Histological Outcome Following Transplantation of hESC-derived Motor Neuron Progenitors in a Mouse Model of SMA
Judy Ha
Mentor: Hans Keirstead

Spinal muscular atrophy (SMA) is a neurodegenerative disease that results in the loss of motor neurons in the spinal cord. SMA is caused by the deletion or mutation of the SMN1 gene resulting in the depletion of the SMN protein. This project focuses on promoting endogenous neuronal sparing following transplantation of hESC-derived motor neuron progenitors (hMNP) into SMA mice. hMNP cells have previously been shown to secrete neurotrophic factors and upon transplantation into a mouse model of SMA (Δ7SMN), such secreted neurotrophic factors may promote the sparing of endogenous neurons and thus prevent further degeneration by the disease. Cryosectioned spinal cord tissue was stained with a mouse biotinylated NeuN antibody in order to identify all neurons, followed by a rabbit antibody to identify human nuclei (Ku80) on serial tissue sections. Neurons were counted using the NIH ImageJ program and the total counts were subject to a statistical analysis using the Mann-Whitney U test. Analysis of the number of neurons in Δ7SMN tissue that were transplanted with hMNP revealed significant neuronal sparing compared to the Δ7SMN animals that were transplanted with vehicle control. We concluded that the secretion of neurotrophic factors by hMNP may be responsible for the increase in neuronal sparing as seen in the cell transplanted SMA animals.

Changes in Mouse Pulmonary Response as a Function of Methacholine Aerosol Characteristics
Brandon Hagghverdian
Mentor: Michael Kleinman

Determination of pulmonary resistance (Rₕ) and dynamic compliance (Cdyn) after a bronchoconstrictor challenge is the gold-standard parameter measured in airway hyperresponsiveness (AHR) studies in animal models of asthma. Methacholine (MCh) is a bronchoconstrictor that provokes lung airway narrowing and is commonly used in airway responsiveness studies to evaluate the toxicity of air pollutants. The sensitivity of this assay is influenced by the design of the aerosol generator and its output parameters such as the particle size distribution (PSD) and mass output of the aerosol. The goals of this study were to: 1) evaluate the output characteristics of two commercial nebulizers, and 2) determine the differences in pulmonary response to a MCh aerosol challenge in the BALB/c mouse when two different nebulizers are used. A cascade impactor was employed to determine the gravimetric output and PSD of the aerosols. An AHR test was administered to determine physiological pulmonary responses based on the intrinsic characteristics of each nebulizer. There was an observed 2.9-fold increase in Rₕ and a 1.8 fold decrease in Cdyn of mice exposed to the highest dose of MCh aerosol generated with one of the tested nebulizers. The predicted inhaled dose of MCh aerosol was estimated to be 1.6-fold greater at the highest tested dose for the nebulizer that elicited a greater pulmonary function response. These results emphasize the need to properly characterize aerosol generation systems to increase the sensitivity and reproducibility of pulmonary function tests for inhalation toxicology studies.

Neurotransmitter Expression in *Xenopus laevis* Visual System
Mamdouh Hanna
Mentors: Susana Cohen-Cory & Ana Nagel

Past studies have shown that growth factors play a role in differentiation, migration, branching, synaptogenesis, and ultimately the connectivity that is required for a functional nervous system. These growth factors have been shown to play a highly conserved role in neurotransmitter receptor localization in the pond snail, rat and zebrafish. The importance of neurotransmitter expression is suggested in Mattson and his colleagues’ investigation on rats which suggest that inhibitory or excitatory expression affects the generation and degeneration of neuroarchitecture in the hippocampus. The effects of inhibitory neurotransmitter expression on neuronal development have yet to be investigated in the visual system of *Xenopus*. Through the use of immunohistochemistry, we examined GABA_B expression in *Xenopus laevis* during a stage when wiring events are known to occur and found that these receptors are expressed near the neuropil where connections are made. These findings suggest the possibility that GABA_B receptors play an important role in development as the retinotectal circuit forms in the optic tectum. We suggest further studies to look at the correlation between neurotransmitter concentration and neuronal growth in relation to growth factors and signaling molecules.
Cocalero Turned President: Evo Morales and The Congruence of Anti-American Rhetoric and Policy Action
Keely Hanson
Mentor: Mark Petracca
Recent political trends in Latin America are largely characterized by a contemporary shift to the left. Many of the leaders within this new generation of leftist leaders have come to power on neo-populist platforms with aims to challenge U.S. hegemony in the region. This wave of political change has been labeled the rise of the “Pink Tide” to contrast the historically hard-line or “red” leftist movements that once characterized Latin America’s political structure. However, there is a need for more research on whether leaders within this Pink Tide employ anti-American rhetoric that actually results in policy action. The goal of this study was to examine whether anti-American rhetoric results in real-world public policy consequences. Given that there is also a need for more research that can distinguish the differences among Latin America’s neo-populists, this study focused specifically on Bolivian President Evo Morales and his rhetoric/policy action associated with counter-narcotic policies. Results demonstrated a significant congruence amongst Morales’ rhetoric and policy action that challenged U.S. influence in Bolivia, especially pertaining to counter-narcotics policy.

ConTXT: Visualizing Personal Digital Traces Using Mobile Phone Logs
Jared Haren
Mentor: Gillian Hayes
Because of their pervasiveness, cell phones have become major hubs for digital communication. In particular, smart phones allow people to connect to others using not only traditional voice calls and voicemails, but also text messages, e-mails, instant messages, social networking services, and video chat. As people use these connected, mobile devices to communicate with others, they are also leaving digital traces of their interactions on the devices. Call logs record all calls made, received, and missed. Text message logs record all messages sent and received. These traces can be leveraged to inform users of their patterns of communication. Through this project, I provided visualizations of digital traces of users’ communication patterns to help users uncover communication patterns with a large amount of people. Moreover, the user can also see the peers with whom they actually interact on a regular basis. This prototype showed potential for a more fleshed-out application that included even more data as mobile devices innovate communication tools.

A Hybrid Self-Regenerative Tissue Approach as a Proper Alternative for Prosthetic Heart Valves
Sara Hariri
Mentor: Arash Kheradvar
Heart diseases associated with valvular dysfunction are the third most common heart problems in the United States. About 170,000 surgical operations on valve replacement are performed annually. A successful tissue engineered heart valve is one that exhibits high biocompatibility, controlled degradation, minimal inflammatory response, high resistance to infection, mechanical integrity, and normal biological growth. The major drawback to many of the currently available bioprosthetic valve replacements is their insufficient regenerative capacity and durability and their inability to withstand the pressure in systematic circulation. The materials used in these prosthetics are often not able to coordinate the interaction between the host and the implant which causes inflammation and trauma. To address these issues development of a hybrid tissue is proposed that has an extra thin core of super-elastic mesh tightly enclosed by biologic multi-layer tissue. This hybrid tissue is expected to be functional under the physiological stresses and dynamics applied inside the heart and exhibit Biocompatibility for human implantation. To approach this method a novel 3-D tissue culture technique is proposed that incorporates layers consisting of endothelial cells (ECs) and valvular interstitial cells (VICs). The cells are cultured in vitro on a biodegradable extracellular matrix scaffold. The hybrid tissue developed would be a living implant with the potential to last a lifetime similar to a natural heart valve and will exhibit improved durability and controlled degradation in vivo.

Kelsey Harris
Mentor: Wendy Goldberg
The primary objective of this study was to examine the association between intervention and behavioral therapy programs and Theory of Mind (ToM) performance in children with ASD. ToM is the ability to infer and understand the mental states of others, and it is theorized that ASD is often characterized by a deficit in ToM ability. In order to examine this objective, we compared ToM performance of children enrolled and not enrolled in any type of intervention. Families who agreed to participate were scheduled for two 60-minute study sessions conducted in the participant’s home. One parent of each child was asked to complete a questionnaire in order to determine the participant’s intervention history. Children were administered a series of verbal and non-verbal ToM tasks. It was our prediction that children enrolled in intervention programs would
score higher on ToM tasks than children who were not receiving intervention. Additionally, we hypothesized differences in ToM performance among children enrolled in various forms of intervention, with children enrolled in interventions that specifically target social skills related to understanding the perspectives of others demonstrating improved ToM performance. Such results would indicate the significance of therapy in helping children with ASD to develop better socio-communicative skills.

**Construction and Characterization of a Vertical Isotropic Turbulence Wind Tunnel**

Sina Hashemi  
*Mentors: Derek Dunn-Rankin & John Garman*

A wind tunnel was constructed to measure droplet evaporation rates directly in an isotropic turbulent flow field. Better understanding of droplet evaporation rates is critical to all liquid fuel combustion devices. By developing a wind tunnel to simulate the process of vaporization, an experimental study will be conducted to examine the effects of turbulence on the vaporization rate of a single droplet moving freely in an isotropic turbulent flow. By the end of the research term, a small scale vertical standing wind tunnel had been designed and fabricated for experimental measurements. Efforts were concentrated on finalizing an active turbulence generating grid to introduce small scale random air disturbances inside the wind tunnel that are essential to achieving appropriate turbulence conditions. Modifications were made to the apparatus to add an X-Z stage to characterize the flow field. This computer-automated X-Z stage holds a hot wire anemometer probe which is mechanically driven through the test section to measure the velocity profile in the test section of the wind tunnel. Measurements were conducted to characterize the temporal flow velocities. The results were several plots that defined the characteristics of the flow in the wind tunnel. After analysis of the results, it became clear that the isotropic condition was not met based on deviations noticed when compared to fully developed isotropic turbulent flows. Based on this finding, several modifications are currently underway to improve the level of isotropy within the test section of the wind tunnel.

**DXU4-Mediation of FSHD Pathogenesis**

Roni Hazim  
*Mentor: Leslie Lock*

Facioscapulohumeral dystrophy (FSHD) is a form of muscular dystrophy associated with heterochromatin loss in the sub-telomeric region of human chromosome 4q. In most cases of FSHD, the heterochromatin loss results from deletion of macrosatellite repeats called D4Z4. The heterochromatin loss is thought to allow expression of a double-homeobox transcription factor, called DUX4, that is encoded within the D4Z4 repeats. In FSHD, the *DUX4* transcript is stabilized by a polyadenylation signal present in permissive haplotypes of chromosome 4q. Although FSHD myotubes have been shown to produce a stabilized *DUX4* transcript, the expression pattern of this transcription factor has not been studied extensively. The goal of this study is to determine whether DUX4 is expressed in pluripotent cells of the early embryo. We used induced pluripotent stem (iPS) cells isolated from FSHD and control subjects as a model of the pluripotent stem cells of the early embryo. Using an RT-PCR assay, we demonstrated that iPS cells derived from FSHD myoblasts and fibroblasts express the *DUX4* mRNA. In contrast, control iPS cells, as well as human embryonic stem cells, generally do not express the *DUX4* mRNA. DNA sequencing, SNP and haplotype analyses revealed that *DUX4*-positive iPS cells possess at least one copy of a permissive allele, 4qA161, which is known to contain the polyadenylation signal responsible for stabilizing the *DUX4* mRNA in FSHD cells. Collectively, these findings support the model of FSHD in which pathogenesis results from the expression of stabilized transcripts of *DUX4*.

**Exhaled Gases in Emergency Patients with Respiratory Complaints**

Calvin He  
*Mentors: Shahram Lotfipour & Jeffrey Suchard*

Contemporary chemical analysis of the air now permits the precise determination of chemicals in the parts-per-trillion (ppt) scale. This has greatly enhanced the opportunity to examine the exhaled gas samples of individuals. Major differences in gas samples between individuals may be used as an indication for common respiratory problems. If such a correlation is found, exhaled breath analysis may be used for less invasive clinical diagnostic purposes in the future. To find the differences, patients with respiratory complaints were approached for consent to take a sample of their breath. It was found that patients with respiratory complaints exhibited higher levels of carbon disulfide, acetoniirile, ethane, propane, propene, i-pentane, and three other unknown compounds than healthy control individuals. The different levels of these gases could potentially be used as indicators for the severity of the diagnosis or what the diagnosis could be or be related to. Future analysis is needed to determine whether these gas levels are similar and can relate to different populations.

**Parental Question- Asking Behavior and Responses of Children with Autism Spectrum**

Briana Hedge  
*Mentor: Wendy Goldberg*

Previous research concerning parental communication with their child with an Autism Spectrum Disorder (ASD)
has found that mothers alter their speech to meet child capabilities. Mothers using facilitating features (e.g., yes/no questions) elicit more adequate child responses than do mothers using more complex WH-questions (i.e., Who, What, When, Where, Why, How questions). However, more research on fathers’ interactions with children with an ASD is needed. The current study aims to: (1) investigate the differences between types of questions parents ask, and (2) examine the association between question type and child replies. Parents and children with ASDs, age three to six, engaged in a 10-minute semi-structured play session at the home. Interactions were coded for the number of yes/no and WH-questions asked, and for the adequacy of the child’s response to each question. Adequacy was defined as a reply within two seconds that continued the conversation. It was hypothesized that mothers will ask more questions and elicit more adequate responses than fathers. Preliminary examination of the direction of means indicated fathers asked slightly more questions than mothers, both parents asked slightly more WH- than yes/no questions, and mothers elicited slightly more inadequate responses. Most child responses were deemed adequate, but WH-questions constituted a greater proportion of inadequate responses, especially for mothers. Results from this study have implications for interventions helping parents alter question-asking patterns to improve the communication abilities of their children with ASDs.

Characteristics of Survivor Banks in Interwar Florida
Joseph Henry
*Mentor:* Gary Richardson

The state of Florida in the interwar period has the distinction of being a sort of natural experiment on bank failure. The state’s banks experienced myriad shocks and stresses from hurricanes and land booms to Depression-period bank panics. This study uses annual, firm-level balance sheet data for Florida’s state banks to determine the characteristics of failure during the years 1921–1932. The probit regression model incorporates three main elements related to bank management and environmental stresses: asset allocation, leverage, and liquidity. The study finds that bank failures are very difficult to predict with balance sheet data alone.

Division of Labor and Marital Quality in Fathers Raising Children with and without an Autism Spectrum Disorder
Maria Hernandez
*Mentor:* Wendy Goldberg

Despite the high numbers of dual-earner couples, mothers still bear much of household and childcare work. However, the division of family responsibilities may be complicated when accommodating the special needs of raising a child with an autism spectrum disorder (ASD). This study aimed to examine: (1) differences in division of labor performed by fathers of children with an ASD compared to fathers of typically developing (TD) children, (2) the relationship between general division of labor and marital quality in both groups of fathers, and (3) the association between division of tasks specific to raising a child with an ASD and marital quality. Fathers completed the “Who Does What” questionnaire, an ASD-specific questionnaire created for the study, and the Marital Adjustment Test during a home visit. Analyses took maternal work status into account. Preliminary results indicated that fathers of TD children reported more shared household labor than fathers of children with ASDs. When fathers do more household and childcare tasks, they report lower marital satisfaction. Findings have implications for family relations and interventions aimed at families with children with ASDs.

The Influence of Interviewer-Provided Social Support on Adolescents’ Memory Accuracy
Vanessa Hernandez
*Mentor:* Jodi Quas

In recent years, police officers, lawyers, and judges have expressed concern about the accuracy of a child’s memory in court case testimony. There is a great deal of controversy surrounding this issue and many are concerned that children are highly suggestible. The purpose of my project is to examine adolescents’ memory accuracy and determine whether interviewer-provided social support influences the amount of information that an adolescent may say and how accurate it is. This study is different in that it focuses primarily on adolescents whereas most studies focus on children. During this experiment, adolescent participants were randomly assigned to different interview conditions, either supportive or non-supportive. During session one, interviewers administered the TSST and had participants fill out demographic questionnaires. During session two, participants were interviewed and asked about what they remembered from the first session. The interviewer either acted in a supportive manner (friendly) or unsupportive manner (stern). Data was collected, coded, and analyzed. The ANOVA revealed that there are no significant effects of social support, but supportive interviewing tended to decrease suggestibility, especially in children. In addition, the results show there was a significant effect of age on the total number of free recall items mentioned. Thus, adolescents remembered more items of free call than did children. Conclusions can be drawn that adolescents have a more developed cognitive ability than do children and thus, they are capable of remembering more information and may be more comfortable talking to adults than are children.
Modeling and Simulation of Viscous Dampers and Isolators and their Effects on Wind Performance of Tall Buildings
Luis Herrera  
*Mentor: Lizhi Sun*

The effects of viscous dampers and base isolation on a five-story concrete building subjected to wind excitation are examined. Both viscous dampers and base isolators help mitigate external forces. By efficiently reducing vibrations caused by these loads, the structural integrity can be maintained in tall buildings. Wind loading is studied to determine the effect that isolators and dampers have on the displacements of nodes on the building. The wind load is applied to the building in accordance with the general building code SEI/ASCE 7-05. This modeling and simulation study will establish the effectiveness of both viscous dampers and rubber isolators in tall buildings; therefore, it can be determined whether the use of both will hinder or enhance the main function of these systems. A finite element package (SAP2000) is used to conduct the investigation and analyze the data. Four concrete moment frames that represent the five story building are inputted into the program with the necessary parameters. The first has neither dampers nor isolators, the second has only dampers with fixed supports, the third has only isolators, and the fourth frame is equipped with both dampers and isolators. After the simulation was completed, the values of the displacements of the joints on the side of the structure where the wind load was applied were analyzed. The preliminary results indicate that there is a reduction in displacement of 1.104% between frames one and two. There was also an average reduction in displacement of 13.1% between frames three and four which indicate that the use of dampers has significantly helped in mitigating the displacement caused by the wind load. Further investigation of the variability of the placement of the dampers is being analyzed to determine whether the displacement can further be reduced.

