thinking of dialogue as part of the sound design of a play, and therefore modern audiences often hear Shakespeare performed by an actor giving more emphasis to his own interpretation of the denotation of the line than to the sounds

that comprise it, leading to a lack of understanding and appreciation because the unfamiliar language isn't brought to life with universally understood inflection. I set out to prove that there is a subtle system of phonetics unique to Shakespeare's works and actors who follow it are much more successful at communicating meaning, emotion, and subtext. In the course of my research, I attended Shakespearean plays, conducted interviews with five Shakespeare scholars, and read several books by experts on the subject. I then presented to an undergraduate class my close readings of sections of text analyzed for irregular rhythm; manners of pulmonic consonants; and patterns in the placement of vowels, for which I created a system of classification derived in part from the International Phonetic Alphabet and based on their correlation to the archetypal sounds associated with various human emotions. I then played sound clips of actors who did and didn't inflect and rhythmize the lines as I suggested and questioned the students as to their preference. Universally, the students preferred sound clips of actors who followed my system, which suggests applications for modern Shakespearean actors in terms of recapturing the interest and imaginations of their audiences.

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Category: Humanities
Name(s): Mariana Aguilar
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Franklin Manis, Psychology Department
Format: Analytical Paper
Title: The End of Education as We Know It
Abstract:

For my independent study, Psyc 490 class, I designed an observational research project of four Los Angeles High Schools. The first school, Fairfax High School, I utilized as the control group because it is a conventional LAUSD high school. The other three schools were charter schools: Fredrick Douglas Academy, an ICEF school on Arlington and Adams; Animo Leadership, a Green Dot school in Inglewood; and, Da Vinci School, a project-based charter high school in El Segundo. I spent eight hours at each school observing classrooms and interviewing faculty and students. I focused my attention on each school's college preparation program, classroom environment, percent of student engagement, curriculum, quality of faculty and relationship with the community. I concluded the semester with a proposal of the optimal high school. In the proposal, I combined successful qualities exemplified by the schools, information gathered from innovative educator, Doreen Nelson, and some of my own novel ideas supported by basic psychological research.

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Category: Humanities
Name(s): Sarah Butler, Renee Duncan-Mestel, Bradford Jackson
Submission Type: Group
Project Sponsor(s) and Collaborator(s):
Lynn Swartz Dodd, Religion
Format: Laboratory-based Research
Title: The Front Lines of Empire: Metal Arrowheads and Projectile Points as Indicators of Social and Political Transformation in the ancient Near East
Abstract:

Artifacts from Near Eastern archaeological sites were analyzed by synchrotron radiation-based XRD and XRF at the Argonne National Laboratory near Chicago in order to understand ancient control of a strategic weapons material: bronze. We learn what the weapons were made of (the recipe) and how they were fashioned (e.g. cast, hammered). Our research explores the metal-working techniques used before, during and after periods of Assyrian and Persian imperial expansion.

Our research investigates the relationships between military provisioning, political control, metal manufacturing, resource acquisition and long-distance trade. We compare metal-making traditions during periods of local hegemony with manufacture in periods of imperial socio-political domination. Tayinat and Judaidah were independent regional centers of the kingdom of Patina/Unqi in the Amuq Plain of south-central Turkey during the 12th–8th centuries BCE. This socio-economically important region was conquered and incorporated into successive imperial control by both the Assyrians and Persians from the 8th–4th centuries BCE. Artifacts from the two imperial centers, Megiddo and Persepolis, provide a baseline characterization for imperial metal production. Megiddo (Israel) was the site of an Assyrian governor's palace during the 8th–7th centuries BCE, while the Persian kings commissioned and provisioned their conquering armies from Persepolis (Iran) during the 6th–4th centuries BCE. Bulk elemental characterization and micro-structural analysis of the artifacts will permit us to assess changes in the metal industries both before and during imperial domination. In the pre-conquest period, we anticipate decentralized, opportunistic metal production as diverse ethnic groups established new settlements. During the subsequent period of flourishing nation states we expect a more robust, though decentralized metal industry encompassing multiple technological styles, reflecting a mix of cultural traditions. In the conquest period, as Tayinat, Judaidah and Megiddo were subsumed into Assyrian and Persian imperial rule we expect centralized, highly organized, industrial production processes to emerge.

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Category: Humanities

Name(s): Grant Dixon

Submission Type: Individual

Project Sponsor(s) and Collaborator(s):
Lynn Swartz Dodd, School of Religion

Format: Analytical Paper

Title: What is a King to Do: An Investigation of Images of Kingship

Abstract:

My research is part of the "Divine and Human Form Project" within the USC Archaeology Research Center and I am contributing to the publication of a catalog of the Egyptian figurines from the Greek and Roman periods owned by USC.

My work centers on a Greco-Roman Egyptian terracotta figurine that shows an image of a man dressed in Roman military costume smiting a barbarian enemy. The identification of this artifact proved challenging because we have no details about its place of excavation, which means that a study of its form, content, and style are our only means of attributing it to its proper ancient time and place. To answer this question, I did an extensive search for comparanda. Although Roman emperors ruled ancient Egypt, they did not impose a completely foreign system into a void. Instead, the Romans used local Egyptian ideas and motifs. My close study of a clay figurine owned by USC reveals one aspect of this cultural transformation through a rare image of a Roman ruler acting as pharaoh in the classic "smiting the enemies" pose.

Along with the identification of this artifact, it is necessary to have a more comprehensive understanding of what this artifact is by analyzing its origins historically and culturally. To do so, I conducted a study of historical uses of the smiting image and a cultural study of Egyptian and Roman kingship. Smiting the barbarian enemy was a concern for both the Egyptians and the Romans.

The figurine is a rare example of the smiting the enemy pose during the Roman period. Additionally, it is – as far as I have determined – an even rarer if not unique example of a figure with multiple paint colors preserved. I am researching the specific paints and pigments used to create these colors.

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Category: Humanities

Name(s): Emily Hron Weigle

Submission Type: Individual

Project Sponsor(s) and Collaborator(s):

Lynn Swartz Dodd, Archaeology

Format: Laboratory-based Research

Title: What Time Is It? The Use of Alalakh Pottery Samples in Dating Techniques.

Abstract:

Pottery is a resource which can provide a wide variety of information regarding the use, dating, and functions of an ancient site. For example, changes in vessel shapes or materials can be used as a means of creating a relative dating of both the pottery vessels themselves and of other archaeological finds. Also, examination of the fabric of a pottery sample--that is, characteristics inherent to the clay body from which the pottery is formed--can provide information regarding the available technology of the society which produced it. Characteristics of a pottery fabric are generally functions of firing temperature and conditions, inclusions in the clay, and the composition of the clay itself.

Alalakh is a palatial center located on the Mediterranean coast of modern Turkey, first excavated by Sir Leonard Woolley in the 1930's. Ceramic materials originally manufactured over period encompassing 500 years were collected from this site. Because shapes of pottery vessels exhibit little variance across the duration of this period, we must look to other characteristics to define how ceramic vessels changed throughout this time. Petrographic examination of the samples excavated from Alalakh allows identification of distinctive features such as clay type and temper materials. By identifying how these features change relative to time--that is, identifying the differences between early and later pottery--this research strives to outline a pottery sequence that will be highly useful for dating purposes. My research involves examining and photographing pottery samples on a microscopic scale, determining whether and how the ceramic fabric and additions to the clay body changed with time, even while shapes of the vessels remained the same.

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Category: Life Sciences
Name(s): Cara Magnabosco
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Douglas Capone, Biological Sciences
Format: Field Research
Title: A Characterization of the Biology and Nutrient Cycling of Two Glacial Lakes in Isfjord Radio, Svalbard

Abstract:

Due to the fact that lakes in the high arctic are only exposed for two to three months out of the year, very little is known about the microbiology and nutrient cycling that occur in this region. Of greatest interest in these high arctic regions are the primary producers that control the majority of the biogeochemical cycling and carbon dioxide sequestration of the region. Therefore, it is important to understand how industrialization of the 20th and 21st centuries is affecting these delicate and vital ecosystems. This study explores two glacial lakes in the high arctic region of Svalbard. In order to gain insight on the nitrate and phosphate supply ratios driving primary production in the region, a series of nutrient enrichment experiments (mesocosms) on eleven locations throughout Isfjord Radio, Svalbard were performed. The results of these experiments reveal that the primary producers of this region are highly responsive to the increased nitrogen deposition from the burning of fossil fuels in North America and Europe. In particular, this study shows that, the past decade alone, diatom diversity within these two lakes has significantly decreased in response to the increased nitrogen loading of these freshwater systems.

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Category: Life Sciences
Name(s): Erin Schuster
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
David Bottjer, Department of Earth Sciences; Kathleen Ritterbush, Department of Earth Sciences
Format: Senior Honors Thesis
Title: Ammonoid Ecology of the Pennyslvanian Epoch

Abstract:

Ammonoids are extinct relatives of squid and other cephalopods, and have been in existence from the Devonian period (415 mya) to the end of the Cretaceous (65 mya). These organisms have progressed from simple to ornate shell morphology, and have inhabited most of the world's ancient oceans. Study of ammonoids shows aspects of the ancient oceans and patterns of speciation. The ammonoids for the study are from the Wewoka Formation in Oklahoma, on loan from the University of Oklahoma's Sam Noble Natural History Museum. There are 328 total specimens, 50% of which were in suitable condition to be measured. This means the specimens are whole without having been crushed or missing crucial aspects of their structure. Within the collection are two different species, on which the study focused: Eoasianites hyattianum and Wewokites

venatum all dating from the Pennsylvanian Epoch. This study addresses several broad questions. The functional morphology can help to discover if there is a connection between shapes, sizes, and ecology for these species of ammonoids. More specifically, this looks at the variety of form within and between each species. Through the use of functional morphology it is possible to determine if the intra- and inter-species variation is due to lack of selection against certain parameters.

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Category: Life Sciences

Name(s): Mathew Schur

Submission Type: Individual

Project Sponsor(s) and Collaborator(s):

Anat Erdreich-Epstein, Keck School of Medicine, Department of Cancer Biology, Pediatrics, Hematology Oncology; Hong Zhou, Children's Hospital Los Angeles, Hematology Oncology; Xiuhai Ren, Children's Hospital Los Angeles

Format: Laboratory-based Research

Title: An inhibitory role for PID1 in ATRT cells

Abstract:

Introduction

Atypical Teratoid Rhabdoid Tumors (ATRT) are rare highly malignant pediatric brain tumors caused by loss of the INI1 tumor suppressor gene. PID1, a novel protein discovered in 2006, inhibits insulin receptor signaling. Our laboratory recently discovered that PID1 expression correlates with better outcome and has inhibitory effects in two types of brain tumors, gliomas and childhood medulloblastomas. In this study I examined the effects of PID1 in CHLA-06-ATRT cells.

Methods

Cells: CHLA-06-ATRT (primary low-passage cell line isolated by us) passage 22-44 were maintained in 10%FBS/IMDM.

Transient transfection: PID1-turboGFP (PID1-tGFP) or tGFP control in PCMV6-AC, (OriGene) using Lipofectamine2000.

Colony formation: cells are flow-sorted for tGFP+ 24hrs after transfection, plated at low density without further selection and grown 11 days.

Mitochondrial depolarization: analyzed in tGFP+ cells using the MitoProbe Kit (BD).

Results

CHLA-06-ATRT cells transfected with PID1-tGFP formed fewer colonies than the tGFP-control cells, indicating that PID1 conferred inhibitory effect on CHLA-06-ATRT cells. PID1-tGFP increased mitochondrial depolarization compared to tGFP by 4.7-fold±1.8 (Mean±SEM, p=0.007, n=4) suggesting possible generation of reactive oxygen species, possible induction of apoptosis, and/or effect on metabolism. When combined with cisplatin (1-20µg/ml), PID1-tGFP-transfected cells showed increased mitochondrial depolarization compared to tGFP cells ($p<0.001$, n=4).

Conclusions and Future Directions

These results indicate that PID1 has an inhibitory effect on CHLA-06-ATRT cells and causes mitochondrial depolarization. Current work seeks to 1) understand if the PID1 effect is due to decreased survival or inhibition of proliferation; 2) examine if PID1 effect also occurs in other ATRT cell lines; 3) examine if PID1-induced inhibition involves signaling via insulin-family receptors. Uncovering the mechanism of the ATRT-inhibitory function of PID1 will allow us to better understand ATRT.

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Category: Life Sciences
Name(s): Jennifer Chang
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Jed Fuhrman, Marine Environmental Biology
Format: Laboratory-based Research
Title: Assessing Spatial Variability of Marine Microbial Communities Using Molecular Fingerprinting Techniques

Abstract:
Marine microorganisms play a pivotal role in climate regulation by removing carbon dioxide from the atmosphere. Recognizing potential patterns in the spatial distribution of marine bacteria and viruses contributes to our understanding of the factors that control microbial community composition and therefore carbon cycling. This information is useful for establishing effective conservation policies that target seawater quality. I collected triplicate water samples from Two Harbors, which faces the San Pedro Channel, and Catalina Harbor, an open ocean facing harbor, in January 2011. Bacteria and viruses from these samples were collected on 0.22 and 0.021 micron filters, respectively. The nucleic acids from these mixed communities were extracted in order to analyze characteristic gene sequences. For bacteria, the intergenic transcribed spacer region was amplified using polymerase chain reaction with forward16S and reverse 23S primers. These spacer sequences are hypervariable in terms of length and sequence and are assessed using Automated Ribosomal Intergenic Spacer Analysis. Viral gp23 capsid protein genes were also amplified and evaluated using terminal restriction fragment length polymorphism. Amplification of both bacterial and viral DNA has been successful and forthcoming community fingerprinting data will provide new insights into the ecology of marine microbial structures.

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Category: Life Sciences
Name(s): Daniel Gardner
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Roberta Kato, USC Keck School of Medicine
Format: Field Research
Title: Blood Flow Response To Cold Face Stimulation Is Blunted In Patients With Sickle Cell Disease

Abstract:
Sickle cell disease (SCD) is characterized by repeated episodes of vaso-occlusion leading to painful episodes, acute chest syndrome, stroke, end organ damage and death. Blood flow changes that result in decreased perfusion of tissues and organs increase the risk for vaso-occlusion by increasing the residence time of deoxygenated and deformed sickled red blood cells in the capillary bed. We hypothesized that SCD patients would have an enhanced vasoconstriction response to other autonomic stimuli, such as the cold face stimulation test, when compared to normal controls and SCD patients who are chronically transfused. We studied 13 normal, ethnic matched, subjects, 12 SCD and 7 chronically transfused SCD subjects. Physiologic data including systemic vascular resistance (SVR), respiratory rate, tidal volume, heart rate and mean arterial blood pressure, as well as Dermal Capillary Perfusion (DCP) and Regional Oxygen Saturation (rSO2) were continuously monitored and recorded digitally. A cold pack was applied to the forehead for 60 seconds and the perfusion and physiological data were recorded. In all three populations there was a rapid decrease of DCP from baseline (-38.2%, -26.6%, -22.5% respectively) and rSO2 (-8.8%, -4.8%, -3.3% respectively) during the cold face stimulation. Thus, compared to controls, the vascular response was blunted in both SCD and transfused SCD. Our results indicate that

there is a decrease in peripheral blood flow during cold exposure in normal controls which also occurs in SCD and chronically transfused SCD; SVR is increased consistent with peripheral vasoconstriction. Interestingly, the peripheral blood flow response to cold face stimulation is significantly blunted in both SCD and SCD with chronic transfusion, and thus transfusion does not correct the abnormality. In overview, these findings indicate that chronic transfusion partially improves autonomic function in SCD patients, but does not correct the abnormality in peripheral microvascular reactivity.

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Category: Life Sciences
Name(s): Jonathan Sepulveda
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Gage Crump, Cell & Neurobiology
Format: Laboratory-based Research
Title: Capsulin and Craniofacial Muscle Development

Abstract:

Capsulin is a promoter that has been discovered to play an integral role in the development of craniofacial muscles. From previous studies we understand that during development the mesoderm and endoderm collect into regions known as muscle cores within the pharyngeal arch. Four muscle cores develop, and these cores eventually differentiate into different muscles throughout the body, such as muscles that control eye movement, muscles in the heart, or jaw muscles.

Through the use of transgenic lines we are able to track the cells that express promoters of interest in order to further understand its role throughout the development of the embryo. By taking images or time-lapse videos of the embryo throughout development, it is possible to determine when the promoter is first expressed, when it is no longer expressed, and whether it is turned on and off intermittently. It is also possible to examine the movement of these cells throughout development, as they are expressing the promoter. These clues can help us hypothesize the specific role of the promoter being examined as well as derive new experiments to either confirm or deny the hypothesis.

In my case specifically, I used the red fluorescent protein known as mCherry to track capsulin expression in the pharyngeal arch. The use of the red fluorescence was to allow for examination of double positive transients that may use another fluorescent protein to track a different promoter. In particular, I went on to examine the interaction between the promoter capsulin, which fluoresced red using mCherry, and the promoter nkx2.5, which fluoresced green using GFP. While both capsulin and nkx2.5 have been known to aid in the differentiation of muscle, capsulin promotes development of craniofacial muscles such as the eye and the jaw, while nkx2.5 promotes the development of cardiac muscles.

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Category: Life Sciences
Name(s): Jack Peace
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Moh El-Naggar, Physics and Astronomy
Format: Laboratory-based Research
Title: Carbon Nanotube-Enhanced Electroporation in Escherichia Coli and Shewanella Oneidensis

Abstract:

This project hinges on the exploring the loosely understood interaction between inorganic carbon nanotubes and bacterial membranes. My overarching hypothesis for this unique interface is that the carbon nanotubes, which are capable of conducting electricity, serve to enhance the

delivery of electrical charge to the membrane, creating pores through which additional genetic material, in the form of small, circular plasmids, can be inserted into the cell. The carbon nanotubes may also assist in keeping these pores open for an extended period of time, ensuring a long enough time interval for the relevant plasmids to enter. In work leading up to this project, I noticed that the nanotube preparation may also alter the way in which bacterial colonies grow. Bacterial colonies that had been exposed to carbon nanotubes had less defined edges and a unique appearance compared to colonies that had not been exposed to nanotubes. This could be due to a number of factors, including the clumping of cells around the nanotubes or the creation of a biofilm. In approaching this project, I designed experiments that allowed me to optimize the transformation of the bacteria while minimizing a loss of viability as a result of the harsh conditions required to transform bacteria, which include exposing the bacteria to nearly 2000 volts of electricity. I prepared samples that tested the effects of the presence of nanotubes, the consequences of electroporation, and the efficacy of genetic transformation. While this work remains unfinished, early results show that carbon nanotubes may in fact have a positive effect on the efficiency of electroporation in *E. Coli*. These early results are promising and may yield to new explorations of this unique interaction.