Jealousy and Relationship Satisfaction in Latino Dating Couples
Nancy Herrera  
*Mentor: Belinda Campos*

Jealousy is universal. Culture, however, shapes the actions that are considered to evoke jealousy and the actions deemed as appropriate responses to jealousy. Cultures where men’s chaste and sexual fidelity are more accepting of behaviors that seek to restore honor through violent responses to women’s sexual transgressions. This study examined culture, gender, and acculturation variation in the jealousy experience and jealousy related communication of Latina/o and European-American couples. I hypothesized that couples from cultures that embrace culture-of-honor values will experience greater threat during a jealousy evoking task than couples from non-culture-of-honor backgrounds, but will manage the threat in ways that promote relationship satisfaction. Specifically, Latino men were predicted to show more intense displays of jealousy related emotions than European American men, and Latina women were predicted to display more social smiles in an attempt to appease their partners and reduce their jealousy compared to European American women. Thirty Latina/o and European-American couples engaged in a spontaneous conversation about the positive and negative qualities of a past partner. Couples self-reported their jealousy during the task and the first minute of the interaction was coded for indicators of negative emotion and appeasement. Results partially supported hypotheses. The need to better understand jealousy and jealousy management in Latina/o couples is discussed.

The Validation of the Cultural Congruity and University Environment Scales with Latina/o Community College Students
Nancy Herrera  
*Mentor: Jeanett Castellanos*

Proper assessment of Latina/o community college students’ perceived educational environment and cultural congruity does not exist. No community college environment and cultural congruity scales are currently normed or validated with Latina/o community college students. Additionally, how the perceptions of the college environment and cultural fit influence Latina/o community college students’ psychological wellness continues to be underexplored. Using an empowerment model, this study will examine the validity of the University Environment (UES) and Cultural Congruity (CCS) scales with Latina/o community college students’, and how perceptions of college environment and cultural congruity account for Latina/o community college students’ perceived educational environment and their cultural fit and provide university officials insight of factors that contribute to Latina/o community college students’ campus integration, campus climate, non-cognitive characteristics of retention, self esteem, coping, and well-being. Implementing a test retest design, the study will address the convergent, construct, discriminate, and predictive validity, and reliability of the UES and CCS. Findings will unveil Latina/o community college student experiences in the context of educational environment and their cultural fit and provide university officials insight of factors that contribute to Latina/o community college students’ campus integration, campus climate, non-cognitive characteristics of retention, self esteem, coping, and well-being. Finally, the validation of the UES and CCS scales will determine the degree of applicability that these scales have on community college students in the context of their educational experiences.
The Rise and Fall of Charismatic Authority in Early Mormonism
Charles Hicks
Mentor: Jack Miles

Nearly a century ago, Max Weber’s seminal discussion of his tripartite theory of authority was published for the first time. Included in his analysis was a lengthy description of charismatic authority, which differed from both traditional authority and legal authority in its focus on the personal qualities of the leader. Weber introduced the name of the founder of Mormonism, Joseph Smith, as one possible exemplary charismatic figure, but declined to confirm that association because of the perceived chance that Smith “may have been a deliberate swindler.” Weber provided no further analysis of Smith in his explication of charismatic leadership. By analyzing both Weber’s theory and Smith’s prophetic career, along with the various historical developments that legitimized Smith as an authority figure in early Mormonism, this paper argues that the case of Joseph Smith confirms Weber’s theory of charismatic authority. It also argues that Smith’s successor, Brigham Young, represents an embodiment of what Weber referred to as the routinization of charisma. These conclusions were reached by studying primary sources and scholarly works related to the earliest years of the Latter Day Saint movement. All of this is important as it helps us understand the authority structure of one of the fastest-growing religious movements in the world, a movement that is gaining considerable influence in American society.

Fabrication of Suspended Nano-Wires via Controlled Electrospinning Deposition
Gary Hill
Mentor: Marc Madou

In the UCI BioMEMS group we have explored the use of electrospinning, a fiber producing technique, for the fabrication of carbon nano-wires by pyrolyzing electrospun polymer fibers. These nano-wires have a wide range of possible uses, with a primary example being extremely sensitive biological sensors. The ability to write small (<100nm diameter) carbon-wires could have an enormous impact on N/MEMS devices. Experiments performed show that the traditional method of both far-field electrospinning (FFES) is promising for this use but difficult to control, while a newer, less established method dubbed near-field electrospinning (NFES) eliminates many of the control difficulties. Here the initial project of designing and building a far-field electrospinner will be shown; the important factors in polymer properties and setup will be explained; the lessons learned in attempts to control and characterize far-field electrospinning will be discussed; and the far-field electrospinning traits will be contrasted to those of near-field electrospinning. While the goal of controlled deposition in far-field was unsuccessful, experience from far-field is still proving useful to help better understand and expand the new near-field setup, which has already proven successful in controlled nanofiber deposition.

Human Annexin II as a Model for Structure-Based Drug Design
Jessica Hinton
Mentor: Hartmut Luecke

The calcium and phospholipid binding protein, human annexin A2 (anxA2), is involved in several pathways that contribute to the proliferation of cancerous cells. One such pathway that promotes the angiogenesis and metastasis of these cells begins with two molecules of anxA2 binding to a dimer of the protein S100A4 on the extracellular surface of the plasmid membrane in the presence of calcium. No crystal model of the complex currently exists. However, homology modeling using the crystal structure of an N-terminal peptide of anxA2 in complex with another protein from the S100 family, S100A10, reveals a similar hydrophobic binding pocket on S100A4. It has been previously shown that the N-terminus of anxA2 is critical for binding to S100A10. Using a lipid pull-down assay that compared binding of full-length and N-terminal truncated anxA2 to S100A4, we have demonstrated that anxA2 binding to S100A4 also involves the N-terminus, and infer that this occurs in the pocket seen in the homology model. Discovery of ligands that disrupt this complex can provide novel pharmaceutical agents to the cancer research community. We performed virtual drug screens on the purported S100A4 binding pocket to decrease the number of possible ligand candidates that we need to test experimentally. Top candidates from the virtual screens are being tested using HSCQ—NMR experiments to determine which small-molecules bind to S100A4 with a high affinity. Finally, we will perform lipid pull-down assays in the presence of the small-molecules to see if they have an inhibitory effect on complex formation. We are confident that a structure-based drug design approach to this problem will not only be cost effective, but also lead to a discovery of a drug molecule that has very high affinity and specificity for S100A4.

Spatial Patterns in the Phenotypic and Genotypic Diversity of Viruses Infecting Marine Synechococcus
Andrew Ho
Mentors: China Hanson & Jennifer Martiny

About one-quarter of the ocean’s total oxygen is produced by the cyanobacterium Synechococcus. In general, cyanophages are responsible for at least 8% of Synechococcus mortality per day, but the ecological and evolutionary relationship between phages and their host Synechococcus...
Effects of Nitrogen Deposition on *Artemisia californica* and its Specialist Herbivore
Nicole Ho
*Mentor:* Kaiyen Mooney

One type of environmental change affecting California’s plant communities is dry nitrogen deposition. Nitrogen is deposited on plants and soil surfaces during the dry season and when seasonal rains begin in the fall, this nitrogen is leached into the ground and made available to plants. Nitrogen deposition has been shown to change the composition and diversity of plants in California’s coastal sage scrub (CSS) community, in which *Artemisia californica* is a keystone species. Using plants collected from five source populations across the range of *A. californica*, I conducted a manipulative field experiment to examine phenotypic variation in plant traits and plant-herbivore interactions in response to nitrogen deposition. I also conducted bioassays with the specialist aphid species, *Oebusicauda coweni*, to determine the consequences of plant response to nitrogen on higher trophic levels. I found that nitrogen deposition increased plant growth and that plants receiving added nitrogen had higher leaf volumetric water content than control plants. Plants from the five source populations responded differently to nitrogen in terms of their leaf carbon-nitrogen ratio. Lastly, aphid population survival was significantly greater on plants in the nitrogen deposition treatment, though survival did not differ on plants from the different source populations. This study documents changes in *A. californica* plant traits in response to N deposition that have cascading effects on a specialist herbivore. In order to understand the effects of broad-scale nitrogen deposition on coastal sage scrub communities, multiple trophic levels need to be examined.

Effects of Mutant-SOD1 G93A Astrocytes on Surrounding Motor Neurons
Kenny Hoang
*Mentor:* John Weiss

Mutant superoxide dismutase-1 (SOD1) is associated with a fraction of Amyotrophic Lateral Sclerosis (ALS) cases—a neurodegenerative disease that causes paralysis and often results in death. Recent studies have shown astrocytes may play a larger role in ALS than previously thought. However, an important question that arises is as to how mutant SOD1 astrocytes affect motor neurons and the mechanism underlying their interactions. Here, we investigate the relationship between astrocytes and motor neurons to verify and determine if mutant SOD1 does worsen neuron death and if more reactive oxidative species (ROS) are produced. We observed that mutant SOD1 astrocytes promote greater neuron deaths. Additionally, minimal differences in ROS generation in mutant SOD1 and WT astrocytes are observed. These findings indicate that astrocytes may be an important key in the progression of ALS.

Optical Coherence Tomography Can Detect and Quantify Chemotherapy-Induced Oral Mucositis
Michael Hoang
*Mentor:* Petra Wilder-Smith

This project was a preliminary study to assess non-invasive Optical Coherence Tomography (OCT) for early detection and evaluation of chemotherapy-induced oral mucositis in 48 patients, 12 of whom developed clinical mucositis. In 48 patients receiving neoadjuvant chemotherapy for primary breast cancer, oral mucositis was assessed clinically and imaged using non-invasive OCT. Imaging was scored using a novel imaging-based scoring system ranging from 0-6. Conventional clinical assessment using the Oral Mucositis Assessment Scale (OMAS) scale was used as the gold standard. Patients were evaluated on days 0, 2, 4, 7, 11 after commencement of chemotherapy. OCT images were visually examined by three blinded investigators. The following events were identified using OCT: (1) change in epithelial thickness and subepithelial tissue integrity (beginning on day 2), (2) loss of surface keratinized layer continuity (beginning on day 4), and (3) loss of epithelial integrity (beginning on day 4). Imaging data gave higher scores compared to clinical scores earlier in treatment, suggesting that the imaging-based diagnostic scoring was more sensitive to early mucositis change than the clinical scoring system. Once mucositis was established, imaging and clinical scores converged. Chemotherapy-induced oral changes were identified prior to their clinical manifestation using OCT, and the proposed scoring system for oral mucositis was validated for the semi-quantification of mucositis change.
Strategy to the p53 core domain in R282W were identified by applying the all-codon-scanning to elucidate the structural biology strategies and p53 assays in the model system. This data can be used to infer information about structure-function relationships and the relative binding affinity of the membrane protein to its binding partners. Poor knowledge of membrane proteins is reflective of the difficulties associated with their expression, purification, and stabilization. Phage display allows us to circumvent this problem by expressing the target protein as a fusion to a coat protein of filamentous phage. The protein is processed on the surface of the phage, and an ELISA can assess the binding affinity of the displayed membrane protein to the target molecule. Thus far, I have successfully sub-

Yeast-Based All Codon Scanning Screening for Reactivation of Human p53 Activity

Haydn Hoffman
Mentor: Peter Kaiser

The transcription factor and tumor suppressor protein p53 is frequently inactivated in human cancers. In many cases, p53 gene mutations result in high levels of inactive, full-length p53 protein with one amino acid change in the core domain that recognizes p53 DNA-binding sites. The ability to endow function to mutated p53 proteins would dramatically improve cancer therapy because it would reactivate a central apoptotic pathway. By using molecular biology strategies and p53 assays in the model system yeast, we aim to identify all possible rescue mutations. Understanding the structural basis of the rescue mechanism will allow the pursuit of small compounds able to achieve a similar stabilization of p53 cancer mutants. In this study, several weak rescue mutations for p53 cancer mutant R282W were identified by applying the all-codon-scanning strategy to the p53 core domain in Saccharomyces cerevisiae.

Infants and Sleep: A Sleeping Infant Does more than Give Mom a Rest

Allison Holt
Mentor: Angela Lukowski

The ability to recall information over the long term emerges near the end of the first year of life. At this time, significant variability is apparent in recall capabilities. Review of the adult literature suggests that one factor that contributes to the formation and maintenance of strong memories is sleep. In this research, we examined the relation between sleep and memory during the first year of life. Thirty-one 10-month-old infants were recruited to participate. At the first session, infants were presented with novel event sequences that were designed at the university to be unlike toys infants commonly have at home. After a brief baseline period, the researcher demonstrated how to complete two target actions with the stimulus materials. After a two-hour delay, infants were presented with the materials again to assess delayed recall memory. During the delay, approximately half of the infants napped, while the other infants remained awake. Infants wore an actigraph during the delay to record their sleep habits. Data collection and reduction is ongoing, but will be completed within the next two weeks. Our primary hypothesis is that infants who nap during the delay between the two sessions will show more evidence of recall relative to the infants who do not nap; we also expect that objective indices of infant sleep will be related to recall performance. The completion of this research will allow for better understanding of the impact of sleep on infant memory.

Phage Display: A Viable Tool for Studying Structure-Function Properties and Binding Interactions of Membrane Proteins

Richard Hooy
Mentor: Gregory Weiss

Membrane proteins are modulated through the direct interaction with other molecules. These interactions play important roles in biological pathways, such as signal transduction and metabolite transportation, which are vital to the cell. In this study, we use phage display to examine the binding interactions of membrane proteins with their receptors. This data can be used to infer information about structure-function relationships and the relative binding affinity of the membrane protein to its binding partners. Poor knowledge of membrane proteins is reflective of the difficulties associated with their expression, purification, and stabilization. Phage display allows us to circumvent this problem by expressing the target protein as a fusion to a coat protein of filamentous phage. The protein is projected on the surface of the phage and an ELISA can assess the binding affinity of the displayed membrane protein to the target molecule. Thus far, I have successfully sub-

Violence of the Gaze: White Sight and the Impossibility of Nonviolence in Frantz Fanon’s Black Skin, White Masks

Asia Hodges
Mentor: Tiffany Willoughby-Herard

As a revolutionary himself, Frantz Fanon did not practice nonviolence as a political philosophy, yet there is a tendency to read the viability of nonviolence as an exercise of political will into his work. In Black Skin, White Masks, Fanon does not locate the French colonial regime within a paradigm of contingent political violence; rather he explains their strategically employed violence principally as an exercise in self-making and unmaking of the Antillean, and also the principal means of articulating itself to the world. Moreover, he describes colonialist rule as a continuum of violence, certainly as physicality but more poignantly and precisely as psychic violence, which manifests as mental illness. For Fanon, the body is the central vehicle for the colonialist project and the primary means for its proliferation or prostration. This article grapples with the disjunct between the body as “weapon” and the body as “object”, and how the process of experiencing the body through what Stuart Hall calls the “scopic drive” forecloses on the possibility of a civil meeting between a body coded as black and an eye which understands itself to be white. Fanon cautions that the scopic battles waged before the eye are met with the hysterical blindness induced by a paradigm of contingent political violence, and this merely renders one open to gratuitous psychic attack.

Skin, White Masks: How the Gaze Benefits the White Skin

Peter Kaiser
Mentor: Richard Hooy

Eighteenth Annual UCI Undergraduate Research Symposium
cloned a mammalian integral membrane protein into phagemid, but the protein failed to display on the phage surface. A Western Blot demonstrated that the protein was either not expressed by the bacteria, or the levels of expression were too low to be detected by this assay. This may explain why the display levels were low. Subsequently I subcloned a bacterial outer membrane beta barrel protein, ShuA, into the phagemid, and propagated phage displaying ShuA. An ELISA indicated that ShuA displays well on the phage. Future experiments will investigate whether ShuA is folded properly on the surface of the phage; we will run a binding assay with a known binding partner of ShuA.

**In Vivo Small Animal Tumor Characterization Using a Hybrid MRI-DOT System**

Mitchell Hsing  
*Mentor:* Gultekin Gulsen

Diffuse Optical Tomography (DOT) is a promising imaging modality which uses near-infrared (NIR) light to probe tissue properties. Using multiple wavelengths, DOT can provide important information about tissue chromophores that are related to tissue metabolism and cancer malignancy. For example, higher total hemoglobin concentration, or reduced oxygen saturation, derived from the main tissue chromophores: oxy- and deoxy-hemoglobin concentration, have been shown to correlate with cancer malignancy. It has been shown that multispectral systems can recover these chromophore concentrations and hence, potentially characterize tumors as benign or malignant. A hybrid frequency domain MRI-DOT system has been developed by our group and has demonstrated to be able to recover optical parameters accurately with phantom studies. In this setting, both MR and multi-wavelength DOT data is acquired simultaneously to improve image resolution. Even though multi-wavelength DOT has been evaluated with phantom and human studies, there have been very few small animal studies in the literature. In this *in vivo* small animal study we have demonstrated that chromophore concentrations from reconstructed DOT results for a breast cancer tumor model enables us to distinguish between two tumor stages: viable and edematous. Ultimately we have validated the use of a hybrid MRI DOT system in *in vivo* small animal imaging.

**A Green Approach to Insect Pest Control Efforts: the Effects of Sticky Surfaces on Bedbug Locomotion**

Irvin Huang  
*Mentor:* Catherine Loudon

Bedbugs have been increasing in number for the past decade as well as quickly gaining resistance to chemical pesticides. The current method of treatment for bedbugs generally involves heavy use of pesticides but could be improved by using physical deterrents such as traps. By investigating bedbug movement, such physical traps could be optimized. I investigated bedbug locomotion on sticky surfaces by recording high-speed videos of bedbugs walking onto double-sided sticky tape and glue traps. I then analyzed these videos by recording when each of the six legs went up and down to create a gait diagram. These gait diagrams help to visually emphasize the difference in movement once the bedbug makes contact with the sticky surface. We have found that bedbugs are usually slowed down by the sticky surfaces, as indicated by a longer gait and deviation from the standard tripod gait. By observing how bedbugs move, we can develop and improve traps as a viable alternative to environmentally harmful pesticides.

**Evaluating Cell Viability after Electromechanical Reshaping of Rabbit Ears**

Syed Hussain  
*Mentor:* Brian Wong

The general goal of the project is to determine the viability of cartilage after reshaping it via the mechanism of EMR or Electromechanical reshaping. Electromechanical reshaping is the basic application of a particular voltage over a certain time. The cartilage will be placed in a right angle jig, through which electrodes will be skewed into the cartilage. An automated system will apply the voltage over a certain time frame and data will be recorded alongside. The cartilage tissue after EMR will be recorded by a picture and the angle digitally measured. The effects of EMR will be measured via a Laser Scanning Microscope (LSM) to observe areas prone to cell death. This study will be conducted *in vivo* on New England White rabbits. The rabbit ear will be electromechanically reshaped while the rabbit has been anesthetized. Four weeks later, the rabbit ears will be harvested to evaluate the cell integrity of the ears. The study will also consider from a histological standpoint the integrity of the reshaped cartilage. Preliminary results have shown that EMR does reshape cartilage. The purpose of correlating EMR with live-dead assays is to find the optimum parameter that brings about the greatest reshaping with the least cell death.

**The Effect of Secondary and Tertiary Phases on the Optical and Mechanical Properties of Ceramics for Armor Applications**

Aileen Huynh  
*Mentor:* Martha Mecartney

This study investigates the feasibility of producing a shape formable, multiphase ceramic that is transparent in both visible and infrared with high room temperature strengths. Single phase transparent crystalline ceramics have shown promise for window armor applications due to their high room temperature strengths. However, complex geome-
tries such as domes require extensive machining that is both expensive and wasteful. Multiphase ceramics can be shape formed at high temperatures into complex geometries that require little machining. With this technology, if successful, it can potentially revolutionize ceramic processing via shape forming, instead of machining out a shape from a ceramic block. Two processing techniques, conventional sintering and spark plasma sintering, were used to process the multiphase ceramics. Investigation of the shape forming properties at temperatures ranging from 1200–1400 °C as well as room temperature mechanical properties and microstructural characteristics will be evaluated for each processing technique.

**Flywheel Exercise Device Induces Muscle Hypertrophy and Increases VO2 Max**

**Bon Huynh**

**Mentor: Josh Cotter**

Space travel causes both cardiovascular and skeletal muscle deconditioning. This deconditioning makes it difficult for crew members returning to an increased gravitational environment. Exercise is a viable countermeasure for this deconditioning. The objective of this study was to test the effectiveness of the Flywheel Exercise Device (FWED) on increasing aerobic capacity and skeletal muscle hypertrophy. Twelve subjects (six men and six women of 22 +/- 4 years old) participated in the study. Subjects exercised on the FWED, performing both aerobic and resistance training for five weeks. Aerobic exercise consisted of doing squats, hamstring curls, and heel raises. For each session, subjects completed four sets of seven repetitions for squats and hamstring curls. Heel raises consisted of four sets of seven repetitions. Magnetic Resonance Imaging (MRI) of the quadriceps, hamstrings, gastrocnemius and soleus and a VO2 Max Treadmill Bike test were done before and after the training. The results showed a significant increase in muscle size and VO2 Max. Males and females had an average increase of between 5% and 15%, with males having a greater percentage of increase in all the muscles except for the soleus. The increase in muscle size and VO2 Max makes the FWED a viable option in minimizing cardiovascular and skeletal muscle deconditioning.

**In Vitro Growth of Primary Murine Colon Crypts in Microfabricated Substrates**

**Douglas Huynh**

**Mentor: Robert Edwards**

The mucosal lining of the colon in the gastrointestinal (GI) tract is composed of a series of cylindrical structures called crypts that are embedded into the underlying connective tissue stroma, known as the extracellular matrix (ECM). Crypts form the functional unit of the intestine, and contain a stem cell compartment at their base that repopulates each crypt every 5–7 days. These structures have been shown to require a level of connectivity and cell interaction with neighboring cells and the ECM to survive. Without these connections, cells undergo an altered contact-dependent apoptosis called anoikis. The dependence of colon crypt on attachment to the ECM stands as a major barrier to development of an *in vitro* model of the large intestine, and in turn, studies involving diseases of the colon. This experiment addresses a possible solution to this problem through the microfabrication of gels with wells 80–110 microns in diameter. Attempting to grow colon crypts in such a substrate is based on crypts requiring a three-dimensional structure for support and direct contact with the extracellular matrix to survive. We performed three trials with both triturated and intact murine crypts and found that the prepared gels lost their integrity after being incubated at 37 °C. Although the gels deformed, both intact and triturated crypts managed to survive for up to 48 hours, providing us with a baseline from which future experiments may be compared to, giving reassurance of the viability of colon crypt cells in such an environment.

**Chromium (VI) Metal Ion Does not Stabilize Hypoxia Inducible Factor-1 Alpha in Melanoma**

**Sarah Huynh**

**Mentor: John Fruehauf**

Carcinogenic agents like chromium (VI), nickel (II), and cobalt (II) are known to cause cancer, including melanoma, yet are still widely used in many industries. In addition, recent studies noted that chromium might cause greater levels of reactive oxygen species (ROS) that are known to damage DNA. Melanoma, the most serious type of skin cancer, normally occurs when melanocytes (pigmented cells) start proliferating uncontrollably and become malignant. The expression of hypoxia inducible factor-1 (HIF-1) complex, the only known mammalian transcription factor that regulates angiogenic genes and other cellular oxygen homeostasis, has been shown to be elevated in cells under hypoxic stress. Part of HIF-1 complex formation requires the accumulation of the angiogenic promoter protein HIF-1α, which stabilizes under hypoxic stress. In this experiment, I examined if chromium (VI) metal stabilizes HIF-1α in two melanoma cell lines in normoxia—normal oxy-
gen condition. Through immunohistochemical analysis, we observed more cell deaths when both A375 and YUZAZ-6 melanoma cell lines were exposed to higher concentrations of chromium. However, ELISA analysis showed that increasing exposure of chromium to these melanoma cell lines resulted in an even lower HIF-1α level than non-treated cells. These results suggest that chromium is cytotoxic to cells and may boost HIF-1α degradation, rejecting the hypothesis that chromium may stabilize HIF-1α in normoxia. Further experiments are needed to examine the actual mechanisms underlying chromium toxicity.

**Comparison of Substance Use Between Young Adults with and without ADHD**
Michelle Hyman  
*Mentor*: Timothy Wigal

This study compared substance use rates between young adults with and without Attention Deficit Hyperactivity Disorder (ADHD). Information was collected from the Multimodal Treatment of Children with ADHD (MTA) longitudinal study at the 12-year follow up assessment. Participants in both the ADHD and the Local Normative Comparison Group (LNCG) were from 19 to 22.9 years of age, and were matched by age and gender. The use of alcohol, nicotine and marijuana was examined. Risk factors examined included ADHD diagnosis and severity, co-morbid diagnoses, gender, peer use and peer tolerance of use, and previous police involvement. This study found that young adults with ADHD tend to use more substances overall and smoke significantly more cigarettes than those without ADHD.

**Effect of Heat Treatment on the Microstructures of Titanium before and after Equal Channel Angular Pressing**
Marko Indraputra  
*Mentor*: Farghalli Mohamed

Over the past few years, there has been great interest in increasing the strength of commercially-available materials. One means to achieve this goal is to produce these materials using techniques that lead to refined grain structures (the Hall-Petch relationship). In this investigation, equal channel angular pressing (ECAP) was used to process heat treated titanium (Ti). ECAP involves pushing a sample of material through two channels of the same cross-section that intersect at an angle. As the sample moves through the angle, it undergoes severe deformation within its internal structure—that is, its microstructure. After multiple passes, a submicron-sized (<10⁻⁶ m) grain structure is obtained. Commercially pure (CP) Ti was selected because it is currently used in medical and dental implant applications, and has the potential of replacing Ti alloys in load-bearing implant applications that require higher strengths (something that CP Ti is currently unsuitable for). The objective of the investigation was to determine the effects of initial microstructure on the microstructure of the material after one pass of ECAP. Samples of CP Ti with three different heat treatments, which resulted in different microstructures, were subjected to one pass of ECAP at room temperature. For each heat treatment, the sample microstructures before and after ECAP were analyzed using x-ray diffraction (XRD), scanning electron microscopy (SEM), and transmission electron microscopy (TEM). Hardness and tensile tests were also performed to compare the mechanical properties of the samples. It was found that each heat treatment resulted in different microstructural and mechanical properties.

**The Behavioral Implications of Superior Autobiographical Memory**
Leilani Isozaki  
*Mentor*: James McGaugh

In 2000, James McGaugh and colleagues began the investigation of a woman, Jill Price, who has the ability to remember virtually all of her salient daily personal experiences with remarkable accuracy. Furthermore, she uses no practiced mnemonics to recall these vast amounts of personal autobiographical information correctly. This phenomenon, identified as highly superior autobiographical memory (HSAM), has been studied in twelve recently identified individuals who all possess the ability to give a highly accurate account of their past autobiographical experiences. An in-depth behavioral investigation of HSAM participants is necessary to further assess the full range of characteristics that contribute to the HSAM phenomenon. A cognitive battery, including both autobiographical as well as non-autobiographical tests, has provided a first step towards accomplishing this behavioral assessment. For most standardized laboratory tests of short-term, non-autobiographical memory HSAM participants perform no better than controls. HSAMs do perform significantly better at recalling both personal autobiographical events and public events, and the dates on which these events occurred. This study opens new fields of research that investigate superior memory rather than memory deficits as a means of learning about the brain and its functions.

**Static G Behavior near Packing Fraction of Beads in Couette Trough**
David Jaenisch  
*Mentor*: Michael Dennin

Static G in complex fluids near the packing fraction exhibits changes in behavior based on density. For this experiment, I used a two-dimensional layer of beads as an analog for a bubble raft in a Couette Trough, a thin circular trough with an inner boundary on the end of a torsion
Abnormal Git1 Concentrations in Hippocampal Synapses of Fragile-X Model Mice

Michael Jang  
*Mentor: Christine Gall*

Fragile X syndrome (FXS) is an X-linked form of inherited mental retardation. It is believed that abnormalities in synaptic plasticity and dendritic spine morphology are linked with the cognitive impairments found in Fragile X patients. In normal rats and mice, synaptic plasticity involves morphological changes in dendritic spines that require reorganization of the actin cytoskeleton. Two different signaling pathways play key roles in dynamic actin reorganization: the Rho>ROCK>LIMK pathway mediates increases in spine filamentous actin whereas the Rac>PAK pathway involves stabilization of new actin filaments. In the Fmr1-knockout (KO) mouse model of Fragile X syndrome, signaling through the polymerization pathway seems to be intact, but activity-dependent signaling through Rac and downstream intermediaries is impaired. It is not currently known what causes abnormal Rac activation in FXS model mice. Git1, a GTPase activating protein (GAP) regulated by the protein lost in FXS (FMRP), is known to both regulate activation and be upstream of Rac. To test the prediction that synaptic Git1 levels may be abnormal in the Fmr1-KO mouse, we used immunohistochemistry and synaptoneurosomes with Western blots to measure Git1 protein levels in the mutants. Although total forebrain Git1 levels were comparable between Fmr1-KO and wild-type mice, we found significantly lower Git1 levels within hippocampal but not neocortical dendritic spines of Fmr1-KO mice. These findings suggest that abnormalities in Git1 localization may underlie the deficits in signaling through the Rac>PAK pathway associated with the stabilization stage of synaptic actin cytoskeletal reorganization.

The Effects of Isometric Resistance Exercise on Stretched Slow Type Skeletal Muscle

Patrice Jang  
*Mentor: Kenneth Baldwin*

The purpose of this study was to create a resistance training paradigm for the rat model that modifies the anatomical position of the ankle to optimize loading on the soleus. Skeletal muscles are susceptible to loading, which increases muscle mass and fiber length, resulting in hypertrophy. Previous studies have shown that muscle loading can be induced through resistance training and by placing a passive stretch on the muscle and that the soleus muscle is particularly difficult to load. In this study, nine female Sprague Dawley rats underwent four days of isometric resistance training on the left leg with the ankle in a dorsiflexed position while the right, untrained leg was used as a contralateral control. Soleus, plantaris, and gastrocnemius muscles were extracted on the fifth day from euthanized animals and later analyzed for total RNA content as well as the presence of mRNA Col-3a1, IGF-BP4, and MGF which are skeletal muscle growth markers and myostatin, an anti-growth marker. Results demonstrated that the soleus in the trained leg compared to the control did not increase in total RNA or myostatin mRNA but did increase significantly in Col-3a1, IGF-BP4 and MGF. Although the wet muscle weight did not change over the short duration of training, the increase in molecular anabolic markers represent the activation of the molecular machinery that leads to a hypertrophic response. Overall, the results of this study affirm the efficacy of our soleus training paradigm and support the creation of a more long term and robust training model.