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Category: Life Sciences

Name(s): Rebekah Romanu

Submission Type: Individual

Project Sponsor(s) and Collaborator(s):

Wendy Knowlton, Neuroscience; David McKemy, Neurobiology

Format: Laboratory-based Research

Title: Co-localization of $Na_V1.8$ and TRPM8 in mouse sensory neurons

Abstract:

Pain sensation (nociception) is fundamental to life, but hypersensitivity to pain reduces quality of life. For these reasons, our understanding of how nociceptive sensory neurons work is important, potentially leading to therapies to lessen the symptoms of painful hypersensitivity. In this research project, I focus on cold-induced pain. While $Na_V1.8$ is the sodium channel active during nociception, TRPM8 is the ion channel that responds to both innocuous and noxious cold temperatures. I aim to determine whether $Na_V1.8$ and TRPM8 channels are co-localized in nociceptive sensory neurons in mice. The co-localization of these two channels can be assessed both at the protein and mRNA transcript levels. Here I stain mouse trigeminal tissue (clusters of sensory neurons) with fluorescent antibodies to visualize the locations of $Na_V1.8$ and TRPM8 proteins. In addition, I prepare $Na_V1.8$ and TRPM8 DNA probes to detect mRNA transcripts coding for $Na_V1.8$ and TRPM8 proteins. Although *in situ* hybridizations to detect co-localization at the mRNA transcript level in mouse trigeminals are not performed here, these probes can be used in the future to confirm the antibody-staining results. The data collected from antibody staining shows that about thirty-four percent of TRPM8 cells also express $Na_V1.8$ channels, indicating that a subset of sensory neurons are responsible for cold-induced pain. This subset of neurons can be further investigated to increase our understanding of the mechanisms behind cold-induced pain and how such pain can be managed for patients with cold hypersensitivity. Furthermore, if only about one-third of TRPM8 cells in trigeminals also contain $Na_V1.8$, this suggests that not all TRPM8 cells are involved in detecting cold-induced pain, prompting further research to determine ulterior functions of TRPM8 cells.

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Category: Life Sciences
Name(s): Julia Lazzari-Dean
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Moh El-Naggar, Physics; Ian McFarlane, Physics
Format: Laboratory-based Research
Title: Direct in vivo Observation of Microbially Synthesized Nanostructured Materials

Abstract:
While eukaryotes are generally limited to oxygen as an electron acceptor for their metabolic pathways, some prokaryotes, such as *Shewanella* species, can respire by reducing Mn/Fe oxides, NO_3^-/NO_2^-, U(VI), Cr(VI), and $S_2O_3^{2-}$ (J. K. Fredrickson *et al.*, *Nature Reviews Microbiology* **6**, 592, 2008; K. H. Nealson *et al. International J. of General and Molecular Microbio.* **81**, 215, 2002). Certain strains of *Shewanella* (MR-1 and ANA-3) can reduce chalcogen compounds (S, Se, and/or Te containing) and process other elements, including arsenic, while precipitating nanostructures such as arsenic sulfide nanofibers. The goal of this project is to develop a thorough understanding of the process through which these structures are produced, with the hope that it can be used to biotically synthesize additional important chalcogenide semiconductors. The cells were grown on pads of agar containing arsenate and thiosulfate; time-lapse diascopic and bright-field microscopy has been used to visualize the cells as they produce the As_xS_y fibers. The fibers show up very clearly in bright field images because they are substantially denser than the surrounding cells and fluid. The arsenic sulfide appears to form on the cell membranes, sometimes completely encasing the cell. To more clearly visualize the fibers and avoid complications from increased pressure in agar, the cells were also imaged while in solution. The data suggest a particular location and rate of production of the nanofibers, which could potentially be used to understand the process and to modify it for other chalcogenides.

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Category: Life Sciences
Name(s): Lindsay (LJ) Agostinelli
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Arshad Khan, Biological Sciences
Format: Laboratory-based Research
Title: Distribution of neurons expressing nitric oxide synthase, acetylcholinesterase, and hypocretin/orexin in the rat hypothalamus: relation to basal and stimulated levels of Fos and phospho-ERK

Abstract:
Lateral hypothalamic area (LHA) neurons participate in a wide variety of homeostatic functions, including feeding and energy balance, wakefulness and arousal, and motivation and reward. Although the distribution of chemical phenotypes within the LHA has received much attention, it remains unclear how specific populations of certain peptide-expressing neurons are precisely distributed with respect to one another. In particular, whereas hypocretin/orexin (Hcrt), acetylcholinesterase (AchE), and neuronal nitric oxide synthase (nNOS) have been localized to various hypothalamic neurons, their spatial relationship to one another has not been fully explored. Nor is it clear how basal activation of neurons expressing activity-dependent markers, such as Fos and ERK, are spatially distributed among these specific neuronal phenotypes.

Here, we undertook multiple dual and triple-label immunofluorescence studies examining the distributions of these peptides within the LHA under basal and stimulated conditions. In keeping with earlier studies, nNOS and Hcrt were mutually exclusive in terms of localization in the LHA, whereas AchE-containing neurons

overlapped in distribution within neurons that also express Hcrt. A complete rostrocaudal mapping and distribution through the hypothalamus was undertaken.

The data indicate a widespread expression of nNOS in areas that are implicated in stress regulation and arousal and wakefulness, such as the tuberomammillary nucleus, the LHA, and the paraventricular nucleus. The AchE expression overlapped in some these areas, but also extended beyond to other hypothalamic regions as well. Confirming our earlier reports of phospho-ERK1/2 distribution, a medial localization of dual Hcrt+ and phospho-ERK1/2+ neurons was evident; new data indicated that Fos expression was also pronounced in medially located Hcrt neurons. Insulin-induced hypoglycemia did not appreciably alter basal levels of Fos or phospho-ERK1/2 in Hcrt neurons, suggesting that these markers may not be tracking hypoglycemia as previous published reports claim.

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Category: Life Sciences

Name(s): Shiven Chaudhry

Submission Type: Individual

Project Sponsor(s) and Collaborator(s):
Suzanne Edmands, Department of Biological Sciences, Marine Environment Biology; Wai Leong, Department of Biological Sciences, Marine Environment Biology; Barret Phillips, Department of Biological Sciences, Marine Environment Biology

Format: Laboratory-based Research

Title: Effects of Copper and Tributyltin Oxide on Marine Intertidal Copepods

Abstract:

Significant numbers of studies indicate toxic effects of copper (Cu) and Tributyltin (TBT) on marine copepods. While sub-lethal concentrations of copper have reported a reduction in female fecundity, TBT has been considered a potential endocrine disruptor (Moraitou et all, 1984, Huang et all, 2010). Despite these known findings, high and possibly detrimental concentrations of Cu and TBTO can still be detected in marine habitats. According to WHO, Cu concentrations in seawater vary from about .15µg/L in clean and uncontaminated areas to more than .100 µg/L in coastal areas undergoing severe human activities. Due to this remarkable variability of toxicity in different areas, we suspect that same marine copepod species, residing in different geographical areas, might show differential resistance to Cu and TBT. Therefore, in order to understand the differences in sensitivity, we take two Californian populations of copepods San Diego (SD) and Santa Cruz (SC) and cross them in two ways :SD female with SC male (DC), and SC female with SD male (CD). We measured the sensitivity through two different test, a chronic development test and an acute 3-hour test. In the former chronic test, we score the copepods based on development on the 7th day i.e. whether or not the copepods are at the naupliar (larval) or copepodite stage. In the latter test, on the 28th day, we subject copepods to high toxic concentrations and measure survivorship after 3 hours. The specific concentrations of the chemicals in toxic treatments for the two tests were determined through preliminary experiments and other published literature. We are currently working on the treatment and analysis of the data, and we see some interesting trends and effects of TBTO and CU on development and survivorship. The results of this study can have practical consequences for coastal water quality management and other ecotoxicology experiments.

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Category: Life Sciences
Name(s): Matilde Hoffman
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Mike Jakowec, Keck School of Medicine; John Walsh, Leonard Davis School of Gerontology
Format: Laboratory-based Research
Title: Experience-Dependent Neuroplasticity of Medium Spiny Neurons in the MPTP Mouse Model of Parkinson's Disease

Abstract:
Parkinson's Disease (PD) is a disorder of the basal ganglia characterized by severe motor impairment and functional disability. In PD, there is loss of dopaminergic neurons, depletion of striatal dopamine, and loss of connections (synapses and spines) between the cortex and the basal ganglia. Loss of these connections is thought to cause motor impairment in PD. Previous studies have shown that intensive exercise leads to increased synaptic connections and to improved learning and memory. In addition, published work from our lab has shown that intensive treadmill exercise leads to improved motor function in individuals with PD and in a rodent model of PD. The purpose of my research is to investigate whether exercise-induced improvement in motor function may be due to an increase in spine density in the dorsal striatum.

We used the MPTP mouse model of Parkinson's Disease (PD) to look at changes in the dendritic spine number on medium spiny neurons (MSNs) of two different striatal output pathways of the basal ganglia: the direct (dopamine D1) and indirect (dopamine D2) receptor containing pathways. Mice were administered either saline or MPTP. The animals were then treadmill exercised for 28 days, one hour per day. There were 4 experimental groups: 1) Saline-injected 2) Saline + Exercise 3) MPTP-lesioned 4) MPTP + exercise. At the end of the exercise period, all animals were analyzed for changes in dendritic spine density within the striatum using biocytin labeling, and microscopy. Our results show that high-intensity treadmill exercise increases spine density mainly in the indirect pathway. Findings from these studies support the role of exercise in facilitating brain repair through enhancing synaptic connections. Understanding the mechanisms leading to recovery of synaptic number and function (termed synaptic plasticity) in our exercise model may lead to novel therapeutic strategies for the cure of PD.

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Category: Life Sciences
Name(s): Takanori Ohkubo, Hao-Hua Wu
Submission Type: Group
Project Sponsor(s) and Collaborator(s):
Brad Foley, Molecular and Computational Biology; Sergey Nuzhdin, Molecular and Computational Biology
Format: Laboratory-based Research
Title: Female attractiveness and male territoriality in a sperm-limited Drosophila melanogaster population

Abstract:
The purpose of our experiment is two-fold. The first is to determine how female Drosophila melanogaster will adapt to a sperm-limited population in terms of body size. Previous published studies showed that larger female body size connoted greater fertility, while smaller body size indicated that the female was more receptive to mating, i.e. greater promiscuity. Thus, one goal of this experiment is to determine which trait of attractiveness, fertility or promiscuity, has greater adaptive significance by analyzing female body size after a number of generations. We hypothesize that fertility will be the most salient trait of female attractiveness, and thus female body size after a number generations will become larger. The second goal In our experiment is to investigate changes in male territoriality

when evolved in a heavily female-biased environment. Females normally benefit when being presented with a number of males they can compare between in a situation with the least risk, thus enabling them to select a male that offers the best prospects as a mate. In many situations, females choose larger aggregations of males, which in turn imposes selection on males for increasing group size by choice of larger aggregations. While we expect to see this type of lekking behavior, we further hypothesize that an aggregation equilibrium would be reached due to the sheer density that will make mating ineffective.

In this experiment, one female-biased population (male/female ratio, 10:100), one effective population control (m/f ratio, 18:18), and one population density control (m/f ratio, 55:55) of Drosophila are allowed to breed over generations; both weight of females and patch distribution of flies are recorded every generation. Each population density is placed in its own separate population cage, and allowed to breed in an isolated manner. Since we've only gone through two generations of flies, our results are still preliminary.

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Category: Life Sciences

Name(s): Katherine Fu

Submission Type: Individual

Project Sponsor(s) and Collaborator(s):

Lisa Aziz-Zadeh, Occupational Science;
Tong Sheng, Neuroscience

Format: Laboratory-based Research

Title: Gender-Specific Commonalities and Uniqueness in Activation for Prosody Perception Tasks

Abstract:

This study investigates commonalities as well as differences in neural networks functioning in prosody perception between males and females to determine whether these commonalities or these differences are responsible for improved distinction of different prosodic conditions. Past research has indicated gender differences in processing of emotional stimuli on a behavioral level as well as on a neural level with demonstrated differences in fMRI activation of brain regions between males and females during prosody perception tasks. FMRI analyses were conducted to directly compare activation levels between genders and identify particular common regions of activation. These overlapping regions of activation were then analyzed with multi-voxel pattern analysis (MVPA) to determine whether these commonalities in neural networks process prosody differently. However, the analysis suggested that these common regions of activation do not undergo different neural processing mechanisms. While these commonalities do not suggest different neural networks between males and females, differences in levels of functional activation between males and females were confirmed following identification of regions of uniqueness in activation between genders. These different levels of functional activation between genders align with the observation of behavioral differences between genders in response to emotional stimuli, and were also analyzed with MVPA to determine if these unique regions served to better distinguish different prosodic conditions between males and females. Results showed that these unique regions of activation also do not suggest different neural networks between males and females, and further study is necessary to better illuminate the manner in which differences in neural activation contribute to perceived behavioral differences in male and female responses to prosody perception tasks.

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Category: Life Sciences
Name(s): Colleen Hoffman
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Sarah Bennett, Biological Sciences; Katrina Edwards, Biological Sciences; Jim Moffett, Biological Sciences
Format: Laboratory-based Research
Title: How marine bacteria make their nutrients more digestible

Abstract:
Iron is an essential micronutrient for microorganisms, yet in the ocean due to iron's chemical properties and behavior it is only present in extremely low concentrations. In order to make the limited Fe more bioavailable ('digestible'), marine microorganisms release low molecular weight organic complexes, known as siderophores. The Marinobacter species is an example of one of these siderophore producing microorganisms. Marinobacter are opportunistic heterotrophic bacteria that have been isolated from habitats as diverse as petroleum-field brines, ballast water from the Arctic, saline soils, surface seawater, marine snow, coastal hot springs, hydrothermal plumes, volcanic basalts and deep seawater. Siderophore production has been previously demonstrated by two of the Marinobacter species, M. aquaeolei and M. hydrocarbonoclasticus. In this study, we investigated the production of siderphores by two additional Marinobacter spp.: M. salsuginis and M. algicola.

Initial investigations were carried out using a traditional colorimetric assay on active, iron replete cultures. This resulted in the detection of siderophores from M. algicola but not from M. salsuginis. The siderophores produced by M. algicola were isolated and identified by electrospray ionization mass spectrometry. A parent ion at 719 and 799 m/z gave fragmentation patterns consistent with petrobactin and petrobactin sulfonate. Since the Marinobacter genus are widely dispersed throughout the ocean, understanding their role in regulating iron chemistry may lead to further understanding of iron chemical cycle as an essential micronutrient.

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Category: Life Sciences
Name(s): Meghan Brown
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Christian Pike, Gerontology
Format: Senior Honors Thesis
Title: Independent and Interactive Effects of Estrogen and Progesterone on Neuroprotection in an Animal Model of Neurodegeration

Abstract:
Alzheimer's disease (AD) is a neurodegenerative disease of aging that differentially affects men and women. In women, several studies have indicated that hormone loss at menopause may promote the development of pathological and cognitive symptoms of AD. While hormone therapy (HT) is considered a possible preventative measure for post-menopausal women at risk for developing AD, certain HT regimens may actually exacerbated the onset of cognitive decline in women. Key variables in optimizing the protective potential for HT include the timing of treatment initiation, the estrogen and progesterone components involved, and the distinction between continuous versus cyclic hormone administration. In this study, we examine the independent and combined neuroprotective effects of estradiol (E2) and progesterone (P4) treatment in the perforant path lesion model of neurodegeneration in female Sprague-Dawley rats. Using this model, we are able to investigate two endpoints for possible neuroprotective behaviors: regulation of neuron viability in Entorhinal Cortex (EC) layer II, and compensatory neurite sprouting in dentate gyrus (DG). Our results indicate that ovariectomy-induced depletion of E2 and P4 worsens

both endpoints. Furthermore, neuroprotective efficacy varies for both endpoints when hormones are delivered alone or in combination, as well as in cyclic versus continuous administration. These results have significant implications for the further development of clinical HT for post-menopausal women at risk for developing AD.

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Category: Life Sciences
Name(s): Benjamin Shin
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Lorraine Turcotte, Department of Kinesiology
Format: Laboratory-based Research
Title: Metformin and resveratrol blunt highly active antiretroviral therapy (HAART)-induced insulin resistance in skeletal muscle cells

Abstract:
Introduction: HIV affects millions of people worldwide. Treatment to prevent the progression of HIV via a pharmaceutical cocktail known as highly active antiretroviral therapy (HAART) has been shown to be effective. Unfortunately, HAART is also known to induce insulin resistance. Fortunately, two pharmaceutical insulin sensitizers, metformin and resveratrol, appear to be capable of increasing insulin sensitivity and may be able to reverse/blunt HAART-induced insulin resistance.

Methods: L6 skeletal muscle cells were treated with the HAART pharmaceuticals, atazanavir sulfate and/or ritonavir, as they are currently recommended to prevent the progression of HIV. Insulin sensitivity was measured via insulin-stimulated glucose uptake as well as the activity level of two proteins known to be activated via inflammation since inflammation has been shown to induce insulin resistance. The two proteins measured were JNK1/2 and p38 as markers of pro-inflammatory signaling. Protein activity levels were measured via Western Blotting.

Results: Treatment with both atazanavir sulfate and ritonavir eliminated the increase in insulin-stimulated glucose uptake when compared to basal indicating induction of insulin resistance. When treatment with metformin or resveratrol was added to the atazanavir sulfate and ritonavir treated cells, the expected increase in insulin-stimulated glucose uptake when compared to basal was reestablished, indicating an increase in insulin sensitivity. Additionally, the JNK1/2 pro-inflammatory pathway was activated with atazanavir sulfate treatment but not ritonavir treatment via increased JNK1/2 phosphorylation when compared to control cells. JNK1/2 phosphorylation was significantly decreased in atazanavir sulfate treated cells with metformin and resveratrol treatment when compared to atazanavir sulfate treatment alone indicating decreased inflammation. Surprisingly, p38 was not activated with either treatment, atazanavir sulfate or ritonavir, indicating that the p38 pro-inflammatory pathway does not contribute to atazanavir sufate- or ritonavir-induced insulin resistance in skeletal muscle cells. Conclusion: Metformin and resveratrol are capable of reversing HAART-induced insulin resistance in skeletal muscle cells.

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Category: Life Sciences
Name(s): Cara Bickers
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Susan Forsburg, College of Letters, Arts, and Sciences: Department of Molecular and Computational Biology
Format: Laboratory-based Research
Title: Novel Mutants Link DNA Replication and Centromere Function in the Fission Yeast, Schizosaccharomyces pombe

Abstract:
The centromere is an area of heterochromatic DNA that is found on each chromosome and acts as the site of mitotic spindle attachment. This spindle forms after the completion of DNA replication, and pulls 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 DNA. These genes could have products with action at the centromere where proper replication and heterochromatin repackaging are vital to proper kinetochore and spindle attachment.

To isolate mutations in these genes, I am isolating yeast strains that are sensitive to both hydroxyurea (HU) and thiabendazole (TBZ). These drugs act to arrest the cell cycle by interrupting two separate phases. HU acts by depleting the nucleotide supply and interrupting DNA replication: S-phase is arrested. TBZ acts as a spindle poison, and therefore mitosis cannot properly occur.

I began by mutagenizing wild-type S. pombe cells with ultraviolet radiation. Surviving colonies were screened for sensitivity to both HU and TBZ. Stringent testing eliminated 43 of the original 46 candidates identified. All mutants were classified as separate, single-gene, recessive mutations. After further characterization of the mutants, I attempted to identify the responsible genes via cloning by complementation. In order to find a genetic complement for each mutation, I transformed each strain with the genomic library of S. pombe. The library is composed of small-circular segments of DNA, each containing a fragment of the genome. Transformation of the correct fragment should restore proper function and reduce sensitivity. The responsible fragment can then be sequenced in order to identify the gene. This process has been difficult, and plans are now being made to deep sequence each mutant's genome. Hopefully my results will add new knowledge to the understanding of DNA replication and chromatin formation at the centromere.

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Category: Life Sciences
Name(s): Vanessa Fimreite, Dimple Shah
Submission Type: Group
Project Sponsor(s) and Collaborator(s):
Daryl Davies, USC School of Pharmacy
Format: Laboratory-based Research
Title: Potential for the use of Ivermectin as an anti-alcohol therapeutic agent

Abstract:
Ivermectin (IVM) is widely used in animals and humans as a treatment for infections of parasitic worms. For over twenty-five years, IVM has continually proven to be clinically safe and its widespread commercial use as an anti-parasitic agent has led recent efforts to expand the uses of IVM in humans. IVM has previously been found to significantly reduced ethanol intake in a dose-dependent manner in wild-type C57Bl/6J male and female mice using a 24-hr access two-bottle choice model. Since IVM is already FDA-approved and is presently being used by millions of people, its novel use to reduce alcohol intake creates new possibilities in the search for new drugs to treat alcohol use disorders. Drinking studies, coupled with behavioral testing, can further prove IVM ability to decrease alcohol consumption in binge drinking scenarios and provide information on the exact dosage of IVM need to bring out this effective decline in alcohol consumption. By utilizing an alcohol drinking model that mimics "binge drinking", we were able to test the hypothesis that IVM can be used as an effective treatment for this type of misuse. Studies will focus on a restricted access drinking paradigm in which the mice will be allotted only a four hour period (per day, every other day) in which they will

have access to alcohol. This paradigm leads to a high level of alcohol intake resulting in blood alcohol concentrations (BACs) of 80-100 mg% which is the level commonly seen in humans that are "binging" on alcohol. The dosage of IVM used will correspond to 10% of the individual mouse's weight, which will be taken daily right before the administration of IVM to ensure an accurate ratio is continuously given. Seeing a reduction in the levels of alcohol intake when testing IVM supports the hypothesis that IVM represents a novel therapeutic treatment for the treatment of alcohol abuse and alcoholism.

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Category: Life Sciences
Name(s): Jessica Tsay
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Andrew Gracey, Marine Environmental Biology
Format: Senior Honors Thesis
Title: Reexamining the role of clock genes: noncircadian biological oscillations in the oyster Crassostrea gigas

Abstract:
The circadian rhythm is an immensely important biological rhythm regulated by the canonical clock genes as studied in yeast, mammals, and drosophila flies. With particular environmental cues being important to the period of biological rhythms, that clock genes express noncircadian rhythm remains a possibility. The oyster Crassostrea gigas was studied in two groups: intertidal/high-site and subtidal/low-site. Using nonlethal sampling by hemolymph extraction, gene expression was tracked in six individual oysters over 48 hours. Every 3 hours, hemolymph was aspirated from the adductor muscle through a hole drilled in the shell. This experiment was repeated in a controlled lab environment. Gene expression was calculated using the qPCR method to measure transcriptional levels. The genes studied were Clock, Per, Cry1, Cry2, Tim, BMAL1, AK, CycB, CS, and Hsp70. Initial results showed that the clock genes were strongly correlated with one another ($r > 0.6$) in both high-site and low-site oysters. The studied genes were also found to have noncircadian transcriptional oscillations. These findings suggest that clock genes not only maintain circadian rhythms, but they also may maintain noncircadian rhythm. This implies that different rhythms of the same canonical clock genes have evolved for different environmental cues.

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Category: Life Sciences
Name(s): Marissa Srour
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Francesca Mariani, Eli and Edythe Broad Center for Regenerative Medicine and Stem Cell Research at USC
Format: Laboratory-based Research
Title: Rib Regeneration in a Mammalian Model

Abstract:
Establishing a model for bone regeneration in mammals is important for developing treatments for skeletal injuries and bone deterioration that arises with age. The regeneration of skeletal elements is typically observed in amphibians, however amazingly in humans, there are reported cases of regenerating digit tips and ribs. We developed a model for skeletal regeneration in the mouse, and our goal was to further determine the role of the periosteum, the fibrous connective tissue surrounding the bone. More specifically, our study aimed: 1) to determine the extent of rib regeneration when both the rib portion is removed along with the surrounding periosteum and, 2) to examine the morphology of the regenerated rib, to better understand innate signaling patterns. Mice between 4-8 weeks of age underwent surgery in which a sternal rib

portion was removed from the surrounding periosteum (n=50). The rib cages of MRL mice and CD-1 mice were examined for the presence of bone and cartilage at ~95 days (n=19) and ~283 days (n=19). In some surgeries (n=12) the rib portion was removed along with the periosteum and analyzed ~118 days post-surgery. Analysis of results showed that: 1) the presence of the periosteum was necessary for regeneration to occur, 2) interestingly, the regenerated bone is forming islands with hollow cavities, which may mimic bone marrow cavities, and 3), the MRL strain showed enhanced healing when the periosteum was removed along with the rib, indicating that there may be sources other than the periosteum that contribute to skeletal regeneration. In conclusion, we successfully expanded our model for skeletal regeneration in the mouse and determined the necessity of the periosteum in the repair process. Our model for skeletal repair has clinical significance for the treatment of skeletal injuries and deterioration ranging from osteoporosis to skeletal injury repair.

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Category: Life Sciences
Name(s): Abigail Armstrong
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Ruth Wood, Cell & Neurobiology, KSOM
Format: Laboratory-based Research
Title: Roid rage in rats? Testing motivation for aggression

Abstract:

Athletes use anabolic-androgenic steroids (AAS) to enhance athletic performance. However, AAS users may demonstrate increased aggression (so-called 'roid rage). The popular image of 'roid rage is of a sudden, uncontrolled reaction. Studies in animals have shown that testosterone increases aggression in a dose-dependent manner. However, aggression in androgen-treated animals is not random or unpredictable. Why then, do androgens increase aggressive behavior? Our study determined if steroids enhance motivation for aggression in male rats, as determined by operant responding for the opportunity to fight with a castrated intruder. Rats (n= 8/group) received daily injections of testosterone (7.5 mg/kg) or vehicle (6% ethanol in an aqueous solution of 13% cyclodextrin) sc for 5 weeks. They had the opportunity to fight with different castrated males on 5 occasions in an operant chamber. Subsequently, rats were trained to operate a nose-poke for access to the castrate intruder on an increasing fixed-interval schedule up to 10 minutes. Nose-poking reflects the motivation to engage in aggressive behavior. This study is still ongoing. During 5 days of responding at FI 1 min, vehicle-treated rats made 2.9 ± .3 nose-poke responses, while testosterone-treated males made 3.8 ± .9 responses (p= .38). During 4 days of responding at FI 2 min, vehicle-treated rats made 3.3 ± .7 nose-poke responses, while testosterone-treated males made 3.4 ± .4 responses (p= .90). There does not appear to be differences in nose-poking behavior between vehicle and testosterone treated rats in this preliminary stage of data.

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Category: Life Sciences
Name(s): Tiffany Sia
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Katrina Edwards, Marine Environmental Biology; Jason Sylvan, Marine Environmental Biology
Format: Laboratory-based Research
Title: Testing the Mantle to Microbe Hypothesis in the Lau Basin

Abstract:

The East Lau Spreading Center (ELSC) and Valu Fa Ridge comprise a ridge segment in the southwest Pacific Ocean, where a spreading region in the north creates host rock of basaltic composition while

subduction in the south forms andesite host rock. The transition zone between the two ends forms a mix of both rock types. We studied the microbial diversity on six rock samples collected along the ELSC and Valu Fa Ridge in the summer of 2009 by constructing 16S rRNA clone libraries of the Bacteria that live on these rocks. This process included extracting DNA from the rocks, PCR amplification, cloning, and DNA sequencing. We also identified characteristics of the rocks by sending off samples for X-ray diffraction (XRD) and thin sectioning. We found that as the host rock changed from north to south, so did the composition of Bacteria. This suggests that the geochemistry of the rock affects the species of Bacteria that live on it. Basaltic rocks from the northern end of the ELSC had high concentrations of Gamma- and Alpha-proteobacteria and Bacteroidetes. These concentrations decreased on the samples as the sources of the rocks moved further south. Andesite rocks from the southern end had high concentrations of Chloroflexi, which decreased in the transition zone and were absent on basalt. Conversely, Epsilonproteobacteria were present on the basalt, decreased in the transition zone and were absent on the andesite. The results of this study support the Mantle to Microbe hypothesis in that different types of prokaryotes are selected for by the composition of the host rock as determined by the melt lens underlying the ELSC and Valu Fa Ridge. Future work entails completing cloning on all six samples, constructing 16S rRNA clone libraries for Archaea, and qPCR to quantify bacterial and archaeal populations on the samples.

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Category: Life Sciences

Name(s): Ronica Patel

Submission Type: Individual

Project Sponsor(s) and Collaborator(s):
Mike Jakowec, Neurology; Giselle Petzinger, Neurology

Format: Laboratory-based Research

Title: The Effects of Exercise on Neurogenesis in the Subventricular Zone and Hippocampus in a Mouse Model of Parkinson's Disease

Abstract:

Parkinson's disease affects about one in ten over the age of 50 and the risk for the disease increases with age. The average age of onset for Parkinson's disease is 60. The causes of this disease are unknown but many researchers believe that it is a combination of several factors, such as environmental toxins, and genetic predisposition. At a biochemical level, Parkinson's disease is characterized by a severe loss of substantia nigra dopaminergic neurons. The loss of these neurons causes a decreased amount of dopamine, which affects the motor pathways of the basal ganglia. Adult neurogenesis is the process by which new neurons are generated and occurs in two distinct regions of the brain, the subventricular zone (SVZ) and the dentate gyrus (DC) of the hippocampus. The purpose of this study was to examine the potential changes in neurogenesis following a high intensity forced treadmill running in a mouse model of Parkinson's disease, the MPTP (1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine) lesioned mouse. Mice were grouped as: 1) Saline, 2) Saline + Exercise, 3) MPTP only, and 4) MPTP + Exercise. At two, four, or six weeks of exercise mice were injected for two days with 5-ethynyl-2-deoxyuridine (EdU) in order to determine the amount of proliferating stem cells. EdU staining of brain sections revealed that MPTP-lesioned mice that continued the intense treadmill regiment for six weeks showed increased neurogenesis in the SVZ and DC than the

MPTP-lesioned only mice and the saline + exercise mice. Similar trends were seen at two and four weeks as well. This preliminary data sheds light on the mechanisms of exercised enhanced repair following basal ganglia injury and can be used to further trials or experiments in order to determine what types of cells these new neurons become and if these new cells can help replenish the lost dopamine source.

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Category: Life Sciences
Name(s): John Choi
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Steve Finkel, Biological Sciences
Format: Laboratory-based Research
Title: The effects of oxidative damage on competitive fitness in aging E. coli

Abstract:

Aging is a ubiquitous process in organisms; from bacterial cells to neuronal cells, all living organisms experience a cell life cycle. Progression of cell cycle, or aging, has been known to have a positive correlation with many factors, one of which is oxidative damage. In cells, oxidative damage may lead to mutation, changes in gene expression, and even cell death. In humans, oxidative damage can help lead to problems like atherosclerosis and Alzheimer's disease. In bacteria like *E. coli*, cell life cycles in batch culture show several distinct phases: after an initial lag in growth that can last for a few hours, there is exponential growth that then enters into stationary phase after about a day. At the third day, the cell enters death phase, which continues into long-term stationary phase after 99% of the cells die. Using this life cycle as a model of aging for the *E. coli* cells, certain populations of cells in post death phase will have accrued greater oxidative damage. In the study pursued, cells with differing levels of oxidative damage due to differing points in the life cycle are competed with each other to see any correlation between the extent of oxidative damage and relative fitness in *E. coli* cells. Through this, the selection of certain populations in long-term stationary phase may be partially elucidated through an oxidative damage explanation Current results indicate that cells with greater oxidative damage see a lower rate of survivability when competed against cells with less oxidative damage; this agrees with the idea that a higher level of oxidative damage results in decreased fitness of the organism. This data can be projected to possible theories on other single cell competitions that are commonly observed, like sperm in zygote formation and domination of certain bacterial strains over others in infection.

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Category: Life Sciences
Name(s): Alice Kim
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Rajat Agrawal, Keck School of Medicine
Format: Field Research
Title: The Honduras Eye Disease Study (HEDS): Assessing the efficacy of survey-based eye disease prevalence studies

Abstract:

In studies measuring the prevalence of eye diseases in a population, surveys of the participants' basic medical history and specific ocular complaints are employed to assess their overall ocular condition. These results are then interpreted at a population level to give an estimate of the presence and prevalence of the detected eye diseases.

However, conditions that affect the retina of the eye require additional steps beyond the survey to properly detect and diagnose. Pupil dilation, examination of the retina, and knowledge of retina pathology are necessary components to reach this

diagnosis. Because eye disease prevalence studies typically do not incorporate pupil dilation and retina evaluation as part of their methodology, the presence of retinal diseases may be undetected, and the actual prevalence of retinal diseases may ultimately be underreported.

In this study, we assessed the efficacy of employing this survey-based methodology to determine eye disease prevalence in a population. Using the World Health Organization's ocular history surveys as guidelines, a novel survey was developed to address a spectrum of common perceivable anterior and posterior segment eye disease symptoms for each subject. Using this, we compared the diagnoses of ocular conditions based on results from the survey to an ophthalmologist's actual diagnoses to determine any variability in such survey-based diagnoses. Subjects were recruited from the Centro de Salud Integral ZOE eye clinic in Tegucigalpa, Honduras, over the span of two months from June to July, 2010.

Our findings indicate that there is indeed variability between the diagnoses of eye diseases based on the survey results compared to the diagnoses following a complete eye examination. Further studies are being conducted to include a larger subject pool and determine a more effective study methodology for measuring the prevalence of eye diseases that incorporates both the efficiency of surveys and thoroughness of eye examinations.

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Category: Life Sciences

Name(s): Kianni Courtade

Submission Type: Individual

Project Sponsor(s) and Collaborator(s):

Shrikanth Narayanan, Viterbi School of Engineering; Smeeta Sardesai, Keck School of Medicine; Sheila Woodward, Thornton School of Music

Format: Field Research

Title: The impact of maternal sound-based intervention on independent oral feeding, growth and neurodevelopmental outcomes in preterm infants

Abstract:

Considering that the prognosis for optimal neurodevelopmental and psychological outcomes for many preterm infants remains poor through adolescence, the goal of this study is to determine whether maternal sound based interventions in premature infants improve physiological, independent oral feeding, growth and neurodevelopmental outcomes. We plan to follow at least 234 children through 2 years to determine if continuous rhythmic intrauterine sounds (recorded in previous research conducted by Dr. Woodward) and intermittent sounds of the infant's mother singing (presented for several hours each night) will impact a number of key outcomes, including growth, successful oral feeding (which is related to discharge dates) and neurodevelopment. The potential benefit to society would be substantial if any of these outcomes is determined to be impacted. It would lessen costs if infants are discharged earlier. It would have long-term impact on quality of life for infants and their families, as well as on schools, if it was determined that learning disabilities were lessened as a result of brain development being enhanced by extended periods of auditory stimulation in the incubator.

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Category: Life Sciences
Name(s): Zhiqi Yip
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Sarah Bottjer, Dept of Biological Sciences, Neurobiology Section; Vanessa Miller-Sims, Department of Biological Sciences, Neurobiology Section
Format: Laboratory-based Research
Title: The morphology of axonal projectons from the High Vocal Center to vocal motor cortex in songbirds

Abstract:
Studying how songbirds learn to generate vocal behavior provides an outstanding model for understanding speech production in humans. Song behavior is controlled by an interconnected set of brain nuclei called the song control system. Premotor forebrain nucleus HVC (used as a proper name) is found in birds that learn the sounds used for vocal communication and is critical to song production in adult birds. HVC projection neurons send axons to vocal motor cortex (RA) and drives bursts of activity in RA; RA in turn projects to downstream areas to drive vocal output. Although a lot of work has been done recording from single HVC neurons, the microcircuitry within HVC and its efferent projections is unknown. To better understand the pattern of neural connectivity in vocal output I made a localized injection of biotinylated dextran amine (a molecular marker) into HVC and reconstructed the morphology of single RA-projecting HVC neurons innervating in RA. I found that these axons have an extremely limited pattern of branching and project to different locations in RA. This pattern suggests that a single HVC neuron will activate only a limited number of RA neurons. This pattern is consistent with a code of electrical activity in which one HVC neuron only fires for a brief period of time during the generation of the song. Such a sparse code suggests that a population of neurons fires together to drive each part of the song resulting in a stereotyped pattern of vocal output.

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Category: Life Sciences
Name(s): Laura Corrales-Diaz Pomatto
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Kelvin Davies, Andrus School of Gerontology; Aaron Hagedorn, Andrus School of Gerontology
Format: Laboratory-based Research
Title: The Oxygen Conundrum

Abstract:
The mitochondria provide the driving force for both survival and growth of the cell. However, even in the most robust cell, the mitochondria cannot achieve maximum efficiency owing to the conundrum of oxygen reliance. Due to oxygen's strong affinity for electrons, it is the final acceptor in the electron transport chain, providing both an efficient means of ATP generation, coupled with the harmful production of reactive oxygen species.

Because of this necessary reliance, cells have developed means to combat oxidative damage that could be detrimental. One specific defense mechanism is the Lon protease found within the mitochondrial matrix, which degrades oxidatively damaged proteins. However, with age, though the production of reactive oxygen species remains constant, the cell's defense mechanisms wane, including the Lon protease. We focused upon the Lon protease production within varying ages of wi-38 cells, a type of embryonic lung tissue, through mitochondrial matrix isolation and cellular staining. The mitochondrial isolation allows for the measurement of mitochondrial activity to determine mitochondrial functionality.

We are using three types of staining techniques to determine Lon activity in varying ages of wi-38 cells. Ki-67 staining

determines if cells have become senescent. In combination with this, "Mito-Tracker Red," determines mitochondrial activity and "Mito-Tracker Green," determines mitochondrial mass. The hope is that as the cell ages, though the mitochondria mass increases, the activity of the mitochondria decline.

These three staining techniques and mitochondrial activity indicate that with increasing age, cells decrease their division rate, coupled with maintaining older components, specifically the mitochondria, leading to increased oxidative damage in the cell. In contrast, younger cells, which continually replace older mitochondria, experience less oxidative damage. As a result, we expect the Lon protease efficiency to mirror this wane in growth: high capacity in the youngest cell group and low capacity in the oldest cell group.