Sources of Bias in Predicting the Intensity of Future Emotion

Danielle Jansen  
*Mentor: Linda Levine*

To decide how strenuously to pursue or avoid outcomes, people attempt to predict how happy or unhappy those outcomes will make them. Thus, accuracy in affective forecasting plays an important role in effective decision making. Research shows, however, that people have a robust tendency to overestimate the intensity of future emotion. We hypothesized that this bias stems in part from a procedural artifact. In most forecasting studies, people are asked to predict how they will feel, in general, after a focal event occurs (e.g., getting a poor grade). Later, they are asked to report how they are feeling in general without reference to that event. People may overestimate because they misinterpret the general forecasting question as asking how they will feel specifically about the focal event. To test this, undergraduates (N = 151) predicted and reported their emotional reaction to receiving a poor exam grade. We
contrasted the typical affective forecasting procedure with a revised procedure designed to eliminate misinterpretation of the general forecasting question. Using the typical procedure, participants overestimated their unhappiness. Using the revised procedure, participants accurately predicted how unhappy they would feel about their grade. In addition, overestimation of how unhappy they would feel in general decreased dramatically when participants were first asked how they would feel about their grade, allowing them to differentiate the two questions. These findings suggest that overestimation of future emotion is partly due to a flawed procedure in which people predict one thing but are later asked to report another.

**Relationship Between Ion Current and Carbon Monoxide Release from Quenched Flames**
Marilyn Jaquez
*Mentor:* Derek Dunn-Rankin

Carbon monoxide poisoning resulting from incomplete combustion caused more than 16,000 deaths in the United States between 1999 and 2004. Incomplete combustion results from poor fuel/air metering and/or interruption of the flame chemistry during quenching. This research examines the effects of flame quenching by measuring chemical current. Ions are naturally produced during the combustion of hydrocarbons and they produce a measurable current when acted upon by an electric field. Preliminary studies have shown that the ion current can be used to monitor changes in combustion chemistry as a flame is quenched. The experiment consists of an axisymmetric jet flame that is quenched with aluminum, copper, brass, and stainless steel plates. Under quenching conditions, the ion current measurements behave similarly for the four materials. The similarity in ion current measurements for different materials indicates that the degree of quenching is independent of material. Carbon monoxide emissions will be taken with the same set up and these results will be compared to the ion current results in order to conclude if this will provide a reasonable measure of combustion quality.

**The Relationship Between Changes in Industrial Production and Employment**
Mildred Jara
*Mentor:* Gary Richardson

The relationship between output and employment is generally believed to be a positive one; increases in production will lead to increases employment and decreases in production will lead to declines in employment. This positive relationship is not always true. Currently, much attention is paid to the relationship between economic growth and employment, especially because the economy is recovering, but employment is not. This project seeks to determine whether changes in output affect employment and if so, by how much. Using industrial production and factory employment indexes from the Federal Reserve Bulletin this project seeks to discover the effect of changes in industrial production on employment. Linear multivariable regression using Ordinary Least Squares (OLS) and Two Stage Least Squares (TSLS) were run in order to estimate the employment elasticities with respect to output of nine manufacturing industries in the U.S. during the period of 1923–1940. Findings reveal employment elasticities vary little across industries, but during economic contractions the employment elasticities of nondurable goods industries are lower than those of durable goods industries. When using TSLS regressions, the employment elasticities for each industry are found to be very low, if not close to zero, implying output growth does not lead to considerable job creation. Finally, evidence is found indicating a jobless recovery occurred from 1933 through 1937.

**Sex, (Cyber)Bullying, and Suicide: Queering Media Conceptions of Sexual Minority Youth and Suicide Ideation**
Cameron Joe
*Mentors:* Jeane Schepher & Jennifer Terry

Following national media coverage of Tyler Clementi, a Rutgers University student who jumped off the George Washington bridge after discovering his roommate broadcast his same-sex sexual encounter on the Internet, anti-bullying legislation and activism erupted across the United States. Media framings of Clementi’s suicide structured discourse on sexual minority youth suicide, consequently constructing a martyr through whom public sentiment was mobilized. This mobilization within a homonormative platform of liberal reformist politics constructed a reductive hermeneutics that materialized the ontology of sexual minority youth as high-risk subjects for suicide ideation. The reification of sexual minority youth as being bullied-to-death through the story of Tyler Clementi, a narrative situated within complex relationships between sexuality, public/private binaries, and technology, marks an interesting turn in contemporary LGBT politics. Through a discourse analysis of news media and the It Gets Better project, a new framing campaign that gained national media attention in tandem with Clementi’s story, we can discern a pathologizing media gaze on sexual minority youth and the discursive implantation of the diagnosis. The media attention through discourse of pity and mourning works to relieve the public of responsibility for the death of Tyler Clementi, as well as reinforce heteronormativity through homonormative legislation and activism. A turn to contemporary suicide studies (sociology and cultural studies) dually with a turn to queer theory elucidates possibilities for expanding understandings of sexual minority youth beyond the reductive repre-
sentations presented by the media, as well as the power of discourse in shaping dominant understandings of particular subjects.

**An Anatomy of Power: The Female Body and the Culture of Virginity in Jan van Eyck’s Painting of The Virgin with Chancellor Rolin**

Colette Johnson  
*Mentor: Amy Powell*

Robed in a brilliant red garment, the Virgin Mary in Jan van Eyck’s *The Virgin with Chancellor Rolin* demurely lowers her gaze to rest on her infant son. Across from her, the kneeling Chancellor Rolin boldly fixes his gaze on her face. Despite the serene mood that seemingly characterizes the scene, there is an undertone of tension between the chancellor and the Virgin. In this paper, I argue that the painting represents a reaffirmation of the dominant religious and social power of medieval men and masculinity. My examination of the Virgin as a symbol of female devotion emphasizes the contradiction between a sexual female body and ideal female virginity. Women who sought to gain power by assuming forms of performed gender exemplified by the Virgin were reduced to the limits of their biological sex. Women were either mothers or virgins, but could never attain the Virgin Mary’s pristine union of both. The image presents the Virgin as beautiful and captivating, yet emotionally and sexually inaccessible. The supernatural union of glorious motherhood and chaste virtue distinguishes the Virgin from mortal women who were forced to choose between a body that was feminine and sexually desirable or virginal and harshly gendered. The image asserts traditional male hierarchies in two ways: first, it praises Rolin’s devotion by privileging him with direct access to the Virgin and Child; and second, it denies women the same privilege by presenting the Virgin’s ideal femininity as a paradox, effectively preventing them from appropriating her divine power.

**Beyond “Bad Apples,” More Than a Scandal: A Cross-Disciplinary Analysis of Institutionalized Organizational Deviance**

Arlen Jones  
*Mentor: Donna Schuelle*

Media attention to police corruption, corporate fraud, and other scandals demonstrates the perennial concern for accountability of large-scale social organizations to the society in which they are embedded. This study reviews relevant organizational studies on organizational failure, bureaucracy, organizational deviance, as well as relevant law and society scholarship on white-collar crime, police corruption, and the endogeneity of law in order to conceptualize bureaucratic organizational deviance. Bureaucracy is defined here as an organizational re-

**Mental Illness and Race in the Juvenile Justice System**

Rachel Jordan  
*Mentor: Elizabeth Cauffman*

Between 65-70% of adolescent offenders in juvenile detention facilities have at least one mental health diagnosis. Mentally ill youth may be less able to handle the stress of detention and engage in behaviors that make them subject to punitive measures by the institution. Ethnic minority youth are also overrepresented within the juvenile justice system and therefore may comprise a majority of incarcerated mentally ill youth. This study examines if the dual difficulties of mental illness and being an ethnic minority are associated with disproportionate punishment within juvenile justice facilities. Our sample consists of 373 male juvenile offenders in an incarceration facility. Sixty-five percent of participants have a diagnosed mental disorder upon entering the facility. The ethnic distribution is 53% Hispanic, 29% African American, 6% Caucasian, and 12% from other/mixed races. Both self-report and institutional reports of offending and punishment were used. All analyses were ANCOVAs that controlled for length of incarceration. According to the facility’s records, mentally ill and non-mentally ill youth are punished equally, even after taking into account official records of institutional misconduct. However, if self-report of offending is controlled for, mentally ill youth of all races are more likely to receive a punishment than non-mentally ill youth. Examination of self-reported punishments revealed that White youth re-
port being punished more than Black and Hispanic youth, regardless of their mental health diagnosis. These results suggest that despite an over-representation of minority youth in the system, mentally ill youth, and possibly White youth, are punished disproportionately.

The World Choir Games: A Cultural and Musical Insight into the World of Singing
Daniel Joseph
Mentor: Joseph Huszti

Music is a universal language that can transcend cultural differences and unite many nations. However, the vast multitudes of backgrounds, upbringings, and cultural differences lead to a variation in the teaching, singing, and conducting of various musical pieces. It is therefore important to investigate the many contrasting styles of both singing, teaching, and conducting to gain a broader and deeper understanding of the impact music has on the world. The World Choir Games in Shaoxing, China presented a unique opportunity to study and listen to a wide range of divergent choirs from a vast number of different countries. By listening to and observing many choirs I was able to note many subtle differences in styles between different nations. I have found that different regions of the world have varying ways of conducting and singing, but conductors and singers of the same country tend to have very similar styles. In conclusion, conducting and singing styles are developed primarily regionally and are not universal world-wide. This, consequently, creates contrasting styles, pronunciations, and artistic freedoms in music around the world.

The Effect of Trait Hostility on the Relationship Between Caffeine, Alcohol, and Tobacco Consumption, Sleep Quality and Latter-Day Moods
Erin Kang
Mentor: Larry Jammer

Hostility is a personality trait characterized by mistrust, aggressiveness, and defensiveness, as well as negative affect and increased use of alcohol, tobacco, and caffeine. Use of these substances may disrupt sleep, which may in turn impact mood, and this relationship might differ for high-hostile individuals. The goal of this study was to explore this relationship in healthy adults. Participants completed a mass of surveys, including the Cook-Medley Hostility Scale. Using an electronic diary, participants were prompted to rate their sleep quality each morning and their moods and caffeine, alcohol, and cigarette consumption every 30 minutes during waking hours over five days. Mean hostility was 17.93; mean sleep quality was 2.325, or “Fairly Good”. The mean level of negative moods, including anger, nervousness, sadness, and stress, all fell between “Not at All” and “Just a Little” (Range = 0-4). Hostility was significantly, positively correlated with all negative moods, cigarette use and with sleep quality, but negatively with alcohol use, and was not related to caffeine consumption. Health implications of the relationship between hostility, sleep, substance consumption, and negative mood will be discussed.

Protective Auditory Stimulation Rescues Cortical Function and Structure following Ischemic Stroke in a Rat Model
Sama Kassira
Mentor: Ron Frostig

Although many attempts have been made to discover new treatments for stroke victims, complete protection from ischemic stroke is still elusive. A previous study from our lab demonstrated that whisker stimulation-induced-plasticity can provide complete protection from damage in a rodent model of ischemic stroke. Such complete protection in humans would allow for full physiological and physical functionality after ischemic stroke. In the previous study, stimulation activated an area central to the endangered cortex and induced protection via redirection of blood flow to this deprived region. This study demonstrates that auditory stimulation can also be completely protective. Additionally, as the auditory cortex is not central to the ischemic insult, our study tests the limits of the stimulation treatment and demonstrates that the plasticity-based stimulation treatment for stroke is not extremely specific in terms of proximity to the ischemic area. Adult male rats underwent a permanent occlusion of the middle cerebral artery and were immediately administered auditory sensory stimulation. Intrinsic Signal Optical Imaging (ISOI) was used to record functional neurological activity. Auditory stimulation delivered immediately following the permanent occlusion of the middle cerebral artery (pMCAO) resulted in complete or near complete cortical protection from stroke damage and compared to control rats that received no auditory stimulation following the same occlusion. The results and data analysis from ISOI and TTC staining supported the hypothesis that auditory stimulation could also induce protection from middle cerebral artery stroke.

Denitrifying Bacteria in a Wastewater Treatment Plant
Garrett Kehoe
Mentor: Betty Olson

Denitrifying bacteria carry out an essential step in the removal of ammonia (NH₃), a major nitrogen compound in domestic wastewater. Ammonia must be removed from the wastewater to help protect the environment before recharge into the environment. In the denitrification process, nitrite (NO₂⁻), a byproduct of the nitrification, can be
reduced into nitric oxide (NO), nitrous oxide gas (N2O), or nitrogen gas (N2). The goal of this research was to investigate different treatment protocols for the improvement of denitrifying abilities, in particular, how to manage a wastewater treatment plant efficiently to minimize nitrogen compounds in the effluent. The analysis was conducted by basing preliminary studies on believed major contributors to the denitrifying cycle, particularly the heterotrophic bacterial strains of Paracoccus, Pseudomonas, Burkholderia, and Zoogloeae. Bacterial concentration curves over one year were created for each strain taken from Irvine Ranch Water District’s wastewater treatment plant. These individual bacterial curves were plotted against the total bacteria curve for the same time period. Results thus far have shown Paracoccus to be a more dominant species than Pseudomonas when comparing their total bacteria curves. Results have also shown that the total bacteria present in the wastewater are not dependent on the temperature and that the strains of Paracoccus and Pseudomonas are also independent of the temperature.

Genital Anxiety and the Quest for the Perfect Vulva: Determinants to Female Genital Cosmetic Surgery
Ariana Keil
Mentors: Karen Leonard & Sheila O’Rourke

In recent years, female genital cosmetic surgery (FGCS) has become one of the fastest growing cosmetic surgery procedures requested by women. What influences a woman’s decision to undergo these procedures is currently unclear, and different interested parties each posit a reason. Cosmetic surgeons, feminists, and mainstream journalists have attempted to uncover what is behind the rise in FGCS’s popularity, but as of yet they have lacked quantitative evidence to back their various claims. This study is an attempt to fill this void. After examining the various contributors to women’s genital anxieties, including pornography, sexual partners, popular media, a lack of awareness about female genital diversity, and finally the popularization of the surgery by the medical establishment, this study identified four factors believed likely to influence a woman’s decision to undergo FGCS. A negative attitude towards one’s own genitals, the consumption of pornography, a high evaluation of pornography’s influence on themselves and their partner’s expectations, and finally a positive attitude towards cosmetic surgery in general were all hypothesized to lead to a favorable view of FGCS. To test this hypothesis, a questionnaire was developed and administered to 275 female participants. To supplement this, interviews were conducted with patients and cosmetic surgeons, and these provided a more nuanced view of the results. Statistical analysis of the questionnaire results dismissed one part of the research hypothesis while upholding another. While a woman’s attitude towards her genitals and her exposure to pornography had no significant correlation with her attitudes towards FGCS, her attitudes towards cosmetic surgery and her evaluation of pornography’s influence both correlated positively and significantly with her attitudes towards FGCS.

Does Stigma Impact Police Decisions?
Felicia Keith
Mentors: Carroll Seron & Jennifer Skeem

The impact of mental illness on an individual surpasses the prototypical symptoms of such diseases, i.e. mania, and depression; it also includes ramifications of how society interprets these diseases and the subsequent impact of these stigmatizing attitudes. Research has shown that these stigmatizing attitudes are present throughout society; research has, however, neglected to investigate the attitudes of individuals within the criminal justice system, where individuals with mental disorders are over-represented compared to the population as a whole. This study reports findings from surveys to police officers about their attitudes toward individuals with mental illness. A sample of 180 police officers from a large urban police department in Northern California completed this study by reading a vignette describing an individual with mental illness and completing a survey measuring stigma towards mental illness. Through a series of logistic regressions, findings show that for the vignette depicting an individual with schizophrenia, stigma had trend level significance when predicting whether or not an officer believed the individual would commit a felony. It was also found that in the control vignette, depicting an individual with no obvious symptoms of mental illness, stigma was a significant predictor of whether the officer believed the individual would commit a felony. It was also found that stigma was a significant predictor in both the control and bipolar vignettes when the officer was asked whether they believed the individual would commit a misdemeanor crime. The limitations and implications will be discussed.

The Impact of Charisma: The Central Asia Institute as a Foreign-Local Hybrid NGO
Ellen Kern
Mentor: Cecelia Lynch

Humanitarian NGOs and international aid efforts are often plagued with problems and challenges that limit their overall success in poverty reduction, and the Central Asia Institute (CAI) is no exception. The CAI is an NGO that builds schools in rural parts of South Asia and has gained popular support through narrative books. As an organization founded, based, and primarily funded in the United States, it faces particular challenges working in the socially and politically volatile countries of Pakistan and Afghanistan. The central (co)founder Greg Mortenson plays a ma-
Breastfeeding, Obesity, and Infantile Feeding Habits
Seyed Ali Khalessi Hosseini
Mentor: Stephanie Reich

The objective of this project is to compare whether breastfeeding mothers adhere to AAP feeding recommendations for infants up to twelve months. Using data gathered from the NICHD-funded Baby Books Project, the breastfeeding and feeding practices of 167 primiparous women were compared. Using home-based data collected during the third trimester and when infants were 2, 4, 6, 9, 12 and 18 months old, women were interviewed about their prenatal intentions to breastfeed, postnatal breastfeeding practices and infant feeding practices for the past week. Although 98% of new mothers intended to breastfeed, only 67% initiated breastfeeding and 50% continued beyond four weeks. Breastfeeding for at least one month was associated with greater adherence to AAP recommendations for the first year. Specifically, at least four weeks of nursing resulted in more women delaying the introduction of complementary feeding. Results suggest that maternal knowledge of the benefits of breast milk and prenatal intentions to breastfeed are not sufficient for promoting breastfeeding. However, when women commit to at least one month of breastfeeding they make better nutrition choices for their infants.