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Category: Life Sciences
Name(s): Ourania Petasis
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Mike Jakowec, USC Keck School of Medicine; Giselle Petzinger, USC Keck School of Medicine
Format: Laboratory-based Research
Title: The Role of Neurogenesis in Exercise-enhanced Motor Recovery in an Animal Model of Parkinson's Disease

Abstract:

Studies have suggested that intensive exercise can be neuroprotective against Parkinson's Disease (PD), and intensive treadmill exercise can reverse motor deficits in an animal model of PD. While many of the underlying molecular mechanisms are still unknown, one possible mechanism is neurogenesis (present but limited in adults). We aimed to determine if exercise enhances neurogenesis in the injured brain. Four groups of mice were compared: (i) mice injected with saline (control), (ii) mice injected with saline and exposed to intensive treadmill exercise (control), (iii) mice injected with the neurotoxin 1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine (MPTP) (mimics many PD features), and (iv) mice injected with MPTP and exposed to intensive treadmill exercise. Exercise was started 5 days after MPTP-lesioning when toxin-induced cell death is complete and was continued for 2, 4, or 6 weeks. Two days prior to these time points, 5-ethynyl-2'-deoxyuridine (EdU) was administered to mark for proliferating cells. Using EdU fluorescence staining, we looked at the levels of newborn proliferating cells in four brain regions: (a) subgranular zone of the hippocampus (SGZ), (b) subventricular zone of the lateral ventricles (SVZ), (c) rostral caudal migratory stream (RCMS), and (d) striatum (where a decrease in neurons and level of dopamine occurs with PD). For the 6-week cohort of mice, there was increased neurogenesis with exercise in the saline-lesioned mice (in SGZ, RCMS) and MPTP-lesioned mice (in SGZ, SVZ, RCMS) compared to the non-exercised mice. Our findings thus far suggest that exercise may increase the generation of new cells in the injured brain and has implications as a possible benefit of intensive physical therapy in PD patients.

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Category: Life Sciences
Name(s): Thomas Kahn
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Moh El-Naggar, Physics
Format: Laboratory-based Research
Title: Using Microbial Fuel Cells to Harvest Electricity from Bacteria and Investigate Bacterial Nanowires

Abstract:

Shewanella onidensis has the uncommon ability to utilize solid-phase electron acceptors for respiration in the absence of oxygen. The main obstacle in this process is bridging the internal electron transport

system with an external acceptor, making bulk electron export a requirement. One proposed mechanism for export is the use of conductive pili, which have been called "nanowires". Nanowires have previously been measured to be electrically conductive and capable of transfer rates a thousand-fold greater than maximum respirational needs. Shewanella decorates its external surface with decaheme c-type cytochromes that have been shown to be necessary for extracellular electron transport and nanowire conductivity. It is therefore believed that nanowires are not a previously undocumented pilus system but rather a known system that has been modified with cytochromes to become conductive. We hypothesized that type IV pili are serving as nanowires. In our microbial fuel cell experiments, two different mutants with deletions in the type IV system all showed decreased current output as compared to wild type, in concordance with our hypothesis. Additionally, a mutant with deletions in another pili system, mannose-sensitive hemagglutinin or Msh, showed a decrease in current output from wild type although to a lesser extent than the type IV mutants. It is believed that there is sufficient homology between the Msh and type IV systems to allow for some type IV pilus biogenesis by the Msh system, which would explain our results.

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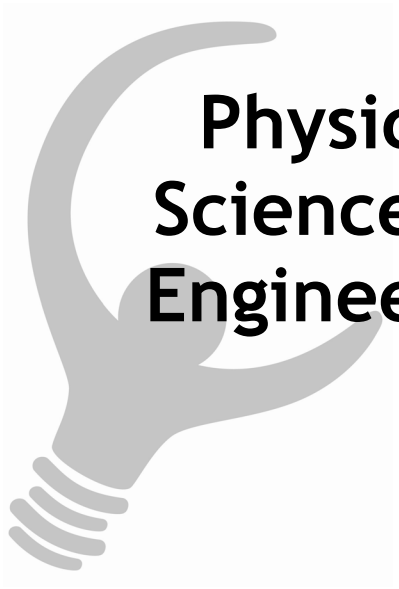

Physical Sciences & Engineering

Category: Physical Sciences & Engineering

Name(s): Lauren Gelbach, Bryce Walters Kelsey Brunner (The College of New Jersey), Salvador Romero (Pasadena City College), Aurelio Valencia (East Los Angeles College)

Submission Type: Group

Project Sponsor(s) and Collaborator(s):
Robert De Groot, Earth Sciences Department/Southern California Earthquake Center; Thomas Jordan, Director of Southern California Earthquake Center; Michael Ihrig, Santa Monica City College

Format: Creative Work

Title: 2010 Southern California Earthquake Center Virtual Display of Objects Production Team

Abstract:

The "Grand Challenge" for the 2010 Undergraduate Studies in Earthquake Information Technology (USEIT) intern class was to develop a Seismic Crisis Visualization System based on Southern California Earthquake Center-Virtual Display of Objects (SCEC-VDO) that can display information needed for operational earthquake forecasting. This includes displaying seismic sequences in real time, kinematic fault rupture models, and probabilities of ruptures on earthquake faults. The Production Team incorporated the above information into animations using SCEC-VDO to be delivered to a wide variety of audiences and organizations. Another responsibility of the Production Team was to work closely with the Development Team to report any bugs with the SCEC-VDO software, test new plug-ins, and identify where existing functionality needed to be improved. The Production Team also collaborated with the Science Research Team to learn about the topics to be displayed in their animations and with the Content Management System Team (CMS) to assemble metadata and publish animations. The Production Team made animations about the 2010 El Mayor-Cucapah earthquake sequence using relocated hypocenter data from Dr. Egill Hauksson at Caltech to depict the northward trend of triggered events. Animations were also created using new plug-ins to demonstrate how CyberShake's theoretical earthquakes would affect the Los Angeles area and to show UCERF participation probabilities on the important faults in Southern California. In addition to those accomplishments, the Production Team also created SCEC-VDO tutorials so that future interns and other users would know how to use the software and the new plug-ins.

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Category: Physical Sciences & Engineering
Name(s): Cauchy Choi, John O'Hollaren
Submission Type: Group
Project Sponsor(s) and Collaborator(s):
Maja Matarić, Computer Science; Ross Mead, Computer Science
Format: Laboratory-based Research
Title: A Distributed Thermodynamics-Inspired Approach to Multi-Robot Obstacle Avoidance

Abstract:
The goal of a robot formation control architecture is to get a number of robots into a specified form. It must be able to handle real-world events that could disrupt the formation, thus requiring formation repair, obstacle avoidance, and changes in the formation. Our approach focuses on obstacle avoidance and maintenance of formations. The obstacle avoidance scheme draws from the principles of thermodynamic phase transitions. We refer to the transformation from a multi-robot swarm to a rigid formation as a "phase transition", since it has many parallels to the state phase transitions observed in matter. For example, it is useful to think of a group of mobile robots with no particular programming for interaction with each other, aside from collision avoidance, as similar to matter in a gaseous state; that is, the "volume" and shape that the group takes on is determined by its surroundings. Robots in a swarm can be thought of as similar to matter in a liquid phase—the swarm is free to assume the shape of its surroundings, but maintains a fixed volume. Robots in formation are similar to matter in a solid state, assuming both a fixed volume and shape.

The proposed method applies these principles to obstacle avoidance. As robots on the perimeter of a rigid, "solid" formation encounter an obstacle, they "warm up" and transition to a "liquid" phase. The liquid (or less constrained) section of the robotic swarm can then circumvent the obstacle. Once the obstacle becomes farther away, the robots "cool down" and return to their solid form. In this manner, the robotic formation is capable of navigating a wide variety of obstacles. Once the robot determines itself to have passed the influence of the obstacle, it reestablishes its temporarily ignored spatial relationships.

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Category: Physical Sciences & Engineering
Name(s): Emre Yuzak
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Chi Mak, Chemistry
Format: Laboratory-based Research
Title: A Graphical Interface for the Visualization of Secondary and Tertiary Structures of RNAs

Abstract:
RNAs are large biopolymers that have many diverse biological functions in a variety of fundamental cellular processes. While RNAs are best known for acting as carriers of genetic information (mRNAs) and for their roles in protein synthesis (tRNAs), they also serve many other important functions including catalysis (ribozymes) as well as gene regulation (riboswitches). Many viral and sub-viral agents also use RNAs as the primary genomic material for their propagation. The functions of RNA depend on its ability to arrange itself in specific three-dimensional shapes, so accurately modeling its shape is critical to our understanding of cells' and viruses' functions.

While determining the complete three-dimensional structure of a RNA molecule would be optimal, most RNAs are not good candidates for the equipment used to obtain 3D (tertiary) structures – NMR and crystallography.

My solution is an interface that represents 2D structures in a way that prioritizes the important (functional) features of the

molecule rather than its shape. RNA's 2D structure is analyzed by the presence of several recurring sub-structures, called "motifs", most of which are commonly recognized in literature. The key motifs within a molecule can be recognized through a combination of distinct geometric features that describe the interaction energies between various nucleotides in the structure.

This new representation scheme has several advantages over what is offered by competing programs: 1. Unimportant regions will not be visually intrusive and can be hidden from the diagram if desired. 2. Large molecules will be as neatly displayed as smaller ones. 3. Secondary structure identifications are based on interaction energies rather than spatial relationship between nucleotides. None of the existing programs are comparable in these respects.

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Category: Physical Sciences & Engineering

Name(s): Bo Chan

Submission Type: Individual

Project Sponsor(s) and Collaborator(s):

Tzung Hsiai, Viterbi School of Engineering Department of Biomedical Engineering

Format: Laboratory-based Research

Title: A New Pulsatile Flow System to Study Cardiac Arrhythmias on Endothelial Function

Abstract:

Cardiac arrhythmia is a leading cause of sudden cardiac death. Emerging data supports a link between endothelial dysfunction and irregular, rapid pulsation associated with cardiac arrhythmias. Irregular shear stress, such as oscillatory flow, has shown to induce an inflammatory response leading to the initiation of atherosclerosis and cardiovascular disease. In contrast, physiological pulsatile shear stress and laminar shear stress have been shown to stimulate anti-inflammatory pathways such as the production of vasodilator nitric oxide. However, the mechanisms have remained unknown. We aimed to create new profiles to assess endothelial response to rapid pulsation associated with cardiac arrhythmia. Bovine (BAEC) and human aortic endothelial cells (HAEC) were subjected to a host of pulsatile shear stress (PSS) that varied in pulse rates, slew rates, and shear stress for 4 hours. The BAECs and HAECs were analyzed to show how the rapid pulsations affected the endothelial cells of cardiac arteries. We demonstrated that endothelial nitric oxide synthase (eNOS) mRNA expression in BAECs and HAECs is significantly up-regulated in response to PSS at 50 bpm and 150 bpm compared with the static condition, whereas eNOS expression is down-regulated in response to oscillatory shear stress (OSS). In parallel, NO metabolites, nitrate (NO2) and nitrite (NO3), increased in response to PSS50 and in response to PSS150. Furthermore, we used a monocyte binding assay to demonstrate that both PSS150 and OSS promote monocyte binding to HAECs to a greater extent than PSS50, whereas laminar shear stress down-regulates monocyte binding. We showed that tachyarrhythmias, PSS150, attenuate NO production but promote inflammatory responses compared to PSS50. Our new set of shear stress profiles provides new approaches to study the mechanisms of cardiac arrhythmias, vascular oxidative stress and inflammatory responses. These findings will help to better understand the consequences of irregular heart contractions and cardiovascular disease.

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Category: Physical Sciences & Engineering
Name(s): Billy Stevens
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Arjun Narayanan, Chemistry; Surya Prakash, Chemistry
Format: Laboratory-based Research
Title: A One-Pot, Superacid-catalyzed, Microwave Assisted Synthesis of 2-Methyl and 2-Trifluoromethylthiochroman-4-ones from Benzenethiols and Crotonic Acids

Abstract:
The condensation of benzenethiols with crotonic acid and 4,4,4-trifluorocrotonic acid has been investigated. It is found that benzenethiols undergo efficient cycli-acyalkylation with crotonic acids in the presence of superacidic trifluoromethanesulfonic (triflic) acid as a catalyst and medium. The reactions were considerably accelerated by using higher temperatures with microwave irradiation. This procedure, combined with a simple workup and flash chromatography, allows direct access to 2-methyl and 2-trifluoromethylthiochroman-4-ones, scaffolds which can be further elaborated for drug discovery and development.

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Category: Physical Sciences & Engineering
Name(s): Erin Fowler, Eric Teegarden
Submission Type: Group
Project Sponsor(s) and Collaborator(s):
Tim Barrett, Information Sciences Institute Space Engineering Research Center; Joseph Kunc, Viterbi Department of Astronautics
Format: Field Research
Title: Aeneas Nanosatellite

Abstract:
The University of Southern California Information Sciences Institute (ISI), in conjunction with the USC Space Engineering Research Center (SERC), is at work on a dedicated USC satellite mission, Aeneas. Supported by the Operationally Responsive Space Office and the Air Force Research Lab at Kirtland Air Force Base, the Aeneas mission is helping to validate a Department of Homeland Security technology demonstration program to track cargo containers. While commercial firms already offer satellite-based cargo tracking services, the low Earth orbiting Aeneas design is far smaller and uses different technologies that will enable use of smaller receivers on the ground that require less power. Aeneas is a 3U Cubesat, a nanosatellite comprised of three interconnected cubic units, each with 10 cm sides. It contains new payload technology for operation and maturation in radio frequency, computer and distributed operation applications for Cubesats.

Aeneas represents further development of the technologies used in Caerus, Aeneas' smaller 1U predecessor launched in December 2010, as well as the addition of other hardware and software to be integrated into the system. Noticeable among these additions is a deployable parabolic antenna that will be folded into the 3U body and deploy after Aeneas is ejected from the launch vehicle on orbit. The structural and mechanical aspects of this antenna and its electrical interface with the rest of the Cubesat system are an interesting challenge for the undergraduates at SERC. The undergraduates also have the chance to work on a burn wire configuration for deployment of the solar panels, a set of secondary whip antennas and the attitude determination and control systems which will ensure that Aeneas points the correct direction on orbit. Aeneas has been a hands-on opportunity for us to learn how to design, test and assemble a spacecraft from a skeleton of commercial off-the-shelf parts.

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Category: Physical Sciences & Engineering
Name(s): Brandon Reinus
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Surya Prakash, Chemistry
Format: Senior Honors Thesis
Title: An Attempt at an Easy and Cheap Synthesis of Enantiomerically Pure Amino Phosphonic Acids

Abstract:
The synthesis of amino phosphonic acids (APAs) in enanteriomerically pure form is of interest due to their close relationship to amino acids. Although procedures exist for the synthesis of APAs and enantiomerically pure APAs, the lack of details and ease of synthesis has created the need for a more practical protocol. Herein, we present an attempt at the synthesis of an optically active amino phosphonic acid. We first synthesized a chiral carbamate, which we subsequently utilized in a one-step three-component reaction with benzaldehyde and dialkyl phosphite resulting in a mix of diastereomers.

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Category: Physical Sciences & Engineering
Name(s): Maxwell Chang
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Priscilla Antunez, Chemistry Department; Richard Brutchey, Jr., Chemistry Department
Format: Laboratory-based Research
Title: An Improved SnSe Synthesis

Abstract:
To create effective and efficient photovoltaic devices, the materials from which they are constructed must have certain physical properties. While SnSe nanocrystals have a band gap appropriate for photovoltaics, the nanocrystals must have a uniform morphology in order to maximize efficiency. This project attempted to improve the size and shape of the SnSe nanocrystals synthesized by the Brutchey group to form a more useful project. Changes to the reaction time, temperature, reagents, and work-up were attempted in order to improve the quality of the product. Powder diffraction (XRD) and transmission electron microscopy (TEM) were used to characterize the nanocrystals. While no conclusively successful improved synthesis has been performed, the benefits of various adjustments continue to be investigated.

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Category: Physical Sciences & Engineering
Name(s): Karen Fang, David Mittelstein
Submission Type: Group
Project Sponsor(s) and Collaborator(s):
Tzung Hsiai, Viterbi Cardiology; Rongsong Li, Viterbi Cardiology
Format: Laboratory-based Research
Title: Atherosclerotic Plaque Rupture - In Vitro Model

Abstract:
Mechanically unstable atherosclerotic plaques at shoulder regions near arterial bifurcations often undergo plaque rupture. This implicates hemodynamic fluid shear stress in destabilizing the plaque. Our experiment investigates the mechanistic involvement of matrix metallo-proteinases (MMP) in atherosclerotic plaque rupture through a proposed in vitro plaque model.

The plaque ruptures associated with acute coronary syndromes are caused by a degradation of vulnerable plaque's fibrous cap. Calcifying vascular cells (CVC), smooth muscle cells that tend to mineralize, were used to assess the MMP's involvement in this. CVC form calcified nodules resembling calcified atherosclerotic plaque in vivo, and this experiment aims to establish CVC nodules as a possible in vitro model for understanding atherosclerotic plaque rupture.

CVC nodule stability upon exposure to simulated hemodynamic shear stress is assessed in response to co-culture with monocytes (THP-1) and treatment with oxidized low density lipoproteins (oxLDL). These factors are both physiologically associated with atherosclerotic plaque development and rupture. A flow chamber was developed to test these nodules in conditions approximating hemodynamic stress (PSS: mean shear stress (Tave) = 23 dyn cm-2; temporal gradient (dT/dt) = 71 dyn cm-2 s-1 simulating regions of human carotid artery bifurcations).

Results show that treatment with oxLDL and/or THP-l destabilizes CVC nodules in response to hemodynamic shear stress and is associated with both increased MMP activity and gene expression in CVC. Furthermore, an MMP inhibitor (GM6001) reverses oxLDL and THP-1-induced nodule instability. These findings suggest that physiological shear stress promotes plaque rupture in calcified atherosclerotic plaque through MMP induction by oxLDL and THP-1.

This in vitro model successfully establishes the role of MMP in plaque rupture. These functional similarities between CVC nodules and calcified atherosclerotic plaques suggest the validity of this in vitro model for further experimental investigation into the mechanism of hemodynamic plaque rupture.

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Category: Physical Sciences & Engineering
Name(s): Dylan Wood
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Adjunct Associate Professor Doris Sung, Architecture
Format: Creative Work
Title: Breath: Creating Thermobimetal Building Skins

Abstract:
This research project explores the application of thermobimetals in a large scale to create a passively responsive building skin system. Thermobimetal is a shape changing 'smart' material, typically found in thermostats, that deforms when heated and returns to its original shape when cooled. While the metal is know to deform, the deformation is relatively small even when exposed to high temperatures. This project focuses on designing a building skin system based on the inherent qualities of thermobimetals. The use of this type of system as a passively responsive system (it can respond to its environment automatically with zero energy input) makes it an extremely relevant topic to current sustainable design and construction practices. The project involves designing, engineering, testing, fabricating, and assembling full scale mock ups of a system to be installed in a building scale installation in August 2011. The project also tackles issues of digital design and fabrication relevant to large scale projects including the use to parametric practices to design, fabricate and produce thousands of custom panels.

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Category: Physical Sciences & Engineering
Name(s): Michael Chiu
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Richard Giles, Chemistry; Kyung Jung, Chemistry
Format: Laboratory-based Research
Title: Deuterium/Hydrogen Exchange of Meta-Substituted Arenes

Abstract:
Deuterium is a stable, non-radioactive isotope of hydrogen, and is naturally-occurring in nature. As deuterium carries a neutron, which hydrogen lacks, deuterium forms bonds with carbon that vibrates at lower frequencies, making those bonds stronger than typical C-H bonds. Its clinical

significance is demonstrated when selectively swapping hydrogen in known drug molecules for deuterium, with the idea that the particular bond will not be metabolized as readily. The effect of slowing down the rate of bond cleavage is known as the kinetic isotope effect. In principle, deuterium-containing drugs will affect the pharmacokinetics for many drugs that are metabolized by pathways involving hydrogen-carbon bond cleavage.

The pharmacological effects of deuteration can be categorized in three types. The first effect is an increase in biological half-life of the compound. This could lead to lower dosing amounts, which would decrease side-effects, and enhance efficacy of the drug, depending on the drug's pharmacokinetics and pharmacodynamics. Typically, any metabolism by the gut wall and/or liver will decrease a compound's efficacy since a large percentage of the unmetabolized drug does not reach systemic circulation. However, since deuterium to carbon bonds are more stable than hydrogen to carbon bonds, deuterium containing drugs can reduce dosing requirements and lower metabolic load. Lastly, many drugs are metabolized in complex patterns, giving rise to both active and inactive metabolites. The kinetic isotope effect can lead to the reduced formation of toxic or reactive metabolites, as well as increasing the formation of desirable active metabolites.

Throughout the semester, deuteration reactions will be carried out on known compounds and studied using NMR spectroscopy to determine the selective exchanged of hydrogen and deuterium. Assays, in collaboration with another group, could be run to determine the stability of the deuterium-containing compounds, and reactions could later be optimized to yield better pharmacokinetic and pharmacodynamic effects.

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Category: Physical Sciences & Engineering
Name(s): Melissa Gish
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Russell Sliter, Department of Chemistry; Andrey Vilesov, Department of Chemistry
Format: Laboratory-based Research
Title: Fast Nuclear Spin Conversion in Water Clusters: A Matrix Isolation Study

Abstract:
Single water molecules have been isolated in solid Ar matrices at 4 K and studied by ro-vibrational spectroscopy using FTIR in the regions of the ν1, ν2, and ν3 modes. Upon nuclear spin conversion at 4 K, essentially pure para-H_2O was prepared followed by subsequent fast annealing generating ice particles. FTIR studies of the vapor above the condensed water upon annealing to $T \geq 250$ K indicate fast re-conversion of nuclear spin to equilibrium conditions. Our results indicate that nuclear spin conversion is fast in water dimers and larger clusters, which preclude preparation of concentrated samples of para-H_2O, such as in ice or vapor.

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Category: Physical Sciences & Engineering
Name(s): Alexa Sieracki
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Sarah Feakins, Department of Earth Sciences
Format: Laboratory-based Research
Title: Geochemical Correlations of Microtephra in DSDP Site 231 to Dated Eruptions at Hominin Sites

Abstract:
Marine sediments in the Gulf of Aden contain tephra (volcanic glass) transported far from the sites of explosive volcanic eruptions in East Africa. Through recovery of this tephra we are able to construct an eruptive history for the Afar Rift Zone,

reflecting the timing and frequency of volcanic events. Many of these tephra horizons are not visible to the naked eye but can be identified by examination under a petrographic polarizing microscope. I isolated and examined microtephra from an early Pliocene interval of DSDP (Deep Sea Drilling Project) Site 231 corresponding to approximately 4.6-4.9Ma. My results yielded evidence of at least 12 volcanic events. The next portion of this project will entail density separations to further concentrate the volcanic glass ready for minor element geochemical analysis. This will enable the identification of the tephra in the marine core in comparison to the dated eruptions recorded at hominin sites on land. By merging the terrestrial and marine tephrostratigraphic records we will improve the absolute age constraints on the marine core and provide direct stratigraphic ties to events on land, independent of dating uncertainties. We will also present plans for paleoenvironmental reconstructions from this core using biomarker isotopic analyses. The δ13C values of plant leaf waxes allow for the reconstruction of the variable extent of forest versus grassland, already shown to be highly variable for later intervals of the Pliocene and Pleistocene. A well-dated record of environmental change in a 300,000 year interval between 4.6 and 4.9Ma will provide insights into the regional environmental conditions in which some of the earliest bipedal hominids existed.

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Category: Physical Sciences & Engineering

Name(s): Szeyan (Charlotte) Chan

Submission Type: Individual

Project Sponsor(s) and Collaborator(s):

Massoud Pirbazari, Sonny Astani Department of Civil and Environmental Engineering; Ryan Thacher, Sonny Astani Department of Civil and Environmental Engineering

Format: Laboratory-based Research

Title: Hexavalent Chromium Treatment in Groundwater by Integrated Electrokinetic and Nanoparticle Technologies

Abstract:

After gaining public exposure by California resident Erin Brockovich in 1993, hexavalent chromium [Cr(VI)] has become one of the EPA's priority pollutants, and a top concern of the WHO, due to its carcinogenic effects from chronic exposure and significant health threats from acute exposure. Cr(VI) exists abundantly in groundwater and soils around the world as a result of unmonitored discharge from a wide variety of industries. Many state-of-the-art remediation technologies are ineffective in aquifer environments with low hydraulic conductivity. Electrokinetic remediation, a novel treatment technology, avoids these issues by transporting charged contaminants through groundwater using a low-voltage direct-current. Essentially, contaminants can be transported and concentrated for more effective and less intrusive treatment. In laboratory-scale electrokinetic trials, Cr(VI) transport to the anode has been observed, and anodic reductive conditions convert Cr(VI) to Cr(III), which has much lower solubility and negligible toxicity. However, for compliance with safe water standards, additional remediation is required. Zero-valent iron nanoparticles are an emerging technology capable of bringing Cr(VI) concentrations to safe levels. Laboratory-scale studies show that nanoparticles rapidly reduce Cr(VI) to Cr(III), and it is hypothesized that their nano-size gives them the ability to travel

through aquifers. Effective nanoparticle transport is essential to Cr(VI) remediation in groundwater. This study evaluates the feasibility of transporting nanoparticles through clay soils using electrokinetic technology in order to treat Cr(VI) contamination. Electrophoretic mobility and particle stability studies were performed, which were essential to evaluating nanoparticle transport potential. In addition, laboratory-scale electrokinetic experiments in soil columns were conducted in the presence and absence of nanoparticles to assess nanoparticle transport and Cr(VI) reduction in a simulated natural system.

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Category: Physical Sciences & Engineering

Name(s): Szeyan (Charlotte) Chan, Hannah Gray, Avril Pitter, Kristen Sharer, Lillian Ware

Submission Type: Group

Project Sponsor(s) and Collaborator(s):

Massoud Pirbazari, Sonny Astani Department of Civil and Environmental Engineering; Varadarjan Ravindran, Sonny Astani Department of Civil and Environmental Engineering

Format: Laboratory-based Research

Title: Investigating the mechanisms of arsenic removal by microbial layer in a bio-sand filter used for drinking water purification in developing countries

Abstract:

This research addresses the enormous global demand for safe drinking water in developing countries. It focuses on removing arsenic and bacterial pathogens from potable water supplies using a bio-sand filter. The filter consists of a supporting gravel layer, large sand layer, and biofilm layer containing a diverse microbial population, acclimated to Echo Park pond water. Our previous conclusions were that the filter in-tandem with a pre-treatment column of iron-oxide-coated sand eliminated these contaminants. The present study focuses on determining the actual mechanisms of arsenic removal within the filter. The previous filter design was adapted to include a layer of iron-oxide-coated sand. Four sampling ports were strategically located to separately quantify arsenic removals in the biofilm and iron-oxide-coated-sand layers. Both sodium arsenate and sodium arsenite were spiked in the filter influent to determine whether arsenic removal was attributable to redox reactions. If arsenic removal occurred within the biofilm layer, the implications would be ground-breaking, highlighting the ability of bacteria to store or process harmful forms of arsenic. Samples of schmutzdecke (biofilm layer) were obtained from the filter for microbial community analysis at two stages -- after acclimation with uncontaminated source water, and after introduction of arsenic into the influent. The DNA materials were isolated from these samples, and the bacterial rRNA sequences were amplified by polymerase chain reaction (PCR) techniques. The PCR products were subsequently separated by denaturing gradient gel electrophoresis (DGEE), and sequenced for fingerprinting identification of dominant bacterial strains, before and after exposure to arsenic. Similar samples were also collected for scanning electron microscopy analysis to morphologically identify microbial species associated with arsenic removal. Elemental analysis was undertaken to determine the locations of any immobilized arsenic species. The presentation will address the mechanisms and interactions and mechanisms of arsenic removal in the bioactive filter.

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Category: Physical Sciences & Engineering

Name(s): Hannah Gray

Submission Type: Individual

Project Sponsor(s) and Collaborator(s):

Massoud Pirbazari, Sonny Astani Department of Civil and Environmental Engineering; Varadarjan Ravindran, Sonny Astani Department of Civil and Environmental Engineering

Format: Laboratory-based Research

Title: Investigating the potential of membrane processes in removing precursors to toxic and carcinogenic contaminants from water

Abstract:

The occurrence of natural organic matter (NOM) in potable water sources presents a major problem in water treatment scenarios. The NOM are precursors to the formation of toxic and carcinogenic organic contaminants during disinfection by chlorination and advanced oxidation processes. These contaminants are exemplified by several aldehydes, ketones, halo-acetic acids and trihalomethanes. The presence of NOM also causes severe fouling, undermining the efficiencies and economics of membrane processes from the standpoints of permeate flux decline and increased energy consumption. The present research addresses these aspects regarding NOM rejection and associated membrane fouling mechanisms. Membrane processes characteristically encounter permeate flux decline problems due to organic, biological, inorganic and particulate fouling, among which organic fouling is the most dominant mechanisms in water treatment scenarios. Membrane filtration tests using polymeric ultrafiltration and nanofiltration flat-sheet membranes were conducted in plate-and-frame cells. These tests were conducted with humic and tannic acids as model compounds (representing NOM), under different operating conditions. These tests investigated membrane rejection characteristic with regard to NOM removals, membrane fouling and permeate flux decline patterns. Membrane autopsy and surface characterization studies were employed to investigate the nature and type of membrane fouling and obtain a better understanding of fouling mechanisms. These studies included Fourier transform infrared spectroscopy, x-ray photoelectron spectroscopy, x-ray diffraction analysis, scanning electron microscopy, and atomic force microscopy. A membrane transport model was employed for performance prediction of membrane processes (ultrafiltration and nanofiltration), regarding permeate flux and NOM rejection. The model incorporated mass-transfer resistances attributed to membrane material, concentration polarization, external gel formation, and internal fouling, besides including mass-transfer and boundary layer effects. The predictive capability of the membrane transport model was validated as the experimental results were in good agreement with the theoretical predictions regarding permeate flux decline patterns and NOM removal efficiencies.

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Category: Physical Sciences & Engineering

Name(s): Chandni Raja, Dennis Su, Haili Sun, Emily Van Guilder

Submission Type: Group

Project Sponsor(s) and Collaborator(s):

Wenrong Cao, Earth Sciences; Valbone Memeti, Earth Sciences; Scott Paterson, Earth Sciences Department

Format: Field Research

Title: North-vergent thrust faults in accreted oceanic sediments and arc volcanics Central Asian Orogenic Belt, Inner Mongolia

Abstract:

The Central Asian Orogenic Belt (CAOB) formed during long-lived Paleozoic convergence between the Siberian and North China cratons. The rock types, location and timing of sutures, and vergence direction in much of the CAOB

are poorly constrained. Mapping and U/Pb zircon geochronology study in the Dashizhai region revealed Permo-Triassic ocean floor metasediments (depositional age around 270-300 Ma) , arc metavolcanics (288 Ma) and plutons (226-245Ma) unconformably overlain by weakly deformed Cretaceous volcanics (130-135 Ma) and intruded by later granitic dikes (132 Ma). Paleozoic packages are composed by mainly deformed metaandesites, metadacites, and less common metarhyolites juxtaposed with greenschist grade slates, phyllites, and local marble and chert.

All units are weakly to strongly deformed by E-W striking, south dipping cleavages that are locally axial planar to tight to isoclinal folds of bedding. We also recognized a major E-W striking, south dipping (average 095/31) ductile thrust system, often along margins between the Permo-Triassic metavolcanic and metasedimentary units. In these ductile thrusts strains increase to >400% extension parallel to a southward plunging mineral lineation (average 32/196) and >80% shortening perpendicular to foliation. Local kinematic indicators support top-to-NNE (average 016) motion in these thrusts. Late quartz veins developed in the area with average 124/57 orientation likely formed in tension gashes consistent with formation during northward thrusting. F2 folds that deform the mylonitic fabric in the thrust faults have average orientation 15/290 and southward dipping axial planes also consistent with north-vergent thrusting.

Our field study suggests in the Late Paleozoic, Dashizhai region was dominated by a northward vergent fold and thrust belt that involved deep to locally shallow water marine sediments and oceanic arc rocks. During thrusting, crustal thickening led to ambient metamorphic conditions in the greenschist facies. No prominent suture has yet been recognized. Thrusting and final amalgamation ceased by early Mesozoic time.

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Category: Physical Sciences & Engineering

Name(s): Tisa Thomas

Submission Type: Individual

Project Sponsor(s) and Collaborator(s):

Surya Prakash, Department of Chemistry

Format: Laboratory-based Research

Title: One-pot synthesis of N-(Fluoroethyl)amines by MCR strategy using Fluoroalkyl Sulfones as Efficient Fluoromethyl-Transfer Motifs

Abstract:

Introduction of fluorine into organic compounds brings forth significant changes in their chemical, physical, and biological properties. Fluorinated ethylamines can be prepared by many methods. However, a simple and efficient approach for highly diverse derivatives of fluorinated ethylamines from their simple molecular units by a multicomponent reaction (MCR) protocol was not known. We have found that fluoro(bisphenylsulfonyl) methane and fluoro(nitrophenylsulfonyl) methane can act as efficient fluoromethyl-transfer motifs for the synthesis of various substituted fluoroethyl amine derivatives by a new multicomponent methodology using the corresponding fluoro(phenylsulfonyl) methanes, amine, and formalin. This simple and convenient base free methodology affords many advantages such as non air sensitive route to fluorinated ethylamines, short reaction time, room temperature reactions, and high selectivity avoiding separation processes in most cases. The methodology can also be extended to prepare a diverse array of fluorinated ethylamines by suitable choice of substituents on fluoro(phenylsulfonyl) methane, amines, and carbonyl compounds.

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Category: Physical Sciences & Engineering

Name(s): Neil Anderson, Michael Sheehan

Ben Siver (Illinois Institute of Technology), Saul Castro (East Los Angeles College)

Submission Type: Group

Project Sponsor(s) and Collaborator(s):

Robert De Groot, Southern California Earthquake Center - USC

Format: Creative Work

Title: Operational Earthquake Forecasting

Abstract:

Since 2002, interns in the Undergraduate Studies in Earthquake Information Technology (USEIT) program at the Southern California Earthquake Center (SCEC) have been developing a robust and fully interactive software suite to be used for exploring seismic data in 3D space. Each year, interns in the USEIT program implement new functionality into the Southern California Earthquake Center's Virtual Display of Objects (SCEC-VDO). The software is used for a variety of purposes including scientific research, rendering animations, and spreading earthquake awareness to the general public.

The 2010 SCEC-VDO development team focused on implementing features under the scope of operational earthquake forecasting. One such feature is the real time earthquake plugin, which is capable of displaying and navigating through the most recent earthquakes in 3D space. Data from the California Integrated Seismic Network is now displayable in real time through this plugin. Furthermore, end users are able to view a live screencast of this utility via the SCEC website during seismic crises. Another feature added to SCEC-VDO is the ability to view static and kinematic fault ruptures based on data from the CyberShake project, although any data in the Standard Rupture Format (SRF) is also displayable. This plugin shows ground displacement in real time as well as total final ground displacement. The ability to view time-dependent rupture probabilities of various points on a fault was also added to SCEC-VDO. Using data from the UCERF model, users can now view the probability of any particular point on a fault participating in ruptures of various magnitudes.

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Category: Physical Sciences & Engineering

Name(s): Patrick Vail

Submission Type: Individual

Project Sponsor(s) and Collaborator(s):

Dan Erwin, Astronautical Engineering; Anthony Pancotti, Astronautical Engineering; Taisen Zhuang, The George Washington University

Format: Laboratory-based Research

Title: Performance Characterization of Micro-Cathode Arc Thruster for Nanosatellite Propulsion

Abstract:

Future nanosatellites will require low-thrust propulsion systems for orbital maneuvers to counter the effects of trajectory perturbations and for attitude control. In addition, the ability to accurately measure and characterize the performance of these propulsion systems is essential for demonstrating their potential usefulness. A micro-cathode arc thruster has been developed at The George Washington University that is advantageous for nanosatellite propulsion due to its efficient usage of propellant (high specific impulse). To generate thrust, the micro-cathode arc thruster expels a highly-directional plasma plume that is generated by an arc discharge between a titanium cathode-anode. The thruster employs a variable-strength magnetic field produced by a coil around the anode to direct the plume and rotate the arc-spot to mitigate cathode corrosion. Due to its potential use as a propulsive device for nanosatellites, the micro-cathode

arc thruster was fully characterized on a torsional thrust stand mass balance (nNTS) in vacuum chamber IV of the Collaborative High Altitude Flow Facility (CHAFF-IV) at the University of Southern California. The nNTS is a specialized low-thrust measurement system that was used to obtain direct measurements of the thrust produced by the micro-cathode arc thruster. The total impulse of the device was found to be 0.7 micro-Newton-seconds, which agreed well with predicted values, and the total impulse was shown to increase with increasing magnetic field strength. The specific impulse of the device was determined by measuring the mass loss from the cathode after repeated firings and was found to be 2500 seconds, and the nominal thrust-to-power efficiency was 14%. Future research will concentrate on increasing the efficiency of the thruster power supply and designing a propellant storage system suitable for long spacecraft missions.

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Category: Physical Sciences & Engineering
Name(s): Victoria Saadat
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Michelle Povinelli, Viterbi School of Engineering
Format: Laboratory-based Research
Title: Polymeric Photonic Crystal Sensors
Abstract:
Many fields, ranging from chemical engineering to medical diagnostics, can greatly benefit from reversible and energy-efficient sensors that can be reused and that do not require elaborate procedures or set-up. Recently, polymeric photonic crystal arrays have been identified as an arrangement than can potentially meet these needs and successfully overcome such obstacles. They consist of a periodic array of spherical dielectric nanoparticles or air nanovoids embedded in a polymer layer. The entire polymer structure produces a color change in response to a stimulus. Such stimuli include physical strain in the form of stretching or localized pressure, temperature change, and ligand binding. Each stimulus expands or contracts the polymer, causing a change in the periodicity of the particles or void array and, subsequently, a reflected color change.

The current project investigates the potential of several different arrangements of nanoparticle/nanovoid polymer structures. Lumerical™ photonics and optics design software was used to measure and evaluate effects of changes in different aspects of the sensor structure on the resultant color changes. Simulation results were coupled with spectrophotometer measurements on polymer samples to propel more effective polymer structure designs. The advantages of these polymer structures lie not only in their flexibility and reversibility in sensing, but also in their intrinsic reflectivity—they don't require an electric current or magnetic field to produce visible color. Consequently, further avenues of research include inducing color change using an electric current or a magnetic field, particularly for applications in electrical engineering or medicine.