CRMP2 Aggregation via IsoAsp Formation
Mitri Khoury
Mentor: Dana Aswad

Collapsin-response mediator protein 2 (CRMP2) plays a critical role in the formation of growth cones and axon differentiation by assisting in microtubule assembly within neurons. CRMP2 has been seen to aggregate in aged individuals, suggesting some correlation to neurodegenerative diseases. In order to understand the nature of this aggregation, this project tests the hypothesis that CRMP2 aggregates as it ages via a covalent cross-linking between polypeptides creating either an -aspartyl-N-lysine crosslink or the lysine side chain from one polypeptide chain interacting with a succinimide, an intermediate in isoaspartyl (isoAsp) formation, of another polypeptide chain. CRMP2 oligomers were enzymatically digested to individual amino acids with a mixture of proteases. These proteases do not cleave the suspected -aspartyl-N-lysine crosslink we believe is causing aggregation. Therefore, when completely digested CRMP2 monomer and oligomers are derivatized and analyzed using reversed-phase HPLC, the suspected crosslink should appear as a unique peak in the chromatograms of the oligomers. As of now, we have attempted two approaches of derivatizing the amino acids using o-phthaldialdehyde (OPA) and dabsyl chloride. However, these two approaches are not suitable for analyzing the specific crosslink we are searching for. Recently I found a new derivatization method, utilizing phenylisothiocyanate (PITC), which appears to be suitable for detection of the suspected crosslink. A comparative analysis of CRMP2 monomers and dimers using this method is currently in progress.

The Change of El Nino Flavor Since 1870
Alexis Kim
Mentor: Jin-Yi Yu

Recent studies point to two types of interannual sea surface temperature variability in the tropical Pacific, a global climate phenomenon called El Nino. Adopting the names given by researchers Kao and Yu at UC Irvine, the Central Pacific El Nino (CP) and Eastern Pacific El Nino (EP) differ from each other by location in the Pacific and global impact. Though disagreeing on the dynamic processes responsible for the phenomena’s generation, the studies note that CP occurs more frequently than the EP in the last two decades, indicating potential climate change influences. Since earlier studies were limited to data from the last sixty years, I used monthly sea surface temperatures (SST) from 1870 to 2009 provided by the Hadley Ice and Sea Surface Temperature data set to investigate the occurrence of CP over a more comprehensive time scale. After using an Oceanic Nino Index (ONI) to identify El Nino events, I used additional indices to identify the type/flavor of the events. I identified 39 El Nino events with three distinct flavors, constructed visual simulations of the change of the sea surface temperatures over time for each event, and identified unique growth and decay patterns for each flavor. This study shows that El Nino can be independently
composed of either one or a combination of the three flavors and that El Nino’s flavor has indeed changed in recent years.

Quantifying the Financial Flow from Banks and Trust Companies
Jae woo Kim
Mentor: Gary Richardson

New York, the financial capital of the United States saw its greatest downside during the Great Depression. Using quarterly national bank data from 1929 to 1935, research was done to find any differences or similarities in how the recession affected New York along with the other states in the country. The purpose of this research was to question the belief that New York affected the rest of the country with its financial meltdown. However, results showed that New York was the last to react to the financial crisis; the bigger banks were slow to react while smaller states that had smaller banks struggled early on due to tight money supply. Research also showed that variables such as size of bank, whether or not it was a trust bank, and whether the bank merged or not affected the longevity and life of the bank throughout the Great Depression. The most strongly correlated variable was the size of the bank and how long it was able to survive. This implies that the bigger banks had the necessary resources to outlast the economic downturn and pull through the struggle.

Children’s Development of Analogical Reasoning: How Spatial Order and Motion Effects Relational Analogy Learning
Jin Kim
Mentor: Lindsey Richland

The ability to use relational analogies is crucial in developing knowledge that is flexible and generalizable. Previous research theorizes that older children’s increased performance on analogical reasoning tasks is due to increased prerequisite domain knowledge. However, younger children are distracted by irrelevant surface similarities between objects in analogy tasks, which lead to errors from poor inhibitory control. In this study, a match to sample task was used to test strategies for supporting younger children in analogical reasoning, in their ability to form relational analogies between pairs of objects that either match or do not match, and to assess developmental patterns across two to four years of age. We manipulated the experimental conditions to examine whether differing spatial configurations, use of hand motions to group objects, and the presence of a distractor object aid children’s performance. Preliminary data analysis shows that there is no difference for the presence of a distractor object across age, but that the three year old children show poorer performance only in the non-match to sample trials. Across conditions there were no differences between different spatial groupings, but addition of hand motions showed lower averages. This implies that non-match trials are more difficult than matching trials. It is also possible that the spatial cohesiveness does not affect performance but using hand motions may be distracting to children.

Control of Costal Cartilage Warping Using Electromechanical Reshaping
Jinwan Kim
Mentor: Brian Wong

Surgery of the ear, nose and upper airway often requires the use of cartilage for repair and reconstruction. Traditionally, septal and auricular cartilage was used for the purpose. However, limited availability of such cartilage encouraged looking for an alternative source. Costal cartilage provides ample material for surgeries requiring greater amount of tissue, but due to the tendency of peripheral costal cartilage to warp over time towards the concavity, a large amount of potential material was thrown out. In order to maximize the material available for operation, many methods have been studied to control the warping of the cartilage. Previously, our laboratory succeeded in controlling warping using Nd:YAG laser. This study attempts to replicate the successful results of laser trials using an alternative method, Electro Mechanical Reshaping (EMR), that achieves shape change through electrochemical oxidation-reduction reaction rather than relying on heat generation from lasers. Using platinum plates, varying parameters of voltage and time were evaluated for their effectiveness in controlling the warping of peripheral costal cartilage of a porcine model. The progress of warping was imaged and converted to a parabolic model to obtain the warping coefficient. Using the data, percent warping within 30 minutes was calculated and compared. The results show a positive trend towards controlling the warping of the peripheral cartilage using EMR.

Neuropeptide S: A Potential Modulator of Sleep and Wakefulness
Soo Kim
Mentor: Rainer Reinscheid

Neuropeptide S (NPS) has been identified as a potent modulator of stress, sleep and memory. NPS is a chain of 20 amino acids, with a conserved serine residue at the amino terminus, thus giving this peptide the name “Neuropeptide S”. NPS precursor mRNA is highly expressed in two regions in the mouse brainstem, the Kölliker-Fuse nucleus and the locus coeruleus (LC). Previous studies in rats have demonstrated that central NPS administration induces profound wakefulness and suppresses all stages of sleep. I hypothesized that NPS-producing neurons might show different levels of activity when mice are deprived of...
sleep. For this purpose, NPS/eGFP-transgenic mice that express the fluorescent marker eGFP in all NPS-producing neurons were deprived of normal sleep via gentle sensory stimulation for 5 hours during the light-phase which coincides with the normal period of rest for these nocturnal animals. Concurrently, another group of transgenic mice was allowed to sleep normally. After the treatment, the brains were processed for immunohistochemical detection of the immediate-early gene c-Fos, which is a marker of neuronal activation. Brain slices were double stained for c-Fos and eGFP in order to quantify the number of NPS neurons being activated by sleep deprivation treatment. Preliminary analysis of a small number of mouse brains showed that there is co-expression of eGFP and c-Fos in brains of sleep-deprived mice, indicating that NPS-producing neurons had been activated. However, the total number of mouse brains analyzed is currently too small to conclude if sleep deprivation has a quantitative effect on activated NPS-producing neurons.

Hydrogen Sulfide Biosynthesis in Healthy Term and Preeclamptic Human Placenta
Theresa Kim
Mentor: Dongbao Chen
Preeclampsia is a human pregnancy specific disorder that affects both the patient and the fetus. It is characterized with anomalous amounts of proteins in the urine and, more importantly, hypertension. Despite extensive investigations for decades, the pathogenesis of this disease remains uncertain. This study was conducted to examine if hydrogen sulfide (H2S) synthesizing enzymes and H2S levels are altered in human placenta by preeclampsia. Placentas were collected from severe preeclamptic (n=7) and normotensive (n=5) pregnancies. Protein expressions of the two H2S synthesizing enzymes, cystathionine γ-lyase (CSE) and cystathionine β-synthase (CBS) were determined by Western blotting analysis and H2S levels were measured by a methylene blue assay. We found that the levels of CBS protein in preeclamptic placentas were higher than that in the healthy control placentas. Levels of CSE protein were higher but did not reach statistic difference. Levels of H2S in preeclamptic placentas was higher but also did not reach statistic difference compared to normal controls. We concluded that preeclampsia may alter placental biosynthesis of H2S via altering the expression and activity of its synthesizing enzymes; however, further studies are necessary to confirm these results.

Contentless II
Mitchell Klein
Mentor: Simon Leung
Imagine an 11-foot long book shelf, waist-high that has been placed perpendicular to a wall. Its top row is full of magazines with their spines facing towards you. Now take away the book shelf, but picture the magazines staying in place. This is the image of Contentless II, the second in a series of monumental sculptures, here, cantilevering hundreds of magazines off one wall. Throughout the course of my research this past year and with the help of an engineering expert I was able to determine the necessary structural support in order to construct Contentless II. Its successful installation was just recently realized. My proposal to display it in the University Art Gallery at UCI was granted in March, earning its way into the 2011 Undergraduate Juried Exhibition titled The Natural Number After 8 Preceding 10. It was recently open to the public from March 31st through April 16th. In going forward, I wish to construct more variation of Contentless II in order to continue the series, and only through my hardships this past year in making this project a reality have I learned what it takes, which will make future constructions that much easier.

Crystallizing LovB: KS-AT Domain of Lovastatin
Liliya Kolozian
Mentor: Sheryl Tsai
The current leading cause of death in the Western world is Atherosclerosis, the process in which cholesterol and other substances build up in the inner arterial lining. Lovastatin is the first FDA-approved cholesterol lowering drug that is part of the statin family. Statins are drugs that are used to prevent and treat atherosclerosis by inhibiting cholesterol synthesis. The significance of these drugs, and other related compounds, has led to a high demand for determining the synthesis of lovastatin, which can be done by understanding the structural complexity and chemical lability of its domains. The goal of my project was to crystallize the LovB KS-AT domain to solve its structure, which enabled us to further understand the protein-protein interaction observed between LovB mega-synthase and ERs. This will bring us closer to the understanding of the overall lovastatin biosynthesis, which can lead to the development of lovastatin analogs containing diverse and reactive substituents that can facilitate chemo-and regioselective synthetic transformations, and display enhanced cholesterol lowering activity.

Microbial Community on Different Testing Coupons Exposed to the Dana Point Slant Well Intake Water
Carl Kopitch
Mentor: Sunny Jiang
The Dana Point Desalination Project is the first desalination plant to use a slant well intake design to retrieve water from beneath the ocean floor. This subsurface-intake design reduces microbial population in the intake seawater by the natural filtration function of the sediments on the sea-
floor. As part of the pilot testing, our lab is responsible for assessing and characterizing the microbial population that can colonize different type of metal and plastic coupons, which could potentially be used in water conveying for the full-scale plant construction. Coupons were exposed to the stream of intake water pumped out from the slant well for a three- to six-month period. At the time of retrieval, bacterial biomass on the coupons was measured using confocal microscope after fluorescent staining. Each bacterial population was scraped off from the coupon surfaces and analyzed for bacterial genomic diversity using pyrosequencing. In addition, a sample from the water discharge tank was also retrieved to understand the environmental impact of the well water discharge to the local microbial community. Over 1,000 sequences of greater than 400bp nucleotide length were obtained from each sample. Microbial diversity analyses were conducted using RDP database, online alignment, and tree building software. This presentation will detail the microbial growth potential on various types of coupons and microbial diversity on coupons based on the deep sequencing analysis.

**Secrected Astrocyte Proteins Promote the Maturation of Inhibitory Synapses onto Nucleus Laminaris in the Auditory Brainstem of the Chick**

Scott Koppel  
*Mentor:* Karina Cramer

Nucleus Laminaris (NL) is a second order auditory brainstem nucleus composed of a single layer of neurons with bitufted dendrites. These dendrites receive segregated binaural input from both ears in an arrangement that facilitates sound source localization. The activity of these neurons is modulated by inhibitory inputs that arise from the superior olivary nucleus (SON) and form as early as embryonic day 10. There is a notable increase in inhibitory inputs into NL beginning at E15, which coincides with the appearance of a distinct population of astrocytes located ventral to the NL cell body layer. Here, we tested whether the emergence of these astrocytes is needed for the observed increase in inhibitory inputs to NL. A heterochronic organotypic brainstem slice preparation was used to test the effect of astrocyte conditioned media (ACM) on the number of inhibitory inputs. Neurons in slices taken from brainstem tissue prior to astrocyte maturation were exposed to proteins secreted from mature brainstem astrocytes. Presynaptic terminals were visualized by immunofluorescence specific for the vesicular GABA transporter (VGAT) to locate and identify presynaptic inhibitory sites. Our data indicate that a 24-hour exposure to ACM accelerated the growth of presynaptic sites at a rate similar to the developmental maturation of inhibitory synapses observed during normal development *in vivo*. In contrast, control slice cultures did not show an increase in inhibitory sites in NL during this time period. These data suggest that proteins secreted from mature brainstem astrocytes are needed for maturation of inhibitory connections in NL during development. Ongoing and future studies investigate the nature of these factors and their role in inhibitory synaptic maturation.

**The University in Crisis: Locating an Educational Philosophy**

Pichaya Kositsawat  
*Mentor:* Rei Terada

The historical trajectory of the University of California’s academic plan is captured in four documents: the 1862 Morrill Act, the 1960 California Master Plan, the 1974 University of California Academic Plan, and the 2007 UCI Strategic Plan. Born out of efforts to professionalize students for the workforce and contribute to a knowledge-based economy, the University enacted policy favoring the applied sciences over the liberal and performing arts, thereby excluding non-technical disciplines in public higher education. While explicit about commitments to promoting instruction and research in the applied sciences, the Morrill Act describes itself as merely leaving room for fields such as the Humanities, without actively specifying their value. It therefore makes possible the narrowing that continues to give way to an emphasis of industry over education. Nevertheless, documents such as the 1974 University of California Academic Plan challenge the assumptions within UC policy, especially in its judgment of programs through the lens of prestige and “high quality,” rather than on their contributions to student learning objectives and social utility. As budget shortfalls continue to threaten non-marketable disciplines within the University, however, the consistently exclusive nature of UC policy suggests that dissent haslittle bargaining power when confronted by economics. In tracing the continual narrowing of the University’s academic mission through the ways academic policies reference and build off of one another, I offer insight on the power of formal inscription over that of social practice. I also call for an urgent revival to assess the value of a Humanities education, so as to not repeat the passive mistake of leaving its value undefined.

**Effects of Age and Gender on Attendance in a High Quality Youth Program**

Natalie Kovacs  
*Mentor:* Deborah Vandell

This research investigates the child characteristics that are associated with adolescent attendance in a high-quality community-based youth program. Research shows that attendance in high quality youth programs is associated with positive outcomes such as gains in school performance and improved social skills. Despite these benefits, the
The Times Reports on the American Civil War
Daniel Kovell
Mentor: Alice Fahs

During the American Civil War the opinion generated by the Times of London was the voice of England’s public opinion in America. Most previous endeavors to engage the history of the Times in America have chosen to focus on the criticism and history of the paper alone. Historians have alleged that war correspondents in America manufactured the opinion of the paper and pursued individual agendas unassociated with the Times. This view produces an array of problems which detract from a larger transnational issue. This new examination of the Times during the Civil War seeks to produce a holistic approach of the history of the Times, focusing on the villainization of war correspondents. This endeavor provides a historiography of the Times of London and a narrative of its correspondents during the Civil War. In studying the criticism and history of the Times during the Civil War it became apparent that John Thadeus Delane, the head editor of the Times, directed the opinion of the paper and not the war correspondents. He alone determined what would be published in the Times and what position the paper would take on key issues. This suggests, contrary to previous scholarship on the Times, that the war correspondents of the Times in America during the Civil War did not pursue their own agendas. This research exposes much of the criticism and blame projected on correspondents during the war by the American press and the Times itself as false.