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Category: Physical Sciences & Engineering
Name(s): Brian Rose
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Andrea Armani, Mork Family Department of Chemical Engineering and Material Science; Heather Hunt
Format: Laboratory-based Research
Title: Silica Sol-Gel Synthesis for Integrated Photonics
Abstract:
One of the focuses of the Armani Lab is fabricating high-sensitivity, low-detection limit silica waveguides for use as biosensors

and integrated photonics. Silica is the ideal medium for an integrated photonic device because of its low propagation loss and low susceptibility to non-linear effects. However, the high stress, which is inherent to thermally grown oxide, can result in structural defects in the optical devices, which will degrade the device performance. Therefore, we are investigating alternate routes of depositing silica on silicon. Our primary approach is based on silica sol-gel chemistry. Sol-gels are a unique way of producing a silica thin film through the hydrolysis and condensation of an alkoxysilane precursor. One of the great advantages of sol-gels is the ability to tailor optical properties of the thin film by using different catalysts and precursors. In the Armani Lab, tetraethyl orthosilicate is conventionally used as the precursor. However, we have also investigated using a combination of methyltriethoxysilane, or MTES, and titanium butoxide to form a composite film that would have a higher refractive index than pure silica.

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Category: Physical Sciences & Engineering

Name(s): Kathleen Harazin

Submission Type: Individual

Project Sponsor(s) and Collaborator(s):

Sergio Sanudo-Wilhelmy, Department of Earth Sciences and Department of Biological Sciences; Lowell Stott, Department of Earth Sciences

Format: Senior Honors Thesis

Title: Submarine reserves of liquid CO2 and glacial/interglacial atmospheric CO2 variability

Abstract:

Carbon dioxide (CO2) plays an essential role in modulating Earth's climate; during glacial terminations, CO2 increases concomitantly with temperature, and during glacial inception, they decrease. Between the last ice age and today, atmospheric CO2 has increased by over 200 ppm (100 ppm of that is a result of anthropogenic input). The rise during the deglaciation has been an enigma to paleoceanographers; an explanation has yet to be set forth that accounts for the entire 100 ppm of the rise. A number of hypotheses, most evoking the sequestration abilities of the deep ocean, have been formulated in an attempt to account for the rise. A new hypothesis, however, states that the rise in CO2 was a result of the release of liquid CO2 originating from subduction arcs. If feasible, this could not only account for the rise in CO2, but also for the observed drop in atmospheric Δ14C as well as an excursion in planktonic-benthic age differences in foraminifera in the eastern Pacific. Here we use Element/Calcium data from planktonic and benthic foraminifera to reconstruct a history of carbonate ion and trace metal concentrations in the Eastern Equatorial Pacific to reexamine the mechanisms behind the last deglaciation. We found that atmospheric CO2 rose before the deglacial temperature rise seen in the Eastern Equatorial Pacific (EEP); the timing of the CO2 rise and the warming lend crucial support to the hypothesis. These results have profound implications for our understanding of carbon dioxide and climate sensitivity in the past. In addition, our trace metal reconstructions possibly indicate the enrichment of micronutrients in the EEP, suggesting the presence of nutrient-rich Antarctic Intermediate Water at the site.

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Category: Physical Sciences & Engineering
Name(s): Niral Patel
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Mark Thompson, Department of Chemistry; Matthew Whited, Department of Chemistry
Format: Laboratory-based Research
Title: Symmetry Breaking via Intermolecular Charge Transfer in meso-linked BODIPY dyads

Abstract:
Boron dipyrromethene (BODIPY) dyes have been of recent interest due to their high extinction coefficients, high fluorescent quantum yields, and sharp absorption profiles. These compounds have been extensively used as molecular probes and labels, as they exhibit absorption and emissions profiles independent of solvent polarities.

A series of BODIPY dyads, through direct meso-linkage and via an intervening phenylene linker, were synthesized and characterized via standard spectroscopic methodsUnlike the parent BODIPY fluorophores and recent derivitizations, the dyads demonstrate a very different effect with changing solvent polarity. Excited state behaviors of these molecules demonstrate a symmetry broken state, leading to intermolecular charge transfer, marked by a drastic red-shift in emission. This behavior is previously undocumented in the red/near IR part of the visible spectrum.

Symmetry breaking, which is most prevalent in the photosynthetic reaction system, utilizes a charge separated state in the "special pair" of chlorophyll molecules. This inorganic mimic could potentially serve as an interfacing layer between the donor and acceptor layers in lamellar organic photovoltaic cells, and facilitate charge separation at the highly polarized D/A interface. As these molecules are highly absorbing in the visible and near IR part of the electromagnetic spectrum (a region lacking absorption in current OPV devices), they are also studied in neat films for potential device fabrication.

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Category: Physical Sciences & Engineering
Name(s): Kristan Culbert
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Wenrong Cao, Department of Earth Sciences; Scott Paterson, Department of Earth Sciences
Format: Field Research
Title: Tectonic implications of the age and characteristics of sedimentary packages for the growth of the Mesozoic arc, central Sierra Nevada, California

Abstract:
Geologic units in the central Sierra Nevada, California record valuable information about the growth of a Mesozoic continental margin magmatic and overlying volcanic arc. I am examining accompanying metasedimentary packages that specifically provide additional constraints on the geologic setting of and active tectonics during arc formation. U/Pb La-ICPMS detrital zircon ages collected from metasedimentary samples with Permian- and Mississippian fossil-bearing clasts at the base of the arc section indicate that the arc started forming by ~260 Ma, ~30 million years earlier than previous researchers had previously determined. Overlying these metasediments is a thick pile of Triassic, Jurassic and Cretaceous metavolcanics. Metasedimentary units are rare higher in the Triassic volcanic section, but increasingly common in the Jurassic section. Here thinly bedded, marine metasediments, one with an early Jurassic fossil (*Weyla*) give way to a thicker sequence of marine sediments to the north that have zircon populations dominated by Jurassic zircons (~170-180 Ma) plus zircons with Precambrian ages compatible with a

North American source. The Jurassic volcanic section is unconformably overlain by a thin unit of Cretaceous terrestrial metasediments and volcaniclastic units (96-98 Ma) which in turn are overlain by coarse volcanic breccias and rhyolite tuffs associated with the Minarets Caldera complex. These data suggest that the arc was built in a shallow marine setting on the edge of North America with the Jurassic arc not as emergent as the Triassic and Cretaceous arcs.

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Category: Physical Sciences & Engineering

Name(s): Jared Brooks, John Rising, Jorge Rodriguez

Submission Type: Group

Project Sponsor(s) and Collaborator(s):

Edward Rhodes, Department of Physics and Astronomy

Format: Field Research

Title: Temporal Changes in the Frequencies, Widths, Amplitudes, and Asymmetries of the Solar p-mode Oscillations During Solar Cycle 23

Abstract:

We present a study of the temporal changes in the sensitivities of the frequencies, widths, amplitudes, and asymmetries of the solar 'p'-mode oscillations to corresponding changes in the levels of solar activity during Solar Cycle 23 and the beginning of Solar Cycle 24. We have analyzed 'm'-averaged power spectra obtained from a combination of MDI and GONG full-disk Dopplergram time series obtained between 1996 and 2010. We have divided all 15 of the MDI Dynamics Runs obtained during 1996 and 2010 into a total of 357 three-day time series. We have also employed 28 additional three-day time series obtained with the GONG++ instruments during 2001. We have computed a total of 385 sets of un-averaged power spectra from these three-day time series for spherical harmonic degrees ranging up to 1000. We have collapsed the 385 sets of un-averaged three-day power spectra into 357 sets of 'm'-averaged power spectra. We then fit a total of 4,390,537 peaks in these 385 sets of 'm'-averaged power using our WMLTP fitting code and symmetric Lorentzian profiles. We also re-fit all 385 sets of 'm'-averaged power spectra using the WMLTP code and asymmetric profiles. We then inter-compared these 770 tables of 'p'-mode parameters and we performed linear regression analyses of the differences in 'p'-mode frequencies, widths, amplitudes, and asymmetries as functions of the differences in as many as ten different solar activity indices. From these linear regression analyses we have discovered new signatures of the frequency shifts of the 'p'-modes. We have also discovered a similar but slightly different signature of the temporal shifts in the widths of the oscillations. We have found yet another different signature for the changes in the asymmetries of the peaks, and we have found an unexpected signature of the shifts in the amplitudes of the oscillations.

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Category: Physical Sciences & Engineering

Name(s): Jack Seeley

Submission Type: Individual

Project Sponsor(s) and Collaborator(s):

Sarah Feakins, Earth Sciences

Format: Laboratory-based Research

Title: Tephrostratigraphy of the Gulf of Aden from 5.03 to 5.2 Ma

Abstract:

We present a tephrostratigraphic record from the Gulf of Aden from 4.9 to 5.2 Ma using identification of volcanic glass shards in the marine sediment core from DSDP Site 231. This record can help reconstruct the history of explosive volcanism in the Gulf of Aden and the Afar Rift Zone, in terms of timing and frequency of eruptions with distally transported tephra. We provide semi-quantitative shard counts,

which may contain information about the relative volumes of eruptions, modified by transport biases. For my section of the column, which is from 5.03 to 5.2 Ma, there appear to be at least 11 events, perhaps more if these eruptions can be distinguished geochemically. Tephrostratigraphy also presents wonderful opportunities for constraining the age of samples by correlating distal deposits of volcanic glass in the marine core to dated mineral grains in tephra deposits near the source volcanoes. Future work will attempt to measure minor element geochemistry in order to allow correlation to previously documented eruptions in terrestrial records. Positive identification would provide a means of improved dating for terrestrial and marine sequence of the Gulf of Aden and Afar region.

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Category: Physical Sciences & Engineering

Name(s): Natalie Ballew

Submission Type: Individual

Project Sponsor(s) and Collaborator(s):

Ramon Arrowsmith, Arizona State University; Robert De Groot, Southern California Earthquake Center

Format: Creative Work

Title: The Carrizo Plain: Puzzle Pieces to Understanding the San Andreas Fault

Abstract:

California has a notorious fault splitting through the state, known for its interesting geologic features and potential to cause major damage to many cities in California: the San Andreas Fault. Earth scientists flock to California to get a chance to study this major strike-slip fault, but those who are interested in geology on a more basic level may find much of the jargon and concepts tricky to wade through. This can be said for much of the scientific world, making basic concepts that are intrinsic to human life and our world seemingly inaccessible. Presenting scientific information in multi-media forms can resourcefully be used bridge the gap between the academic science world and the general public, as media is the primary transportation channel through which we consume and interpret new information. In this project, earthquake science and the consequences of geologic occurrences along the San Andreas fault at the Carrizo Plain National Monument are communicated in the form of short videos. The Carrizo Plain has been studied by geologists across the globe due to the unique preservation of geological data pertaining to earthquake science and geomorphology. The camera in this project captured the pieces of information from the landscape and from knowledgable experts in the field to form the story of the Carrizo Plain and the San Andreas fault. Footage describes paleoseismology and tectonic features such as sag ponds, pressure ridges, and offset channels. With potential to be used in classrooms and in web-based forms, these videos are filled with both basic and detailed information about geology and earthquake science that can be understood and used by anyone from the blossoming elementary school child to the curious post-doctoral scholar.

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Category: Physical Sciences & Engineering

Name(s): Catherina Ticsay

Submission Type: Individual

Project Sponsor(s) and Collaborator(s):

Dr. Veronica Eliasson, Aerospace and Mechanical Engineering; Chuanxi Wang, Aerospace and Mechanical Engineering; James Tamashiro, Aerospace and Mechanical Engineering; Daniel Gally, Aerospace and Mechanical Engineering; Martina Troesch, Aerospace and Mech

Format: Laboratory-based Research

Title: The Effects of Cavitation Due to Pulses Propagating Through Fluid-Filled Cracks

Abstract:

Experiments were conducted to investigate crack propagation due to shock-induced

cavitation. The experimental apparatus used a pressurized gas gun to simulate shock impact upon polycarbonate samples. The samples had machined cracks and contained varying levels of water. Both single-framed and high-speed Schlieren photography were used to capture the shock impact and view wave and crack propagation throughout the structure. It was of interest how cavitation and overall fluid-structure interaction affect crack behavior. Crack propagation in a water-filled crack was compared to that of a simple polycarbonate sheet with no water. Major stress spots were seen at the crack tips due to impact. Crack growth had the tendency to grow along the line of impact, and it was observed that the addition of more water led to greater damage of the samples. Fracture surface analysis has led to the hypothesis that cavitation increases the crack velocity. Despite the initial results, further investigation of damage characteristics is necessary to form conclusions about the strength of solid structures. More test runs are necessary to confirm if these observations are consistent. Photo-elasticity and caustics are two additional visualization methods that will be used to understand crack growth and aid in developing a model to measure crack velocity.

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Category: Physical Sciences & Engineering

Name(s): Irene Gow

Submission Type: Individual

Project Sponsor(s) and Collaborator(s):

Thomas Jordan, Department of Earth Sciences

Format: Field Research

Title: The Impact of the Earthquake Country Alliance Earthquake Education and Public Information Centers (ECA EPIcenters)

Abstract:

Starting as an informal alliance in 2008, the Earthquake Education and Public Information Center (EPIcenter) Network now consists of over 65 free-choice learning institutions primarily located throughout California. Members of the EPIcenter Network share a commitment to encouraging earthquake preparedness through demonstrated leadership in risk-reduction and earthquake education. Currently, the EPIcenter Network is building a strategy for sustainability. The purpose of the research was to develop impact measures for the EPIcenter Network through grounded theory.

A literature review on informal learning environments and evaluation methods was conducted. Six members of the EPIcenter Network in Southern California were interviewed, representing five types of informal learning environments—natural history museums, children's museums, libraries, outdoor areas, and science and technology centers. The purpose of the interviews was to understand each institution's mission and participation in the EPIcenter Network. The data from the interviews were incorporated into six logic models, one for each member, and analyzed. A seventh logic model was also created to represent the overall EPIcenter Network.

The logic models illustrated how the mission of the EPIcenter Network supported the mission of each institution through similar theoretical long-term outcomes. The logic models also indicated the need to continue the development of the EPIcenter Network through research, increased visibility, and increased communication among members. In addition to the continuation of the literature review, data collection, and analysis of logic models, the development of a rubric that will allow individual institutions and the EPIcenter Network as a whole to measure success and identify areas of improvement was recommended.

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Category: Physical Sciences & Engineering
Name(s): David Horrell
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Scott Paterson, Earth Sciences
Format: Field Research
Title: Unfolding the Tectonic History of Joshua Tree National Park: A structural and petrologic study of the Johnny Lang Canyon area

Abstract:
Joshua Tree National Park, in southeastern California, displays a spectacular ~ 2 b.y. geologic history of the evolution of the western North American margin. Evidence lies in deformed and metamorphosed Precambrian sedimentary and plutonic rocks, the construction of a Mesozoic magmatic arc, and recent strike-slip faulting and block rotation. In the Johnny Lang Canyon region of the park, a large anticline of Mesozoic age folds the Precambrian rocks and is closely tied to formation of the Mesozoic magmatic arc. The ~1.75 Ga (age of zircon cores dated by Barth and Wooden) Precambrian rocks (para- and orthogneisses) were highly deformed and metamorphosed at around 1.4-1.45 billion years ago (age of zircon rims from Barth and Wooden). During the late Cretaceous (~82-70 Ma) a complex of sheet-shaped to large elliptical plutons were emplaced, which field relationships establish is the same time as the formation of the large anticlinal fold. Thin section analysis of the rocks reveals changing deformation and metamorphic assemblages that follow a retrograde path from high pressure and temperature assemblages of biotite+garnet+kyanite associated with intense deformation to moderate P and high T assemblages of biotite-sillimanite associated with moderate deformation and finally to lower PT static assemblages with chlorite-sericite-clinozoisite. We link the high PT assemblage to the 1.4 Ga zircon rims, the moderate PT assemblages to Cretaceous pluton emplacement, and low T to post pluton cooling.

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Category: Physical Sciences & Engineering
Name(s): Hanlong Chen
Submission Type: Group
Project Sponsor(s) and Collaborator(s):
Robert De Groot, Earth Science Department; Thomas Jordan, Earth Science Department
Format: Creative Work
Title: UseIT 2010 Media Team

Abstract:
The task of the 2010 UseIT Media Team was to capture the experience of the UseIT intern class and demonstrate how students from across the country came together for eight weeks to achieve the "Grand Challenge". We collaborated with the other multi-disciplinary teams to accurately portray the roles of each group in achieving the Grand Challenge for this year, which was to produce a seismic crisis visualization system based on SCEC-VDO. In order to accomplish our task, we first learned how to operate the camera and audio equipment as well as how to edit audio and video using media editing software. The first stage of the movie making process was to draft the script. As we went through multiple revisions of the script, we were challenged to effectively describe UseIT and the Grand Challenge. It was important for us to portray the struggles that the interns faced to show our audience the nature of the UseIT program. Coming from different backgrounds, the interns learned to collaborate and develop software used by scientists. Finally, footage obtained over the course of the internship was edited and assembled into the final product. To help the interns remember their summer experience, a SCEC intern t-shirt was produced for everyone, which we oversaw. We were also responsible for assisting in planning the UseIT poster session at the SCEC Annual Meeting so

that each team's poster was presented in a logical manner.

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Category: Physical Sciences & Engineering

Name(s): Ian Cox

Submission Type: Individual

Project Sponsor(s) and Collaborator(s):
Wenrong Cao, Department of Earth Sciences; Valbone Memeti, Department of Earth Sciences; Scott Paterson, Department of Earth Sciences

Format: Field Research

Title: Volcanoes and their Underlying Magma Forming Systems: The formation of a Volcanic Arc in the Central Sierra Nevada

Abstract:

Over the course of millions to 100s of millions of years, the subduction of oceanic crust beneath continental margins leads to the melting of crust at depth and the formation of magmatic arcs, that is chains of volcanoes and their underlying plutonic plumbing systems. Based on field mapping and geochronology, we have begun to explore the magmatic history of one of these ancient and now partially eroded arcs in the central Sierra Nevada, California.

Our new geochronology indicates that arc formation began 260 +/- 10 Ma, when subduction of an oceanic plate beneath the North American margin initiated melting and construction of an arc unconformably upon older Paleozoic metasediments. The base of the arc is marked by metasediments with zircons ranging back to ~260 Ma that are in turn overlain by a thick sequence of Triassic and Jurassic volcanics that were formed between 250 to 146 Ma. These volcanic rocks range in composition from rhyolite to andesite and range from coarse breccias to ash flow tufts. Marine metasedimentary layers were also found in thin layers throughout the Jurassic volcanics. At the top of the Jurassic volcanics, we found a second large uncomformity, where erosion or magmatic inactivity creates a gap in the history between 146 to 96 Ma. Cretaceous volcaniclastic and terrestrial sediments occur immediately above this second uncomformity, and are overlain by rhyolitic tuffs and volcanic breccias formed in a caldera collapse setting. Plutonic bodies (the now frozen magma plumbing systems) occur throughout the region and now intrude the tilted and deformed volcanic sequences.

Our new mapping, geochemistry and geochronology allow us to track the temporal and geochemical history of this evolving continental margin arc between 260 and 96 million years ago and thus better constrain the Mesozoic tectonic history the North American margin.

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Category: Social Sciences
Name(s): Erika Levonian
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Brian Baucom, Department of Psychology
Format: Senior Honors Thesis
Title: Alcohol Use and the Intergenerational Transmission of Parent-to-Child Physical Aggression

Abstract:
Alcohol abuse and parent-to-child physical aggression are major problems in society today and there is a need to further understand these issues and find ways to prevent them. The purpose of this study is was to examine the relation of alcohol abuse and the intergenerational transmission of parent-to-child physical aggression. Gender differences were also looked at. The data for this study was taken from the National Longitudinal Study of Adolescent Health (Add Health). One thousand seven hundred eighty-four adults (approximately 29% male and 71% female) between the ages of 24 and 32 years completed surveys and in-home interviews that in part assessed parent-to-child physical aggression and substance use examining both the focal child and their parents. I hypothesized that youth who were victims of parent-to-child physical aggression were more likely to perpetrate aggression towards their offspring than youth who were not victimized. I also hypothesized that youth who abuse alcohol are more likely to perpetrate aggression towards their offspring than those who do not abuse alcohol. Consistent with hypotheses, a 2 X 2 X 2 between subjects ANOVA revealed that youth who were victims of parent-to-child physical aggression were more likely to perpetrate aggression towards their offspring than those who did not experience victimization. In addition, youth who abuse alcohol are more likely to perpetrate aggression towards their offspring than youth who do not abuse alcohol. Lastly, results showed that females were more likely to perpetrate aggression towards their offspring than males. This is a prospective study with the purpose of identifying predictors of risk for parent-to-child physical aggression. Since parent-to-child physical aggression is such a big problem, it is important to pinpoint risk factors in order to strengthen the prevention effort.

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Category: Social Sciences
Name(s): Emily Frank
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Brian Baucom, Psychology
Format: Senior Honors Thesis
Title: Alcoholism and Family Conflict

Abstract:
Alcoholism and binge drinking are associated with a wide range of negative outcomes for college-aged adults including increased risk of academic failure, symptoms of psychopathology, morbidity, mortality, risk of contact with sexually transmitted infections, and legal problems. Additionally, alcohol use is a major

contributor to distress in clinical and community samples. The effects of problematic alcohol use extend well beyond the individual user and frequently spill over to influence family and friends. One of the enduring questions in the empirical literature on alcoholism is the role of family factors (parenting styles, family coping styles, and family conflict) in increasing risk for problematic alcohol use. While it has been shown that both genetic and family environmental risk factors significantly contribute to alcoholism and binge drinking, it is not well understood how inherited genetic risks interact with learned behaviors to increase risk. This study investigated how family history is associated with current alcohol use behaviors indicated by college students. The sample population was recruited through the psychology department subject pool. This population consisted of 267 USC college students. The study utilized five self-report questionnaires, including demographics, family of origin history of alcohol use and current alcohol use of the participant. Additionally, participants completed a demand and withdrawal measure looking at family conflict and finally an open-ended questionnaire describing their family of origin environment. This qualitative component was derived through interviews conducted for this study with inpatient residents at a drug and alcohol rehabilitation facility. Responses were analyzed using a computational linguistics program determining thematic concepts to help paint a general picture of the phenomenon of alcohol addiction. This research project proposed that the alcoholic individuals' perception of their family of origin might shed light on the process by which alcoholism develops. Multiple regressions were used to test study hypotheses.

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Category: Social Sciences

Name(s): Lu Zhang

Submission Type: Individual

Project Sponsor(s) and Collaborator(s):

Eileen Crimmins, Davis School of Gerontology

Format: Senior Honors Thesis

Title: Cardiovascular Health Disparities and Risk Factors in Chinese Older Adults: Analysis of the 2008 CHARLS Study

Abstract:

Background: The health and nutritional environments have transformed significantly in China during the last twenty years, with a decline in communicable diseases and a rapid increase in chronic illnesses such as cardiovascular disease. However, effects of these changes on the aging population have received relatively little attention even though the older population is the fastest growing age group in China. My research focuses on the prevalence of cardiovascular health indicators across socioeconomic and demographic groups as risk.

Methods: I will be analyzing data collected in the 2008 cross-sectional pilot survey of the Chinese Health and Retirement Longitudinal Study (CHARLS), with 2,529 adults aged 45 and over included in the analysis. SAS was used for statistical analysis. Cardiovascular health indicators include hypertension and high cholesterol, which are both self-reported and measured in order to provide indicators of high risk conditions, and knowledge of these conditions. Gender, rural and urban residence, education, and obesity (as indicated by BMI) are all related to CVD health risks.

Results: The results indicate relatively high prevalence of hypertension and high cholesterol among older Chinese adults, with rates of 46.43% and 36.76%, respectively. The prevalence of both indicators is highest among urban

residents, women, the uneducated, and overweight individuals. However, under-diagnosis of CVD risk indicators remains a severe issue, especially among the rural residents, women, the uneducated, and underweight and normal weight individuals.

Conclusion: The high prevalence of CVD risk indicators raises alarm over the health education, provision, and management of older adults in China. The issue is more severe among rural communities, women, and the uneducated.

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Category: Social Sciences
Name(s): Allison Maxwell
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Brian Baucom, Psychology; Gayla Margolin, Psychology
Format: Senior Honors Thesis
Title: Children's Daily Mood as Influenced by Intrafamilial Aggression and Protective Factors

Abstract:
Current research suggests that intrafamilial aggression negatively affects children across a number of important functional domains including mental health, physical health, and academic functioning. The purpose of the study was to examine the influence of marital and parental aggression on children's daily mood and how children's coping mechanisms may mediate this relation. Participants were 67 children involved in a longitudinal study of the impact of multiple violence exposure on families and on children's adjustment. The study used up to 14 days of daily diaries completed by each child. These diaries included measures of aggression, coping, and mood. The data were analyzed using complex survey methods for Structural Equation Models, which are appropriate for the nested design of this dataset. Consistent with the hypotheses, increased aggression was linked to higher levels of negative mood; higher levels of coping were linked to higher levels of positive mood. When both aggression and coping were present, the interaction lessened the relation between higher levels of positive mood and higher levels of coping. These findings demonstrate the threat aggression poses to children's mood on a daily basis and highlight coping's role as a protective factor promoting positive adjustment for children living in aggressive families.

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Category: Social Sciences
Name(s): Daniel Paris
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Jo Ann Farver, psychology; Karen Hennigan, psychology
Format: Senior Honors Thesis
Title: Conceptual and Empirical Definitions of Group Membership: Measuring Street Gang Affiliation

Abstract:
At present, there are two leading methods of measuring gang membership: self nomination (Esbensen, Winfree & Taylor, 2001) and the Eurogang assessment of key attributes of a youth's group of friends (Decker & Weerman, 2005). Like most self-report measures, these are subject to self presentation concerns. But in addition, contrary to popular stereotypes, emerging gang cliques are not highly structured or cohesive groups with clear boundaries, and as such the respondents themselves may have difficulty with answering categorical (in or out) questions. Research shows the need for a comprehensive, agreed upon, and consistent definition for measuring gang membership. However, little is known about the overlap in these very different approaches. The current study compared the reliability and validity of these two approaches using the dataset from the Gang Reduction and Youth Development study.

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Category: Social Sciences
Name(s): Ashley Williams
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Felix Guiterrez, Annenberg School for Communication and Journalism
Format: Field Research
Title: Connecting Network News to the College Aspirations of Minority High School Students

Abstract:

Television news impacts individuals' perceptions of themselves. Compared to local news, network news has a greater impact on its audiences due to its national presentation of issues and current events. Previous studies demonstrate that network news' portrayals of African Americans increase the endorsement of minority stereotypes and racial attitudes within society. Since African American adolescents watch more television than any other demographic, increased exposure to television network news programming may affect their college aspirations and self-concepts.

This experiment investigates whether viewing television network news programming affects the college aspirations of Hispanics/Latinos and African American high school students. An online survey was administered to more than 150 students, predominantly African American, recruited from Crenshaw High School in Los Angeles, California. Students were asked a serious of questions based on their previus experience with televsiion network news viewing, education aspirations, societal issue of interests, and self-images. Results demonstrated subjects believed network news programming encouraged negative stereotypes towards African Americans, and network news programming that includes a successful African American providing solutions to societal issues increased college aspirations and self-concepts. Results also revealed that some African American adolescents' academic achievements caused their peers to ridicule their racial identity. This study encourages future discussions on stopping the endorsement of African American stereotype portrayals in network news, implementing media literacy into classrooms, and connecting African Americans' academic aspirations to their racial identity.

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Category: Social Sciences
Name(s): Mark Lay, Tavish Nanda, Brooke Sanders
Submission Type: Group
Project Sponsor(s) and Collaborator(s):
Mary Helen Immordino-Yang, Brain and Creativity Institute/Rossier School of Education; Xiaofei Yang, Brain and Creativity Institute
Format: Laboratory-based Research
Title: Cultural differences in behavioral and psychophysiological empathic reactions to physical pain

Abstract:

In an ongoing fMRI study headed by Mary Helen Immordino-Yang and conducted by Xiaofei Yang, Chinese participants in Beijing and American participants in Los Angeles were exposed to narratives designed to evoke admiration and compassion. These narratives were presented in full during a video recorded interview prior to the fMRI. In the fMRI machine, participants' EKG data were collected while being reintroduced to reminder clips of each narrative, while a button-pressing system was utilized to record the intensity of the feeling of emotion while in the fMRI.

The undergraduate team was responsible for transcribing the videos of each subject. After each transcript was verified by a separate transcriber, the team developed a

coding system to analyze the behavior of subjects' responses when viewing stimuli designed to evoke compassion for physical pain. The coding system designated four levels of expressiveness to quantify the behavior of each participant's response to the narratives. After establishing inter-rater reliability for the codes they were compared to the psychophysiological data recorded during the fMRI.

The data suggest that the stoicism expected in Chinese culture can be observed behaviorally in the Chinese participants' lack in exhibition of expressive emotions. Furthermore, these results were corroborated by Xiaofei's psychophysiological data interpretations, in which a majority of Chinese participants exhibited EKG patterns with a lack of the immediate sympathetic spikes in activity characteristic for the majority of American participants. Despite these differences, upon comparison of button-press data, both groups reported the same intensities of emotion. Consequently, the correlation between the behavioral coding data and the psychophysiological data suggests that Chinese stoicism is not only observed behaviorally, but also influences psychophysiology, while emotional intensity remains similar between cultures.

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Category: Social Sciences

Name(s): Monica Do

Submission Type: Individual

Project Sponsor(s) and Collaborator(s):
Elsi Kaiser, Linguistics

Format: Laboratory-based Research

Title: Deep or Shallow? Effects of processing depth on pronoun interpretation

Abstract:

Past research has shown that the degree to which people process the information they receive is intimately related to the demands of the task at hand. For example, if participants are reading short texts and answering questions about them, question type has an important effect: If the questions are superficial (do not require much more than basic recollection), participants tend to engage in shallow, incomplete processing; if the questions are more demanding, participants will work to attain a more in-depth analysis of the sentence.

In the context of this study, we investigated how differences in processing depth influence participants' processing of pronouns. We tested whether pronoun interpretation is facilitated by pronouns' gender cues ("he" vs. " she") and information from verbs, under deep and shallow processing. If people process input shallowly, they may not "bother" to engage in pronoun resolution, whereas participants processing deeply will strive to interpret the pronouns. Thus, we can see whether the presence/absence of gender or verb cues has different effects under different processing modes. We utilized Self-Paced Reading, where participants read sentences word-by-word (pressed the space bar to "unmask" words one-by-one). This allows us to measure the reading time for each word, to see whether participants slow down more when faced with ambiguous pronouns.

Our results have the potential to provide new insights into how depth-of-processing influences participants' resolution of pronouns, and can also help us to obtain new insights into what kinds of strategies can involve reading comprehension more generally. We hope to extend this study to include data by non-native English speakers in order to determine whether same factors that influence native speakers' processing depth apply to second-language learners.

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Category: Social Sciences
Name(s): Alexandra Battat
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Karen Jungblut, Shoah Foundation Institute (was professor for 2010 Problems Without Passports Cambodia); Kosal Path, International Relations
Format: Field Research
Title: Ending Vindictiveness: The Role of Buddhism in Achieving Forgiveness and Reconciliation in Cambodia After the Khmer Rouge

Abstract:
The course itself was Conflict Resolution and Peace Research, but within that framework we were free to pursue our own research topics. I chose to focus on Buddhism and its effect on the reconciliation process in Cambodia 30 years after the genocide took place. Buddhism firmly believes that to end the cycle of revenge one should not seek vengeance against a perpetrator, but in the aftermath of such a catastrophic event as a genocide, this is simply not enough as a means for moving forward and for reconciliation. What Cambodia needs is dialogue; people need to feel safe enough to speak about their experiences, and the country's youth need to be educated about what happened so that history is not repeated. Buddhism provides the peaceful environment for this to take place by encouraging its adherents to be forgiving, but extra steps need to be taken if Cambodia is truly going to move beyond its troubled past.

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Category: Social Sciences
Name(s): Nitika Kumar Gupta
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Carol Prescott, Psychology; Susan Luczak, Psychology
Format: Senior Honors Thesis
Title: Exploring Gender and Religio-Ethnic Differences in Tobacco Use among People in Mauritius

Abstract:
In 1972, the Joint Child Health Project was started in Mauritius to study the mental health of the inhabitants of the island. This study examines the tobacco use among the JCHP cohort, and distinguishes the smoking habits between males and females, and among the three main religio-ethnic groups, Hindus, Muslims, and Creoles (a mix of African and French descent). The results show gender differences in smoking – only 22 of the 517 women in the sample reported smoking, whereas 304 of the 651 men reported smoking. Further, it was found that there were significant differences between the males in the religio-ethnic groups – the Creole and Muslim men used significantly more tobacco than did the Hindu men in this sample. Further research can examine the reasons for these differences. This study has implications for further research with younger adults, as it has been noted that there is an increase in tobacco use in developing nations.

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Category: Social Sciences
Name(s): Chanel Honda
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Thomas Gustafson, English Department, College of Letters Arts and Sciences; Leland Saito, Sociology Department, College of Letters Arts and Sciences
Format: Senior Honors Thesis
Title: From Yellow Peril to Model Minority: Evolving Perceptions of Chinese Food and Chinese Americans in Society

Abstract:
This research project will use food and restaurants as a way to examine the changing views of society toward the Chinese in the United States. I will look at the evolving perceptions of Asian Americans and examine if or when Chinese cuisine became more mainstream. Do these processes occur simultaneously or separately? Is looking at the receptiveness or enjoyment of one's cuisine a good indicator of how we perceive an ethnic group? This study will reveal the relationship between the acceptance and acknowledgement of Chinese food with the acceptance and assimilation of Asians, particularly the Chinese, into American society. There will be a brief historical overview of the important political and social events that have occurred in Asian American history, as well as significant dates of when Asian dishes were invented or brought over to the states. However, while I will be looking at how Asians were viewed in the past, my focus will be on contemporary times. A large part of my thesis will be focused on Chinese restaurants in Los Angeles. I will be looking at the set-up, décor, location, awards won, and diners or who is eating there. I will also be using online reviews and focusing on what is being said about service, the food, and the restaurants as a whole. I hope to reveal the societal impacts and cultural exchange processes of ethnic restaurants, and will attempt to define what "American" food really is.

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Category: Social Sciences
Name(s): Erika Levonian, Amanda Spoto
Submission Type: Group
Project Sponsor(s) and Collaborator(s):
Brian Baucom, Department of Psychology; Gayla Margolin, Department of Psychology
Format: Laboratory-based Research
Title: Impact of Family Aggression on Emotional Expression during Family Conflict

Abstract:
Family aggression has wide ranging impacts on parents and children, including their psychological, social, and interpersonal functioning. Though the impact of family aggression on emotional expression and experience is theorized to be an important mechanism by which aggression affects outcomes, very little is currently known about the ways that emotionality is affected by family aggression. The emotional security hypothesis suggests that higher levels of family violence are likely to be associated with restricted range of emotional expression which may be associated with subsequent maladjustment. Researchers have used many different ways to measure emotional expression. We used a system based on component process models of emotion that focus on different dimensions of emotion rather than different specific emotions themselves. Our work focuses on two dimensions, facial valence and vocal arousal. We hypothesize that higher levels of family aggression will be associated with lower variability in arousal and valence, lower peak arousal and less extreme valence, and lower average arousal and valence. So far, we have tested these hypotheses using correlations. Consistent with our hypotheses, higher levels of family aggression are significantly associated with lower levels of average arousal for fathers. We will further analyze our data using

multiple regressions prior to finalizing our poster. These results suggest that fathers' emotional expression may be particularly sensitive to family aggression. Given the important role of fathers in modeling and responding to emotion during conflict, these results identify a potentially important target for clinical intervention.

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Category: Social Sciences

Name(s): Erica Silva

Submission Type: Individual

Project Sponsor(s) and Collaborator(s):

Ricardo Ramirez, University of Notre Dame (formerly at USC Department of Political Science)

Format: Field Research

Title: Is Now the Time? Examining the Naturalization Process through Citizenship Assistance Workshops

Abstract:

In response to the 2006 pro-immigrant marches and growing anti-immigrant legislation emerging across the nation, the National Association of Latino Elected and Appointed Officials (NALEO) created the Ya Es Hora ¡Ciudadanía! (It's Time for Citizenship) campaign in an effort to increase naturalization rates among the Latino community. This research addresses the effectiveness of NALEO's citizenship assistance workshops and what role they play in an individual's propensity to apply for citizenship. Prior research has explored immigrant reasons for naturalization and the political mobilization of newly naturalized citizens. Although naturalization rates are up to 118% in Los Angeles, no study has evaluated the effectiveness of these workshops on an individual's propensity to apply for naturalization. Using a pre and post survey, this paper analyzes the change in attitudes among workshop participants in California and Texas. The survey explores immigrant perceived barriers towards USCIS procedures, the role of support networks in applying for citizenship, and the workshops affect on an individuals emotions towards the application process. This research is the first step in evaluating citizenship assistance workshops, and provides recommendations to increase workshop effectiveness in an effort to help immigrants attain their legal and political rights as American citizens.