Identification of HLA-A*0201-Restricted CD8+ T Cell Epitopes from HSV-1 Glycoprotein B
Elizabeth Kritzer
Mentor: Lbahir BenMohamed

Herpes simplex virus type 1 (HSV-1) is a very successful pathogen and representative of the α-herpesvirus family. Approximately 90% of the human population is seropositive for this virus. Although HSV-1 usually causes the well-known mild lesions on the lips (cold sores), it also causes blinding infection of the eyes and fatal encephalitis. Despite the rapid spread of herpes infections, there is presently no herpes vaccine approved for human use. CD4+ and CD8+ T cells specific to HSV glycoprotein B (gB) epitopes appear to be critical effectors for protective immunity against both HSV-1 and HSV-2 infection. To date, however, information regarding human gB-specific T cell immune response is limited to CD4+ T cell epitopes with no human CD8+ T cell epitopes yet identified. In the present study, we sought to identify and characterize human HLA-A*0201-restricted CD8+ T cell epitopes from HSV-1 gB. The complete HSV-1 gB sequence was screened for potential HLA-A*0201-restricted CD8+ T cell epitopes using prediction algorithms. Ten candidate epitope peptides were synthesized and tested for affinity to the HLA-A*0201 molecules and CD8+ T cell functional stimulation. Two of these peptides—gB441-449 and gB561-569—exhibited high affinity for HLA-A*0201 molecules and significantly stabilized HLA-A*0201 molecules on the surface of T2 cells. Consistent with this, the most frequent and robust CD8+ T cell responses were directed mainly against gB441-449 and gB561-569 epitopes, as detected by both human IFN-γ ELISpot and tetramer assays in ten HLA-A*0201-positive, HSV-1-seropositive, and/or HSV-2-seropositive healthy individuals. These results suggest that gB441-449 and gB561-569 are immunodominant HLA-A*0201-restricted CD8+ T cell epitopes and may be important components of an immunotherapeutic clinical herpes vaccine.

Changes in Male Allocation after two Generations of Artificial Selection in Schiedea salicaria, a Gynodioecious Species
Mickey Ku
Mentors: Ann Sakai & Stephen Weller

Many models of evolution of plant breeding systems depend upon measures of common currency. Empirical studies of breeding systems often use counts of different flower parts to measure allocation to male or female function instead of a common currency and assume they are equivalent. The goal of this research was to determine if patterns of male allocation are similar for measures of the number of pollen grains per flower and for the common currency of biomass of stamens in Schiedea salicaria (Caryophyllaceae), a gynodioecious species with females and hermaphrodites in the populations. After two generations of artificial selection for greater male (stamen) biomass in hermaphrodites (High Male lines), hermaphrodites in the High Male lines had more pollen grains relative to Control lines, even after the greater stamen biomass in these lines was taken into account. Selection for higher male biomass leads to greater numbers of pollen grains, but this selection also affects allocation patterns within stamens to the mass...
of the walls of the anther sacs and/or the size of the pollen grains. Counts of parts such as pollen grains may reflect different male allocation patterns than those patterns shown by measures of common currency such as biomass.

Amyloid Fibrils Characterization of Cataract-Related Variant G18V γ-S-crystallin and Wild-Type
Alvin Kung
Mentor: Rachel Martin

γS-crystallin is a structural protein that is responsible for maintaining the high refractive index and transparency of the eye lens. It exists in a highly ordered protein network and must remain stable and soluble for the lifetime of an organism, as it does not undergo protein transcription and degradation. With these conditions and the combination of oxidative damage and UV radiation, crystallins are susceptible to aggregation and precipitation of the proteins that leads to opacification of the eye lens, more commonly known as cataracts. Cataract is the number one leading cause of blindness in humans; therefore, analyzing the aggregated γS-crystallin structure provides a step forward in discovering therapeutic results. Many detrimental diseases, such as Parkinson’s and Alzheimer’s, are characterized by the protein aggregation, deposition and accumulation of amyloid fibrils. Previous studies have shown that human C- and D- crystallin form amyloid fibrils in vitro; however, characterization of γS-crystallin aggregates has yet to be shown. Thus my project is to synthesize, purify, and concentrate both wild-type (WT) and the variant G18V γS-crystallin followed with inducing amyloid fibril formation in order to characterize the resulting fibrils with Congo red staining and scanning electron microscopy (SEM). We report here that WT and G18V S-crystallin form amyloid fibrils.

Identification and Molecular Characterization of Nrf1 Protein Isoforms in Mouse and Human Cells
Eric Kwong
Mentor: Jefferson Chan

The ability to counteract oxidative stress and other types of stress is essential for survival at the cellular level. The transcription of antioxidant genes occurs through the activation of sequences known as antioxidant response elements (ARE). Nuclear factor erythroid-derived 2-related factor1 (Nrf1) is a member of the cap ‘n’ collar basic leucine zipper transcription factors that plays an integral role in the regulation of antioxidant response elements and has been implicated in cancer and neurodegenerative diseases. The Nrf1 gene codes for several protein isoforms. The p65 isoform has been shown to act as a dominant repressor of Nrf2. Here we demonstrate that the four in-frame internal ATGs located downstream of the Nrf1 gene control the translation of the p65. 293T cells transfected with the wild type Nrf1 construct stably expressed p65. Consistent with the four internal ATGs acting as an alternative translation site, 293T cells transfected with a mutant Nrf1 construct containing four mutated internal ATGs abolished the expression of p65. Expression of endogenous Nrf1 proteins suggests that the p65 is a minor product in comparison to the p120.

Parental Reasoning in Communication and Frequency of Adolescent Alcohol Use
Rachel LaCoe
Mentor: Candice Odgers

Adolescents who begin drinking prior to their fifteenth birthday are at an increased risk for a number of poor health outcomes. Parents, policy-makers and those invested in the health of adolescents are constantly searching for ways to reduce alcohol use in general, and binge drinking in particular. There is some evidence that both frequent and open communication between adolescents and their parents decrease rates of adolescent alcohol use. This study assesses both the depth and content of reasoning with respect to parental communication regarding alcohol use and tests whether these key features of parental communication predict substance use among young adolescents. Participants included fifty parent/child pairs with adolescents aged 12-14. Parents and adolescents completed surveys that gathered information related to substance use, personality, communication style and behavior. Parents also sat for a semi-structured interview to gather in-depth information regarding their parenting practices, position on alcohol use before the age of 21, and the nature and content of their communication with their child about underage drinking. The interviews were coded for both the content of the reasoning and the depth of reasoning. Content of reasoning refers to the reasons given for or against drinking before the age of 21, such as health effects of drinking, possible consequences or sanctions for drinking, and social or academic ramifications of drinking. Depth of reasoning indexes the amount of justification or evidence provided to support their position regarding underage drinking. Ideally this study will identify the key features of parental communication regarding substance use that are associated with lower rates of alcohol use and binge drinking among young adolescents. Implications for future research, theory and practice will be discussed.

Contension in Cyberspace
Khuyen Lam
Mentor: Dorothy Solinger

My thesis focuses on the phenomenon known as online contention in China and its past and potential influence on the Chinese government. The Internet has served as a political space for the Chinese public. Netizens, a term used
to describe Internet users active in online communities, have used this technology to voice their opinions or demands in various forms with varying results. I examine six cases, which together demonstrate that online contention in China has the potential to affect the policies of the Chinese government. I study the cause of each protest’s inception, who or what online protestors were targeting, the methods by which protests were carried out and government responses. My findings show that the government’s response varies greatly based on: size of the protest, methods employed by the protestors, and cause. Cases where netizens do not attack the central government directly appear to be treated with ambivalence. Moreover, the Chinese central government is more supportive of certain protests than others—particularly those against other countries such as Japan. The central government may also be supportive of protests about contested issues on the local level to appease the populace and retain legitimacy. The central government may intervene if it feels that online contention may damage its own legitimacy or reputation. While complaints against the local government may sometimes be tolerated, complaints lodged against the central government will be retaliated against. Finally, I ask whether such contention might promote a stronger civil society.

Body Ink
Madeline Lamond
*Mentor: Loretta Livingston*

Inspired by Natalie Goldberg’s work with free writing and my interest in dance improvisation as a choreographic tool, I am attempting to choreograph a dance that uses several timed free writing sessions as inspiration to evoke new movement. I am interested in creating a movement score that is conceived from the sporadic thoughts that occur in my head combined with other improvisational techniques to create a choreographed work. My hope is that by creating this loose improvisational structure I will be able to broaden my range of movement vocabulary, and by using several sessions of free writing I will find new movement inspiration. I plan to then comb through these thoughts and create movement phrases and link the phrases together in various ways to create a work that appears to be a train of incomplete sentences spoken through the body.

Mutational Analysis of Putative Family I CoA transferase RipA from *Yersinia pestis*
Benson Lan
*Mentor: Celia Goulding*

*Yersinia pestis* is a pathogen responsible for various forms of plague, including bubonic plague. The *rip* operon has been found to be important in the intracellular pathogenesis of *Y. pestis* in activated macrophages. This operon encodes for the Rip proteins: RipA, RipB, and RipC. To better understand this novel virulence pathway, we have focused our efforts on characterizing RipA. Previously, our lab has shown that RipA exhibits CoA transferase activity as well as solved the 1.9 Å crystal structure of RipA, which has structural homology to other Family I CoA transferases. To further investigate RipA, we have mutated active-site and CoA-binding-cleft amino acid residues predicted to be important for RipA function. Several RipA mutants, including E249A, E249D and Q224S, demonstrated reduced CoA transferase activity. Additionally, we have determined crystals structures of some of the mutants. Knowledge from these studies will provide insights into residues important in CoA transferase activity, CoA specificity, and CoA binding.

Graphics Card Parallelization of Fluid Simulation Algorithm Using CUDA
Kevin Launglucknavalai
*Mentor: Feng Liu*

The application of graphics processing unit (GPU) parallelization to a standard Computational Fluid Dynamics (CFD) computer algorithm is desired in order to reduce the simulation time of the previously developed CNS2D. The simulation code is a Reynolds Averaged Navier Stokes (RANS) flow solver. The GPU parallelization is aimed at optimizing the Euler flux portion of the program, which is deemed to be most costly. Since the application of Compute Unified Device Architecture (CUDA) has not initially yielded satisfying optimization of Euler flux algorithm, the optimization of a more fundamental process has been chosen to obtain more knowledge involved in using the GPU. Solving the Laplace equation using an iterative method has been adapted to CUDA, studied, and compared to the same process in serial code or non-parallel code. Optimization methods are also applied to the Laplace equation in order to gain tools to apply to optimization of the Euler flux algorithm.

Synthesis and Characterization of 4-Ureido-2-Pyrimidone (UPy) Electronic Variants
Bryan Le
*Mentor: Zhibin Guan*

Synthetic polymers can be engineered with high toughness, high extensibility, or high tensile modulus. However, there are few examples of man-made polymers designed with a combination of these desirable mechanical properties. Such materials continue to remain a challenge to construct using chemical or engineering means, whereas nature has created a wide array of biopolymers possessing a combination of desirable mechanical properties. Recent elucidation studies on advanced biopolymers, such as titin and spider silk, reveal a common molecular architecture. These results
have encouraged the development of new biomimetic strategies to incorporate combinatorial properties into synthetic materials. We have developed a biomimetic concept using the massive muscle protein, titin, as a model. Titin is largely responsible for the toughness and elasticity of muscle fibers during contractile movement, making it a useful natural polymer for the design of application-specific materials. The exhibited properties are postulated to be derived from the reversible energy-absorbing behavior of the six hydrogen bond pairs found in the Ig domains of titin. Following the modular structure of titin, we have designed a polymer containing the quadruple hydrogen bonding 4-ureido-2-pyrimidone (UPy) structure to mimic the Ig domains. Previous studies involving the UPy motif have shown that its incorporation into commercial polymers formed a tough, strong, and elastic material. My project involved the synthesis of a modified UPy-incorporated monomer that can be chemically tuned by changing electronic substituent groups to modulate the hydrogen bond strength.

**Vietnam’s Position in Gereffi’s Global Apparel Value Chain**

Cindy Le  
**Mentor:** David Smith

This research project examines the development of the Vietnamese textile and garment (T&G) industry. Dr. Gary Gereffi’s global apparel value chain (GAVC) theory examines the global apparel and textile industry, the global division of the production chain and its implications for power relations between the countries, and the possibility of economic development through a greater control of the GAVC. There is limited research, however, that focuses solely on the Vietnamese T&G industry and its history. The purpose of the study is to investigate whether the development of the Vietnamese T&G industry can help Vietnam develop economically as a country and improve the livelihood of its workers. The methods include second-hand data analysis of news sources about the T&G industry and general statistics from Vietnam. The results indicate that the economic development of Vietnam and the improvement of the workers’ livelihood are possible, but are threatened by limited skilled labor, a lack of raw materials, and rising labor costs.

**Our Best Possible Selves: How Expressive Writing Affects Exam Performance**

Desiree Le  
**Mentor:** Joanne Frattaroli

People who take graduate school entrance examinations often experience high levels of stress and anxiety, which could negatively affect their exam scores. Previous research has shown that writing about one’s deepest thoughts and feelings (expressive writing) can improve exam performance, but it is unknown whether other forms of writing can have the same effects. This study examines whether writing about one’s “best possible exam self” (i.e., ideal, future self in which everything has gone the best it possibly could have) can also improve exam performance. Individuals from UCI and the surrounding community taking the MCAT, LSAT, or PCAT (average age=22) were recruited for the study and randomly assigned to an experimental group (where they engaged in a “best possible exam self” writing task) or a control group (where they wrote about a neutral topic); the writing session took place approximately nine days before the exam. Those in the “best possible exam self” group (N = 25) scored in the 64th percentile for their graduate school entrance exam, whereas the control group (N = 26) scored in the 55th percentile. Although these effects are not yet significant due to a small sample size, evidence in this study suggests that “best possible exam self” writing may improve graduate school entrance exam performance. Possible psychological variables that could account for these effects (i.e., working memory, test-related emotions, depressive symptoms, study habits) were also examined and will be further discussed.

**Yoga beyond Postures and Breathing: An Exploration in the Process of Transposing Centuries Old Yogic Philosophy into an Embodied Language**

Politeia Le  
**Mentor:** Loretta Livingston

Among most of the population in the United States, yoga is understood as a means of accessing fitness and alleviating stress through “a lot of breathing and stretching in various poses.” However, there is depth and a rich foundation of values and beliefs embedded in the practice yoga that is unknown to many. Through the choreographic process and using dance as an embodied language, I hope to expand the understanding of yoga beyond the solely physical practice for which it is dominantly understood today. The body of works created puts into practice the use of dance as a means of communicating ideas on kinesthetic level. Yogic philosophy and practice were embedded in the choreographic process. Asana (posture) and pranayama (breath) practice began rehearsals to center and ground dancers as well as educate them of the content of the work they were a part of. Asana correlating to specific chakra was also used for developing movement vocabulary, in turn stimulating and balancing the performers’ chakras. In addition to contributing to movement vocabulary, Chakra and yogic philosophy aided in direction for choreographic structure, theme, and sound choice. This creative project will result in an evening length concert open for the public to experience.
Role of Naloxone in the Nucleus Ambigus during Electroacupuncture on Inhibitory Cardiovascular Responses
Christine Lee  
Mentor: Stephanie Tjen-A-Looi

Acupuncture in recent years has become a more popular form of treatment for a variety of conditions, including cardiovascular related ones. Studies have shown the effects of acupuncture on the cardiovascular system, but the neuronal pathways behind these effects are relatively unknown. The Longhurst laboratory has studied a number of regions in the brain involved in electroacupuncture, including the arcuate nucleus, the rostral ventral lateral medulla, and the ventrolateral periaqueductal gray. In this study, we examine the role of naloxone in the nucleus ambiguus during electroacupuncture on the inhibitory cardiovascular responses brought about by phenylebiguanide. Phenylebiguanide, injected intravenously into the right atrium, causes a drop in blood pressure and heart rate, leading to a large change in mean arterial blood pressure (ΔMAP) and heart rate (ΔHR). Electroacupuncture is applied to normalize blood pressure and heart rate. Electroacupuncture has been known to involve opioid receptors in its effects; using naloxone, we are able to effectively confirm the role of the nucleus ambiguous in the parasympathetic pathway involved in the regulation of heart rate. Microinjections of naloxone into the nucleus ambiguous attenuate the normalizing effects of electroacupuncture on heart rate, leading to a reversal of electroacupuncture effects. This reversal of electroacupuncture effect confirms the role of opioid receptors in the nucleus ambiguous on the parasympathetic pathways affected by electroacupuncture.

Caffeine as a Gateway Drug to Licit and Illicit Drug Use
Eileen Lee  
Mentor: Chuansheng Chen

Drug use increases from age 12 and peaks during the ages of 18 to 25. Young adults constitute the largest percentage of drug users in the United States. Therefore, further research needs to be done concerning what factors in adolescence contribute to the high rate of drug use among young adults. Marijuana, tobacco and alcohol have been identified as potential gateway drugs to hard drug use, but not a lot of research has investigated if this path begins earlier. Previous research suggests that habitual drug users tend to consume more caffeine than non-habitual drug users. This study looks at the Gateway Drug Hypothesis beginning with caffeine and ending with illicit drug use. This study also looks at the impact of peers and parental monitoring during the time periods of junior high, high school and college. A convenience sample of 491 college students from the University of California, Irvine participated in this study. This study finds that there exists a drug pathway beginning with caffeine use in junior high and terminating in hard drug use in college. Peer sanctions against drug use and parental monitoring function as moderators throughout this pathway.

The Influences of Environmental Factors on Adolescents’ Perceived Risk of Drug Use
Eileen Lee  
Mentor: Joanne Christopherson

Young adults constitute the largest percentage of drug users in the United States. Drug use begins as early as age 12 and peaks during the ages of 18 to 25. Research can establish factors that contribute to the high rate of drug use among young adults. This study is an investigation of how several factors—perception of peer and parental approval of substance use, and exposure to substance abuse prevention programs—influence adolescents’ perception of the risk of drug use. Cross-sectional data from the National Survey for Drug Use and Health was analyzed for the year 2009 for the 17,705 adolescents aged 12-17. Results show significant relationships between the independent variables and perceived risk involved in drug use. The likelihood that adolescents disregard the risks associated with drug use is highest when parents and peers are neutral or express little disapproval.

If You Build It: Do Neighborhood Amenities Predict Children’s Health Outcomes?
Christopher Lee  
Mentor: Candice Odgers

The built environment has been shown to correlate with our health, whether the measure is physical, psychological or social. Neighborhood amenities, such as parks and recreation centers, have been shown to predict better health outcomes for adolescents. This project examines whether the presence of child-friendly neighborhood amenities correlate with children’s health. First, I conducted a case study of six families’ neighborhoods to develop a coding scheme for the study. I used geographic information systems (GIS) to map child-friendly amenities (e.g. parks, community centers) within a half-mile radius of the homes of families in the E-Risk Study. Secondly, I extended this coding procedure to 200 of the E-Risk families; cases were selected in order to ensure equal numbers of affluent versus deprived neighborhood contexts. UpMyStreet and Police.uk were used to collect data on amenities and crime, respectively. I am analyzing the data to test whether features of the built environment predict children’s mental and physical health status during childhood and early adolescence, holding for selection factors. I expect to see child-friendly amenities serving as a protective factor for children in deprived neighborhoods.
Evaporation of Cloud Droplets Containing Dissolved Organics as an Efficient Route to Light-Absorbing Aerosols
Paula Lee
Mentors: Tran Nguyen & Sergey Nizkorodov

Limonene (C\textsubscript{10}H\textsubscript{16}), an abundant biogenic volatile organic compound in the atmosphere, forms secondary organic aerosol (SOA) that can dissolve in cloud droplets. Limonene SOA is known to produce “brown carbon” compounds when aged in the presence of reduced nitrogen and acidic species. We investigated the simulated aqueous cloud processing of limonene SOA with dissolution and evaporation cycles in the presence of acid and ammonium sulfate ((NH\textsubscript{4})\textsubscript{2}SO\textsubscript{4}), a common atmospheric pollutant. We also studied the effects of pH and evaporation temperature in forming “brown carbon” products during evaporation. Dissolved limonene SOA samples were prepared by extracting laboratory-generated SOA in water, adding acid or base to obtain the desired pH, and evaporating the sample to dryness. The sample was re-dissolved in water to complete one simulated cloud-processing cycle. The evaporation was repeated if desired. UV-Visible absorption spectra of the samples were taken before and after evaporation. Our results show that acidity promotes formation of light-absorbing species for SOA. A different class of light-absorbing species is formed in the presence of (NH\textsubscript{4})\textsubscript{2}SO\textsubscript{4}. The implications of these results for the climate effects of cloud-aerosol interactions will be discussed.

Determination of the Structure of Equisetin
John Leong
Mentor: Sheryl Tsai

Acquired immune deficiency syndrome, AIDS, is one of the most prevalent and lethal sexually transmitted diseases in the world. It is caused by the Human Immunodeficiency, HIV, virus which infects the vital T-cells in the human immune system. HIV infections can lead to irreplaceable damages to hosts’ immune systems and eventually leads to opportunistic infections such as tuberculosis. One way to prevent HIV infections and the development of AIDS is to prevent integration of HIV viral DNA into host cells. One way to accomplish is by inhibiting viral components necessary for the HIV virus to integrate its DNA into hosts’ genomes. Equisetin, a polyketide teramic acid that inhibits the HIV-1 integrase, is synthesized by the enzyme Equisetin synthase (EqiS) in the fungus Fusarium heterosporum. Because Equisetin acts as an anti-HIV agent, it was used as a model for the development of raltegravir, the first anti-HIV integrase inhibitor approved by the FDA. If we are able to fully solve the structure and functions of the EqiS domains, we can possibly manipulate each enzymatic domain to produce various drugs for clinical use. The goal of the EqiS TR project is to study specifically the TR do-

main of EqiS. TR proteins will be purified from transgenic E. coli. cells and crystallized for further studies. By studying the crystallized structure of TR protein we hope to gain further knowledge on the complete structure and function of TR domain.

Examining Key Factors of Litigant Satisfaction in Mediation Proceedings
Tarah Lephart
Mentor: Candice Odgers

As seen in research conducted by Emery, participation in mediation has lasting effects. Specifically, individuals who participate in mediation are considerably more likely to adhere to the stipulations they took an active role in creating compared to a judicial ruling. This study examined data from small claims court proceedings wherein litigants voluntarily participated in a mediation process that resulted in a legally binding agreement. The aims of the study were to determine if impartiality and fairness during mediation played a role in litigant satisfaction. These key aspects were specifically examined in order to evaluate the likelihood that a litigant would repeat the process or recommend mediation to others. The primary benefit of this study identifies influential factors of litigant satisfaction whereby future recommendations of best practices can be made.

A Sulfonate Containing Polymer Nanoparticles Used for Toxin Neutralization
Benjamin Lesel
Mentors: Ken Shea & Keiichi Yoshimatsu

Synthetic polymer nanoparticles capable of binding to specific biomacromolecules are of importance due to their potential application in diagnostics, research tools in molecular biology and as antidotes for toxins. Recently, the group of Prof. Shea demonstrated the efficient neutralization of a toxic peptide, melittin, by a cross-linked synthetic polymer hydrogel nanoparticle containing a hydrophobic monomer N-(tert-butyl)acrylamide (tBAm), and an acidic monomer, acrylic acid (AAc). The reported nanoparticles were found to be stable at neutral pH and efficiently captured melittin. However, due to weakly acidic and hydrophobic nature of the nanoparticles, it was found to be sensitive to the surrounding environment (pH, ionic strength etc.). My research involves efforts to synthesize nanoparticles with improved melittin affinity, selectivity and stability. To achieve this goal I have synthesized and characterized a series of nanoparticles containing a new functional monomer. The synthesized nanoparticles showed a toxin neutralization capability comparable to the previously reported nanoparticles. However, since they exhibit an improved tolerance to pH, these new, second generation nanoparticles are found to be an improvement over the original synthetic polymer nanoparticle.
Can the Human Pathogen *E. coli* Grow with Bloom-Forming Algae?
Lucy Li
*Mentors* Sunny Jiang & Marilou Sison-Mangus

*Escherichia coli* is a human-gut non-pathogenic bacterium that is being used as an indicator for sewage pollution in the environment. It is assumed that *E. coli* can only survive for a short period outside the primary environment of the intestine. However, recent studies have shown that *E. coli* can survive and multiply in organically-rich beach sands and macroalgae, thus increasing the chance of water contamination and giving pseudo-high fecal indicator count. The objective of this study is to determine if the survival of *E. coli* in marine environments may also be encouraged during algal bloom, an event that supports the growth of marine bacteria. The bloom-forming diatom *Chaetoceros sp.* and *E. coli* were grown in binary culture to determine if the diatom provides a favorable environment for *E. coli* growth. After continuous monitoring of *E. coli* colonies and algal concentrations over twenty days, the growth trend indicates that *E. coli* cannot be sustained by algal growth alone, suggesting that *E. coli* may need other nutrients for prolong survival in the ocean.

Elder Care: Comparison Between Asian and Anglo Older Adults
Philana Li
*Mentor:* Judith Treas

With the rapidly growing size of the elderly population, the issue of elder care becomes increasingly important. This study aims to investigate the factors behind the decision to either live with extended family or in a retirement community. Specifically, this study looks into the role ethnicity plays in the decision-making process. Data was collected through intensive interviews with Asian and Anglo older adults living with extended families or in retirement communities. Results show that Asian older adults tend to live with their extended families while Anglo older adults tend to join retirement communities. This finding is attributed to different cultural expectations of old age. Asians value filial duty and respect whereas Anglos value independence. As Asians begin to acculturate to American values and behaviors, retirement communities may need to evolve in order to meet this upcoming market.

The Future Prospect of the Shanghai Cooperation Organization (S.C.O.) and its Implication toward the Trilateral Relationship Between the U.S., Russia and China
Ian Liao
*Mentor:* Patrick Morgan

In many aspects, the Shanghai Cooperation Organization that consists of Russia, China, Kazakhstan, Uzbekistan, Tajikistan, and Kyrgyzstan is the reflection of the essence of Sino-Russo relationship in the Post-Cold War era. The S.C.O. is neither a semi-defense alliance nor merely a political forum for regional affairs as some analysts suggested. Rather the organization is created out of the necessity in the Post-Soviet environment. China finds the organization to be a useful tool in combating separatism while Russia tries to use the organization to consolidate its influence over Central Asian republics. While the S.C.O. is not an Anti-NATO semi-alliance as some have suggested, the organization has a realistic potential to become a significant factor in the region’s affairs and could be a possible hindrance to U.S. strategic objectives in the region.

Legal Pressure and Program Compliance at an In-Patient Recovery Facility
Rachael Liebman
*Mentor:* Roxy Cohen Silver

The California prison system has one of the highest recidivism rates in the United States, with seven out of ten prisoners returning to jail within three years of release. One of the strongest correlations between criminal behavior and parolee recidivism is drug use. Successful rehabilitation of addicts is difficult and requires program compliance. I hypothesized that the stronger the legal pressure, the more likely an individual would comply with drug treatment program regulations. Forty clients in a residential treatment center in Southern California were divided into three groups by offender status: low legal pressure (*e.g.*, voluntary clients), moderate legal pressure (*e.g.*, clients on formal probation), and high legal pressure (*e.g.*, clients on parole). Program compliance was measured through incident reports (IRs), positive drug and alcohol tests (DATs), termination rates (TRs), and total infractions (TIs). A 1-way ANOVA found no significant difference in the number of IRs, positive DATs, or TIs between high, medium or low legal pressure groups, although means were in the predicted direction. Surprisingly, results revealed that high pressure legal clients showed a greater tendency to leave the program early than any other client group. The implications of this study are that legal pressure may act to keep many clients in recovery, but it may also lead individuals under high legal pressure to leave a recovery program early. As such, alternative sentencing programs may act to prevent recidivism and could prove to be a better sentencing option than jail or prison.
Middle School Vietnamese American Math Efficacy: The Association of Educational and Occupational Aspirations with the Academic Competence to Succeed

Stacey Lien
*Mentor*: AnneMarie Conley

Research has found that students’ motivation is a good predictor of how well they will perform in school. Self-efficacy, a type of motivation that refers one’s confidence over his or her ability to perform and exercise influence over events in their lives, is especially important to look at. A student’s confidence in his or her abilities is an important predictor of achievement behaviors such as effort, persistence, cognitive engagement, and future aspirations because the more confidence a student has, the more effort he or she will put into education, and, therefore, perform better at school. Past research on student motivation has focused on minority groups such as Latinos and African Americans, but very little research has been done on Vietnamese Americans. This study particularly looks at Vietnamese Americans because research suggests that, due to their minority group status, they would have low efficacy beliefs and do poor in school. However, recent research has shown that they are excelling at higher rates than expected. Another important construct to look at is aspirations, which are people’s strong desires in their occupational and educational achievements. There is a link between expectancy for success and achievement-related behavior, including that of aspirations. The purpose of this study is to investigate if there is a distinction between the motivations of Vietnamese students and the motivations of their minority counterparts. Self-efficacy beliefs, as well as occupational and educational aspirations were examined to determine if the two are related. In order to do this, a subsample of Vietnamese students was taken from a survey conducted by the Math and Science Partnership—Motivation Assessment Program. Results indicate that there is a relationship between educational aspirations and efficacy beliefs. Occupational aspirations are currently being assessed and results are pending.

Localization of HDAC4 and 5 in Neurons Lacking HDAC3

Theresa Lien
*Mentor*: Marcelo Wood

Histone deacetylases (HDACs) can regulate gene expression by removing acetyl groups on histone tails and increasing their affinity for binding DNA. Through this mechanism, HDACs may turn off expression of genes required for long-term memory processes. Our lab has previously shown that HDAC3 negatively regulates long-term memory formation. However, HDAC3 is part of a corepressor complex with other enzymes, such as HDAC4 and HDAC5. Currently, it is unclear if HDAC4 and 5 are altered when HDAC3 is knocked out or inhibited. We used HDAC3-FLOX genetically modified mice in combination with AAV-Cre recombinase to create small hippocampal deletions of HDAC3. In complement, we also used a selective inhibitor of HDAC3, HDAC3i. We examined HDAC4 and 5 localization by immunohistochemistry and fractionation/Western blotting. Immunohistochemistry of HDAC3flox mice and HDAC3i-treated mice showed a decrease in HDAC4 immunoreactivity in the dorsal hippocampus compared to wildtype and vehicle-treated controls. Analysis of HDAC5 using immunohistochemistry was inconclusive. Next, we used fractionation/Western blotting to determine the localization of these HDACs after an injection of HDAC3i. The HDAC3 inhibitor resulted in a decreased HDAC4 and increased HDAC5 in the nucleus. These findings suggest that loss of HDAC3 disrupts the corepressor complex leading to a reduction of HDAC4 and a compensatory increase in nuclear HDAC5.