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Category: Social Sciences

Name(s): Joshua Real

Submission Type: Individual

Project Sponsor(s) and Collaborator(s):

Brian Baucom, Psychology; Gayla Margolin, Psychology

Format: Senior Honors Thesis

Title: Linking Blink Rate to Motivational Systems and its Neural Substrates

Abstract:

The appetitive and aversive motivational systems are thought to be the neural substrates that underlie reward seeking and punishment avoidant and have been shown to play a major role in overall psychological functioning. For example, greater appetitive motivation is linked to greater overall life satisfaction, greater marital satisfaction, and fewer symptoms of depression. The appetitive and aversive motivation systems are typically measured using either invasive physiological methods or time consuming self-report instruments that are not good candidates for use during social interaction. Though the appetitive and aversive motivational systems are likely to be a significant determinants of behavior during social interaction, but very little work has been done to establish the construct validity of measures of the appetitive and aversive motivational systems, such as endogenous eye-blink rate, that can be used during social tasks. This study seeks to identify whether endogenous eye-blink rate during triadic family conflict is associated with symptoms of anxiety, depression, and PTSD. Greater endogenous eye-blink rate, which is

indicative of greater appetitive motivation, is associated with lower symptoms of anxiety, depression, and PTSD. Consistent with hypotheses, we found that the correlation between blink rate and depression was significant (r=0.XX, p<.031) and that the relationship between blink rate and anxiety was nearly significant (r= 0.XX, p><.084). Additionally, the correlation between blink rate and PTSD was significant when three influential observations were removed (r=0.XX, p>

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Category: Social Sciences
Name(s): Silvia Green
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Joseph Hawkins, Anthropology and Gender Studies
Format: Senior Honors Thesis
Title: Maternal Infanticide and Sudden Infant Death Syndrome: How Maternal Instincts Can Lead to Hidden Cases of Maternal Infanticide

Abstract:
In our society nurturing maternal instincts are often thought to come naturally to women. Cases of maternal infanticide made public are shocking, and the mothers are often portrayed as monsters. Because maternal instincts do not come naturally to all women, mothers do not always ensure the safety of their offspring. It may even be argued that maternal infanticide is an adaptive reproductive strategy for women. With this in mind, it is important to investigate Sudden Infant Death Syndrome (SIDS) objectively and acknowledge that some cases may be diagnosed incorrectly. This research examines the possibility that maternal behaviors are not biologically produced, but rather culturally and socially reproduced. The experiences of new mothers and how these align with our cultural expectations of motherhood are the main focus of this project. The study presents cases of women with differing experiences during the postpartum period and interviews with experts regarding the possibility of SIDS misdiagnosis, of mother-induced SIDS, and of what they consider to be typical maternal behaviors. The research also makes use of literature regarding risk factors for SIDS, misdiagnosed cases of SIDS, and maternal instincts. Participant observation was conducted to investigate the experiences of new mothers. It was found that the experiences of mothers vary greatly and cannot be considered universal. Of the participants, those with better support systems and more resources fared better in terms of coping with the birth of an infant and adjusting to the change of lifestyle. Mothers living with extended family and/or who participated in an activity away from their infant regularly experienced less depressive symptoms than did those in neolocal residences and/or with little support. It is important to identify these as risk factors for postpartum depression, which may lead to a mother harming her infant and subsequently be misdiagnosed as SIDS.

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Category: Social Sciences
Name(s): Nicole Nowparvar
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Stanley Huey, Jr., School of Letters, Arts, and Sciences; Caitlin Smith, School of Letters, Arts, and Sciences
Format: Senior Honors Thesis
Title: Monetary Incentives and Job-Seeking Behaviors in Gang-Affiliated Juvenile Youth

Abstract:
Gang-affiliated juvenile delinquent behavior is a serous, costly problem that undermines the well-being of victims, perpetrators, and communities. Previous studies have shown that adolescent delinquents respond positively to monetary gains by increasing positive behaviors, such as employment and decreasing their rates

of recidivism. The purpose of the proposed study was to observe the effects of monetary incentive on job-seeking behaviors in gang-affiliated delinquent youth. These participants are recruited from the Behavioral Employment Intervention Program and were selected on a single-case study basis using a multiple baseline approach. We hypothesized that monetary gains would motivate the youth to engage in job-seeking activities, such as submitting completed job applications and resumes, making follow-up calls to potential employers, attending job interviews, and meeting regularly with a counselor for scheduled counseling sessions.

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Category: Social Sciences
Name(s): Shelly McArdle
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Richard John, Psychology; Heather Rosoff, USC CREATE
Format: Analytical Paper
Title: National Responses to September 11 Over Time: Analyzing Changes in Emotions, Beliefs, and Behaviors

Abstract:
Before 9/11, the small number of attacks and a limited number of people directly affected by the attacks left it unclear how Americans perceive the likelihood and consequences of terrorist attacks. September 11 created a natural experiment; a real attack from which we can examine how the event affected people across the nation in different ways. With this information, we investigate the behaviors, emotions, and beliefs of people nationwide.

Using poll data collected consistently over the five years following 9/11, we further investigate the changes over time. We hypothesize that: A) There will be a time when the heightened responses in reaction to September 11 will dissipate and plateau over time; B) Perceptions and behaviors will be moderated by age, sex, party, and region.

The data used was derived the 9997 total participants of the ABC News's and CBS News's polls collected from 2001 until 2006. The current study investigates the responses to seven questions asked across 10 polls regarding the respondents emotional, cognitive, and behavioral reactions. Respondents' answers to the seven poll questions were analyzed using independent, univariate ANOVA with each independent variable (time, sex, age, party, and region).

A significant interaction with time was found in all but one of the poll questions. Each of the moderating variables also provided significant interactions with time. Finally, over time both the emotional and behavioral responses returned to a normal, even state after one year, while the changes in beliefs were still diminishing as late as September 2006.

This information is critical for providing insight into how citizens will perceive and respond to an attack on the airline system, and for contributing to the development of effective organizational policies and recovery. Further experimental research on the airlines' responses to attacks would be beneficial.

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Category: Social Sciences
Name(s): Jordan Vieira
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Tok Thompson, Anthropology
Format: Field Research
Title: Performance, Sex, and Politics: The Quest for Identity in Southern Uganda

Abstract:
It is an understatement to assert that

neocolonialism as a consequence of 19th century imperialism has formed numerous catalysts resulting in profound effects on the subsequent world reconfiguration and global sociopolitical, socioeconomic, and sociocultural development. This project explores such effects in the context of the intersections between contemporary "traditional" performance, agency, and politics among the Baganda people of Uganda. Sampling traditional narrative of the Baganda Kingdom and then examining the state's attempt at creating national identity post-colonialism, I analyzed the implications of female and homosexual agency via performance in terms of identity creation and political ramifications. Using drum playing and dance as a symbolic and practical baseline assessment of agency, the research also draws upon folklore narratives, government policy, and examples of western involvement to unpack and reveal the multiple layers involved with performance of everyday life. These components all demonstrate how one can look to these common practices and political rhetoric for a holistic assessment of identity construction, negotiation, and agency within a developing, post-colonialist state.

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Category: Social Sciences
Name(s): Andrew Choi
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Karen Hennigan, Psychology
Format: Senior Honors Thesis
Title: Possible Selves and Street Gang Involvement in Los Angeles Youth

Abstract:

This study examined the relationship between individuals' involvement with social groups and measurements of their possible selves (future beliefs about their self concept). The study was a secondary analysis of data gathered from the Social Identity Project, in which 416 males aged 14 to 21 were interviewed from areas where civil gang injunctions did or did not take place. Relations among street gang involvement and uncertainty and criminal-related possible selves were compared between gang affiliated youth and those who were not.

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Category: Social Sciences
Name(s): Megan Moine
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Minah Kim, USC School of Social Work; Kyeung Hae Lee, USC School of Social Work; Ann Marie Yamada, USC School of Social Work
Format: Senior Honors Thesis
Title: Spiritual Leaders and Mental Illness: A Cross-Cultural Study of Etiology and Treatment

Abstract:

Due to inherent cultural beliefs regarding mental illness, many Asian Americans do not seek help for mental health issues. According to the National Latino and Asian Americans Study, only 8.6% of clinically diagnosed Asian Americans sought services (Wang et al., 2005). Research literature suggests that for Asian Americans who do utilize services, their needs are poorly met; current approaches to counseling often neglect culturally specific idioms of distress, culture-bound syndromes, and the extreme societal prejudice associated with mental illness (Bateman et al., 2009). Despite the need for culturally competent mental health services for minority immigrant populations, little research exists on the topic. Furthermore, many factors prevent Asian Americans from accessing adequate help: language barriers, cultural insensitivity, mental illness stigma, lack of awareness of resources, loss of face, shame, and belief in traditional medicine (Lee et al., 2008). However, as role models of their respective spiritual communities, pastors may serve as bridges for

congregants seeking mental health services. The purpose of this study was to compare Korean and Euro-American pastoral perspectives on mental illness etiology and treatment. According to previous studies, etiological explanations of the causes of mental illness reflect ethnic patterns of beliefs, which subsequently influence treatment behavior (Yeh et al., 2004). An exploration of the beliefs and treatment endorsed by clergy may help to explain the racial disparities in Asian American mental health service utilization. Implications for the development of culturally competent services for Asian Americans in need of individualized treatment will be discussed. Data will reflect the specific needs of an underserved minority population in treatment and speak to the need for active collaboration between mental health services and religious communities.

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Category: Social Sciences
Name(s): Angad Singh
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Robert English, International Relations
Format: Analytical Paper
Title: Stuck in the Middle: An Analysis of Ukraine's Domestic and Foreign Policy in Balancing Between the West and Russia

Abstract:

This research study analyzes Ukraine's unique geopolitical situation as a nation caught between the West and Russia through a thorough examination of Ukrainian domestic and foreign policy. This paper examines the political values, economic goals, defense needs, and cultural heritage of Ukraine in order to understand why Ukraine struggles to form a cohesive and consistent foreign policy towards the West and Russia. The paper contends that the primary reason for Ukraine's failure to form a unified foreign policy towards its neighbors is because of domestic disagreement between the Western Ukrainian population which is mostly pro-West and the Eastern Ukrainian population which is mostly pro-Russia. This split in national opinion manifests itself politically in which political leaders from both parts of the nation change the course of the country when obtaining power after elections. With such a deep split between the Ukrainian population resulting in major political disagreement, Russia is able to isolate Ukraine from the West and also manipulate Ukraine economically and politically for Russian gain. Although this study does include a historical overview in order to put the current conflict into perspective, this research project focuses on events following the collapse of the Soviet Union in 1991 up until the present. Specifically, the paper covers two pressing issues impacting the conflict: the role of NATO and the impact of Russia's energy trade with Ukraine and the West. The study also includes a section on the future of Ukrainian foreign policy towards Russia and the West.

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Category: Social Sciences
Name(s): Christopher Feather
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Fayez Hammad, School of International Relations
Format: Analytical Paper
Title: Tempting the Tides of Turmoil: Healthcare and Governance in Somalia

Abstract:

Somali healthcare presents an intriguing and different way to examine the state of Somali affairs. The development of hospitals, treatment, and care providers is linked inextricably to external and internal factors within Somalia. Such factors span not only Somali society but also that of the international system in different

governmental, economic, and nongovernmental institutions. Who has the ability to administer care for Somalis gives an interesting look into the dynamics of power within the state. The rise and fragmentation of the incumbent Islamic Courts Union (ICU) of President Sharif and the weak Transitional Federal Government (TFG) does have a telling relationship with healthcare and other government services that are administered by groups not under their control. These power politics and the different relations between these militant groups are linked to who provides services that the TFG has been circumvented in administering.

These different actors and the nature of their actions regarding the current situation in Somalia are examined using three different tools: 1. Levels of analysis in foreign policy making, 2. Historical and statistical data, and 3. Analogical reasoning. Many aspects of the situation investigated: from human factors like individual leaders of different groups in Somalia and in the international community, to the national attributes of the East African state and its neighbors, to systemic attributes of the international system and the rule of law, to global factors like transnational social movements and the media. These levels of analysis are further supported by historical analysis of the modern-conception of Somalia—like colonial status, identity politics, previous governments, and regime types. Finally the application of analogical reasoning in this case gives future decision-makers an important framework in governing through such situations in dealing with "failed states."

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Category: Social Sciences
Name(s): Emily Kamen
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Biing-Jiun Shen, Department of Psychology; Karan Singh, Department of Psychology
Format: Senior Honors Thesis
Title: The Effects of Central Adiposity and Perceived Task Difficulty on Cardiovascular Recovery

Abstract:
By examining factors that lead to cardiovascular disease, preventative measures can be taken to address this leading cause of death in the United States. The degree of cardiovascular reactivity during laboratory stressors and recovery afterwards has been associated with the risk for future heart disease. Obesity, as well as perceived difficulty of the stressful situation, may both influence cardiovascular response. The current study examines the relationship between obesity and perceived task difficulty on cardiovascular recovery as measured by respiratory sinus arrhythmia.

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Category: Social Sciences
Name(s): Sarah Sack
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Biing-Jiun Shen, Psychology
Format: Senior Honors Thesis
Title: The Effects of Relationship Satisfaction and Social Support in Appraising Life Stressors

Abstract:
There are many known health and psychological benefits of having adequate social support. Marital support is a unique form of social support, the benefits of which are contingent upon marital quality for women. The effects of social support are not fully understood. Little is known

about how healthy, post-menopausal women experience marital and social support in relation to life stress. The proposed study will examine the relation between relationship satisfaction, social support, and perceived undesirability of negative life events in post-menopausal women.

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Category: Social Sciences
Name(s): Rebecca Layne
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
John Monterosso, Psychology/College of Letters, Arts, and Sciences
Format: Senior Honors Thesis
Title: The relationship between response to reward in the ventral striatum and impulsivity and cigarette smoking

Abstract:

Nicotine addiction is a serious problem in the United States. Abnormally steep delay discounting has been repeatedly observed in smokers. In addition, smokers have a high correlation with depression, a specific aspect of which, anhedonia, has been shown to decrease the likelihood of smoking cessation. Interestingly, both delay discounting and anhedonia seem to have a neural tie to the ventral striatum. To investigate this possibility, brain scans of smokers will be examined to isolate the ventral striatum. This study proposes to hand-draw the ventral striatums of smokers and examine response to reward in this region and relate this to delay discounting and anhedonia.

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Category: Social Sciences
Name(s): Tiffany Pouldar, Hyeran Shin
Submission Type: Group
Project Sponsor(s) and Collaborator(s):
Laura Baker, Psychology; Adrian Raine, Psychology; Theodore Botwick, Psychology; Mike Kelly
Format: Laboratory-based Research
Title: What Makes You Sweat: Genetic and Environmental Influences on Skin Conductance Response to Stress

Abstract:

The ways in which we respond to stressful situations varies tremendously. We investigated these individual differences in a large twin study of adolescents, in which data were collected on their physiological responses to stressful situations as well as their cognitive abilities, personality, and stressful life events. We examined skin conductance responses elicited during two stressful laboratory tasks, one involving a difficult math challenge and the other involving making a speech. Sex differences in the skin conductance stress responses were tested, and compared to each subject's math and reading abilities, as assessed using cognitive tests in laboratory as well as school grades and achievement tests. One hypothesis we tested was whether individuals with better abilities showed less stressful responses (i.e., lower skin conductance) compared to others with lower abilities. Genetic and environmental influences on stressful responses were also tested by examining twin correlations in the two stressful tasks. The relationship of physiological stressful responses to self-reported stressful life events was also examined, in order to understand the relationship between individual propensity and experiences that result in individual differences in stress.

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Category: Social Sciences
Name(s): Sarah (Katie) Camarda
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Dorinne Kondo, Anthropology and American Studies and Ethnicity; Andreas Kratky, School of Cinematic Arts, Institute for Multimedia Literacy
Format: Senior Honors Thesis
Title: When Material and Digital Culture Collide: Ethnographic Expressions of "The Contemporary"

Abstract:
Fashion is the cultural construction of embodied identity (Steele). In turn, it is a sharp and important indicator of broader cultural phenomena. Currently, through a series of bi-annual *Fashion Week* fashion shows, both fashion shows and media coverage of the events are taking on intriguing new forms in cities around the world. "Fashion presentations" such as fashion films, installations , and installation-runway shows have begun replacing traditional runway shows. Similarly, the recent development of Web 2.0 technologies have created a contingent of independent, self-appointed journalists known as fashion "bloggers" who now cover the events alongside "elite" fashion journalists. Enabling users to shape the flow of media through participation (Jenkins), Web 2.0 bloggers have changed the aesthetics of media by creating an expressive "participatory" culture. Just as emerging technologies have altered the aesthetics of fashion and media, academia's humanities have undergone recent shifts, with the "digital humanities" striving to transition its traditional disciplines into a digital era. By examining the relationships between media users, participants, and the recent configurations of *Fashion Week* fashion shows through an anthropological lens, one may understand how these forms of cultural expression are producing new constructions of knowledge that are reflective of wider cultural practices occurring in this digital age.

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Category: Social Sciences
Name(s): Josephine Chou
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
David Neal, Psychology Department
Format: Field Research
Title: Why What You Wear Matters: The Type and Salience of Attire Influence Message Impact

Abstract:
Sometimes people are not only persuaded by the message, but also by features of the messenger. This study was based on the Elaboration Likelihood Model of persuasion, which suggests that people are persuaded by peripheral cues (e.g., a messenger's attractiveness) if they lack the resources to process central cues (e.g., the quality of the messenger's argument). In this study, we focused instead on whether the peripheral cue of a speaker's clothing (business vs. casual) significantly influenced the listener's perception, if presented in a salient manner. A sample of 80 students from the University of Southern California was randomly asked to participate in this study, which was masked as a study on memory. Religiosity surveys were conducted before and after the memory task, which consisted of four statements from the Christian Gospel. The messenger was wearing either casual, USC attire or formal, business attire, which constituted the manipulation of peripheral cues. Salience of these cues was manipulated by having the speaker read the Gospel points (thus the participant was looking at the cue during the presentation of the argument) or by having the subject read the statements from a piece of paper (thus, the cue was present, but not salient). Formal, business attire led to significantly higher religiosity than casual, USC attire, but only when the cue was made salient. These results suggest that some cognitive capacity or attention is required for peripheral cues

to influence people.

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Category: Social Sciences
Name(s): Kerry Zweig
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Wendy Wood, Psychology
Format: Senior Honors Thesis
Title: Windows of Opportunity for Altering Habits

Abstract:

The general purpose of this research was to give greater insight into behavioral methods that may encourage more healthful eating. More specifically, the purpose of this study was to examine the possibility that there is a window of opportunity in new eating settings, before eating habits are established, when intervention such as healthy eating information and implementation intentions may effectively help direct study participants to form healthy eating habits. After this window of opportunity has passed, however, participant eating habits may become more firmly established, and healthy eating intervention may become less effective. The independent variables of interest for this study were the timing of the intervention window, and the specific set of interventions used to attempt to induce dietary change. The dependent variables of interest were participant food consumption habits and attitudes. The results confirmed this window of time hypothesis, and showed, to the p=0.035 level of significance, that subjects eating for the first time in a new location were indeed more likely to be influenced to eat healthier than subjects who had already established eating habits in a familiar location. California has now instituted a requirement that restaurants have to provide nutritional information to customers. This study helps confirm the wisdom behind this public policy, and further suggests that exactly how this information is presented may be important as well.

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Category: Social Sciences
Name(s): Dana Jebreel
Submission Type: Individual
Project Sponsor(s) and Collaborator(s):
Thomas Lyon, USC Gould School of Law
Format: Senior Honors Thesis
Title: Young Children's Ability to Generate False Statements as a Precursor to False Belief Understanding

Abstract:

The purpose of this study was to assess 36 three and four year old's ability to generate false statements under three different conditions. Preschool children participated in a 'No Fish' card game. In order to study the emergence of an ability to lie, children were told to never state they have a fish card, and instead state they have a Duck. Perceptibility of the actual card itself was also manipulated on whether the child, child and experimenter, or neither could see animals on the cards, i.e. whether the truth was hidden or revealed. We hypothesized that the youngest children would make made false statements if they didn't know the truth, and older children would have difficulty if they or the recipient knew the truth. The youngest children found it easiest to make false statements when the truth was not revealed. Within the oldest children no significant difference was found between whether only the child or the child and experimenter could see the cards. This study has implications for understanding the emergence of deception in young children, and for child witness assessments of competency and credibility.

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Symposium Participants by Category

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USC UNIVERSITY OF SOUTHERN CALIFORNIA
Undergraduate Programs, Office of the Provost

Social Sciences