Developing a Storytelling Game to Enhance the Social Skills of Children with Autism

Tom Lillehoff
*Mentor*: Gillian Hayes

The aim of this research is to explore game technologies for developing a visual and interactive tool that will help children with autism remain engaged with the learning guidelines we are trying to teach. We are particularly interested in exploring whether there is a single-player alternative for teaching social skills to children with autism. Previously developed board games and group therapy-based modalities required other children and a parent/guardian to guide and supervise play. However, for many parents, especially parents of only children, supervising a multiplayer board game or attending group therapy may not be feasible on a regular basis. To cope with these issues, we will develop a single player interactive computer game that will incorporate strong replay and motivational components so the virtual skills rehearsed can be integrated into the player’s real world social skills armamentarium. With the development of the game and its deployment we will be able to explore three major themes related with social interactions: (1) school interactions with teachers and friends, (2) home life interactions with family members and (3) playground/park interactions with friends and other adults.
Investigating the Relationship Between Electric Field and Degree of Reshaping in Rabbit Cartilage Treated with Electromechanical Reshaping
Amanda Lim  
*Mentor:* Brian Wong

In future head and neck surgeries, the complex carving, incisions, and sutures currently used to reshape cartilage may be replaced by the elegant use of needle electrodes to apply a DC voltage to cartilage held in a new shape by a moulage. This emerging technique is known as electromechanical reshaping (EMR). Applied voltage and the distance between needle electrodes may be varied in EMR, also varying the applied electric field of the technique. While voltage and application time have been shown to be proportional to the degree of reshaping achieved by EMR, the hypothesis that electric field can be similarly used to predict shape change has not been previously verified. For this study, a right angle jig was used to retain rabbit septal cartilage at a right angle while EMR was applied. Finite element modeling with COMSOL was used to identify parameter pairs of voltage and inter-electrode distance, respectively, giving two electric fields, 1.11 kV/m (4.00 V, 6 mm; 5.37 V, 8 mm; 6.73 V, 10 mm; 8.10 V, 12 mm) and 2.21 kV/m (8.00 V, 6 mm; 10.74 V, 8 mm; 13.47 V, 10 mm). EMR was applied for 2 min, and samples were rehydrated 15 min before being photographed. Bend angle, representing the degree of reshaping, was measured from the photos using ImageJ software. In general, isoelectric parameters did achieve statistically similar bend angles, approx. 23° and 30° for 1.11 and 2.21 kV/m, respectively, providing evidence that electric field may be an additional value used to optimize EMR.

**Parameters of a Green Nanosecond Laser to Ablate Centrosomes**  
Jessica Lim  
*Mentor:* Michael Berns

Cancer cells do not cease their replication process due to a lack of regulator, which could be attributed to gene mutation(s). Since centrosomes are the primary microtubule organizing center (MTOC) and the regulator of cell-cycle progression, we investigated the centrosome's role during cell division by monitoring the cell’s viability after its centrosome is removed. The purpose of this project is to determine the appropriate parameters for the green wavelength 532 nm nanosecond laser that would be used to selectively ablate the centrosome(s) without damaging the cell. Previous studies employed the femtosecond laser for ablation of centrosomes. For this project, we used PtK2 cells because they have a few large chromosomes and they remain flat during cell division. As most of the cell’s organelles are transparent under the microscope, the centrosomes of our PtK2 cell line used are stably transfected with GFP (green fluorescent protein) so that we can monitor and check the presence of the centrosomes after we ablate them with the laser. After ablating the cells' centrosomes with varying laser parameters, we stained the cells with primary and secondary antibodies as another marker to ensure that the centrosomes were fully destroyed. We conclude that the suitable green nanosecond laser parameters to successfully ablate the centrosome of PtK2 cells (without damaging the cell) are 40 mW and 50 pulse width, whereby the laser beam is focused by a Zeiss 63×PH3 oil immersion apochromat objective lens (NA 1.4).

**Associations Between Age, Depressive Symptoms, and Task Evasion**  
Stephanie Lin  
*Mentor:* Susan Charles

Depression is a mood disorder characterized by an overall low mood and reduced interest in activities. Depressed individuals exhibit behaviors similar to learned helplessness and believe that their attempts to continue working on stressful tasks are futile. Task evasion refers to behaviors in which an individual avoids or disengages from the task. Across the adult lifespan, individuals learn to cope with negative emotions in various ways. Studies have documented that older adults tend to use avoidant coping more often than younger adults to disengage immediately from stressors. Avoidant coping has been found to reduce negative affect associated with social stressors for older adults. This study examined the association between age, depressive symptoms and task persistence and evasion during a difficult socially evaluative arithmetic task. It was hypothesized that individuals with greater symptoms of depression would engage in more task evasion. Older adults were predicted to engage in more task evasion than younger adults, and greater task evasion would reduce the negative affect associated with the task for older adults only. Results show that neither depressive symptoms nor age predicted task persistence or evasion. However, there were age differences in the effectiveness of task evasion on negative affect associated with the stressor, depending on the participant’s depressive symptoms. These results suggest task evasion may be a beneficial coping mechanism depending on age group and depressive symptoms.

**The Influence of Life Contexts and Events on Reported Health Status among Latinos**  
Dana Lin  
*Mentor:* Michael Montoya

The Latino population is one of the fastest growing minorities within the United States; however, there has not been an overall improvement in reported health quality of the Latino community. The everyday stresses of being a
Understanding the Role of the Lymphocytic Choriomeningitis Virus Stable Signal Peptide in Directing Virus Glycoprotein Expression

Emily Ling
Mentor: Michael Buchmeier

The lymphocytic choriomeningitis virus (LCMV) genome is composed of bi-segmented, single-strand, negative-sense RNA segments. The smaller, S, segment encodes a glycoprotein precursor complex (GPC) as well as a nucleoprotein (NP). The GPC is post-translationally processed into three individual polypeptides: stable signaling peptide (SSP), glycoprotein-1 (GP-1), and glycoprotein-2 (GP-2). Prior studies have shown that the SSP also functions in directing GP cleavage into GP-1 and GP-2, GP-1 and GP-2 transport to the cell surface plasma membrane, and pH-dependent glycoprotein-mediated membrane fusion. To understand how the SSP is trafficked and processed in conjunction with GPC within transfected cells, we inserted an eight amino acid strep tag protein sequence within various SSP regions within the entire GPC coding sequence in order to detect the SSP. Mutants were then transfected into mammalian cells to determine if strep tag SSP constructs could direct wild-type (wt) levels of GP expression. Transfected cell lysates were probed by western blot for presence of the strep tag to determine if the tagged SSP could be detected. Strep tag constructs produced variable GP expression, such as low levels of GP cleavage or lack of glycoprotein-mediated cell membrane fusion. SSP-HA constructs, which were created to detect SSP in trans, were successful in rescuing mutant construct GP expression. Successful rescue of GP expression with SSP-HA may allow for detection of the SSP without disrupting its function. This may allow for subsequent biochemical studies of SSP activity and microscopy studies of SSP localization within transfected cells.

The Relationship of Exercise to Physiological and Psychological Responses to Stress

Sarah Link
Mentor: Sally Dickerson

Social self-preservation theory argues that threats to the social self create the same physiological stress responses in the human body that occur when faced with life-endangering physical threats. It is because it is in a person’s best interest to preserve his/her social status that situations involving social-evaluative threat create a similar fight or flight response as when facing bodily harm; this fight or flight response mobilizes the body to respond quickly to the stressor, whether physical or interpersonal. Because continued exposure to stress is detrimental to body, it is imperative to study the situational variables and personality characteristics that can potentially moderate stress responses when faced with interpersonal and social threats. This experiment is designed to study the role that an individual’s exercise behaviors has on the output of cortisol, an indicator of stress response, when faced with social-evaluative threat. This was explored through use of the Trier Social Stress Task, which requires participants to give an impromptu speech to a panel of judges. Cortisol output was taken before, during, and after the task to measure each participant’s stress response. A variety of other personality and health behavior questionnaires were also administered as a means of studying the relation between cortisol output and individual characteristics. Preliminary data from this study indicate that the Trier Social Stress Task did indeed result in increases in cortisol output over baseline levels amongst participants. Further analysis will focus on examining whether exercise behaviors mediate the magnitude of the observed stress responses.

Design Tradeoffs of Embedded Video Processing Systems

Austin Liou
Mentor: Ian Harris

The purpose of this project was to interface a digital camera with an embedded microcontroller. I wrote a high-level software application in C to do this, but there were two low-level aspects beneath the application: correctly controlling the camera parameters (such as image resolution and contrast), and receiving video data in real-time. In order to accomplish these tasks, I used a field-programmable gate array (FPGA), which allowed me to design a system with the performance benefits of hardware and the reprogrammability of software. To configure the camera’s parameters, I wrote a memory-mapped controller in Verilog that uses the FPC protocol to read and write to the camera’s internal registers. The controller also received raw 12-bit image data and converted it to RGB (red, green, blue) pixel values before sending it to the software application via
interrupts. However, I found that some pixel data was never received properly, because the interrupts were not being acknowledged and processed quickly enough by the software application. Throttling the input clock to the camera in order to slow down the rate of data sent resulted in more pixels received by the software, but not enough to produce a complete image. This demonstrates a performance failure in the system, which may be resolved by redesigning the system to first buffer pixel data as entire images in system memory, before sending the data out to the software application.

Retinoic Acid Responsive ETS Repressors are Necessary for Primary Neurogenesis in Xenopus laevis
Sophia Liu
Mentor: Bruce Blumberg

The purpose of this study was to elucidate the role of the Ets family gene, Erf, as a downstream target of retinoic acid (RA) during primary neurogenesis in Xenopus laevis embryos. RA is a signaling molecule implicated in many developmental processes. We hypothesized that Erf is a transcription factor that links RA signaling to primary neurogenesis. To test this hypothesis, embryos were exposed to RA agonists or antagonists, or microinjected with various antisense morpholino oligodeoxynucleotides (MO) or mRNAs in order to knock down or over-express the corresponding genes, respectively. Injected embryos were then assayed for marker gene expression using whole-mount in situ hybridization and quantitative real time reverse transcriptase-PCR (QPCR). We found that Erf is responsive to changes in RA signaling and that Erf is required for the formation of primary neurons.

Identifying Ideal Brow Vector Position: Empiric Analysis of Three Brow Archetypes
Tiffany Liu
Mentor: Brian Wong

Brow lifts counteract aging effects, correct ptosis and optimize forehead aesthetics. While surgeons have control over brow shape, metrics defining ideal brow shape are subjective. This study aims to determine empirically whether three expert brow design stratagems are aesthetically equivalent using expert focus group analysis and its impact on brow surgery. A comprehensive literature search identified three dominant brow design methods heavily cited, referenced and/or internally recognized in either medical literatures or lay media. Westmore’s method, cited by surgical texts, contends the brow arch should be perpendicular to the lateral limbus. Lamas’ method defines the arch as located on a line drawn from the base of the nose tangent to the iris. Anastasia, popular with local media and celebrity clientele, suggests the arch be positioned on a line starting from the center of the nose through the center of the pupil. Using the guidelines from these three methods, brow shape was modified (Photoshop) for 10 female faces. A total of 30 modified images were created. A focus group of 50 make-up artists ordinally ranked the three images relative to each other for attractiveness. No significant difference was observed in beauty score for the different methods. Therefore no single method consistently rated most or least attractive. The more contemporary methods laterally displayed the brow arch further than Westmore, and are considered the trend in facial aesthetics; but this was not supported empirically. Despite each method claiming to be the best approach, none achieved statistical significance in optimizing attractiveness, though each can be used effectively as a tool in designing eyebrow shape during brow lift procedures. Overall, the three methods can be used interchangeably.

Effect of Nanoparticle Density and Size in Neutralization Activity of Hemolytic Peptide
Andrea Lo
Mentor: Kenneth Shea

Melittin, also known as honeybee venom, is a toxic 26-amino acid peptide composed of hydrophobic and positively charged components. Nanoparticles (NPs) counteract melittin’s toxic activity through binding via complementary hydrophobic and electrostatic interactions. Previous studies have found that N-isopropylacrylamide (NIPAm) based NPs with 40% hydrophobic N-tert butyl acrylamide (TBAm) and 5% negatively charged acrylic acid (AAc) are effective in capturing and neutralizing melittin. In studying NP’s neutralization capabilities, the sizes of NPs are of interest because smaller and higher density NPs possess locally concentrated AAc groups that may bind to melittin more tightly. To explore the effect of size, I have synthesized NPs at varying crosslinker concentrations. I tested neutralization activity through red blood cell (RBC) tests and found that a higher crosslinked NP (5%) enhanced its neutralization activity. I also investigated how solution conditions affect NP size. The diameters of NPs were evaluated by Dynamic Light Scattering under conditions that varied temperature, salt concentration, buffer, and pH. Results showed that the diameter of NPs decreased as the pH of the solution increased. Because of this size change as a function of pH, I examined the NP neutralization activity using the RBC test at various pH. These neutralization studies will allow us to develop optimum NP characteristics for capturing melittin.
Investigation into Different Parameters for TEM Sample Preparation of Titanium Using Twin-Jet Electropolishing

Sapphire Lopez  
**Mentor:** Farghalli Mohamed

In this study, the sample preparation of titanium using twin-jet electropolishing for transmission electron microscopy (TEM) was investigated. Twin-jet electropolishing involves passing a voltage through a sample while aiming two jet streams of an acid solution (one on each side) at the sample to produce a hole with electron transparent edges. Sample preparation is, therefore, very important for TEM because the sample preparation will determine the quality of edge transparency. Different combinations of parameters were used to determine the optimal conditions for preparing the best samples for TEM. The parameters investigated in this work were the flow rate of the acid jet streams, photosensitivity of the detector measuring the light passing through the sample hole, and temperature of the acid solution. Titanium is selected for this study because it is currently being investigated for its importance as a biomedical and dental implant material. It was found that a high photosensitivity, moderate temperature and slow flow rate were required for optimal sample preparation.

Proton Conductivity in Strontium-Doped Monazite

Juan Lucio-Vega  
**Mentor:** Martha Mecartney

With the current drive to encourage and improve alternative energies, renewed efforts have been focused on candidates such as solid-state proton conducting fuel cells (PCFCs). Strontium-doped monazite (La_{1-x}Sr_{x}PO_4) experiences protonic conductivity under water partial pressures making it a possible electrolyte material for PCFCs. Understanding the parameters effecting proton conductivity of monazite are crucial for producing robust electrolyte for PCFCs. In this study the effect of strontium dopant on proton conductivity was examined. The monazite powders were synthesized via solution precipitation where compositions 0, 5, and 10% of the lanthanum sites are substituted with strontium. The powders were then sintered samples and characterized with scanning electron microscopy and energy dispersive spectroscopy. These techniques showed the presence of excess phosphorous in the powders that led to the formation of a secondary liquid phase at sintering temperatures of 1100 ºC. Through processing techniques the phosphorous liquid phase has been removed. Conductivities of 0, 5, and 10% strontium doped monazite were measured by alternating current impedance spectroscopy with and without secondary phase under water partial pressures.

Role of the Perirhinal Cortex and Hippocampus in Odor Recognition Memory

Denise Ly  
**Mentors:** Timothy Allen & Norbert Fortin

This study focused on the involvement of the hippocampus and the perirhinal cortex in recognition memory for items (“what”). In order to study the role of the hippocampus and the perirhinal cortex in recognition memory, rats received either hippocampus or perirhinal cortex excitotoxic lesions followed by behavioral assessment of odor recognition memory and spatial memory. Lesions were confirmed histologically. Results showed that the hippocampus lesion did not affect recognition memory for both social and household odors. However, the hippocampal lesion rats demonstrated a characteristic deficit in spatial memory paradigm. Perirhinal cortex lesions did affect experimental performance on recognition for social odors on retention intervals at and greater than 1 hour. Since social odor stimuli contain highly overlapping mixtures of components, these data support the hypothesis implicating the involvement of the perirhinal cortex in overlapping feature disambiguation.

Effects of UVA and UVB Radiation on nNOS Expression and NO Generation in Primary Melanoma Cells

Michael Mahoney  
**Mentor:** Frank Meyskens

Nitric oxide synthase (nNOS), which is abnormally elevated in human malignant melanoma, produces nitric oxide (NO) in the cell. Nitric oxide, generated by UV radiation in the skin, has been well-documented in its contribution to skin cancer carcinogenesis and progression. NO stress has been found to be associated with increased melanoma proliferation and invasion in our previous studies. This study seeks to determine if UVA and UVB radiation produces a distinct response on nNOS expression and NO generation. We examined the changes of nNOS protein levels after UV radiation at different time points (UVB: 25 mJ/cm²; UVA: 3 J/cm² respectively) in primary melanoma cells. Our results showed a significant induction of nNOS occurred by 4 hrs and peaked at 6 hrs after UBV exposure, which correlates with an increase of intracellular NO levels. The expression pattern of nNOS after UVA treatment was found to differ from UVB treatment in that marked elevations of expression level and NO generation were found at 4hrs and remained evident till 72 hrs. These findings indicate that primary melanoma responds to UVA and UVB in a distinct manner and possibly through different mechanisms. UVB-induced nNOS mediated a more rapid response in NO generation, while UVA-induced nNOS expression, which lasts for at least 72 hrs after exposure, might contribute to a delayed response with pro-
Tissue-Specific Gene Expression in the Salivary Glands of the Dengue Vector Mosquito, Aedes aegypti
Asif Majid
Mentor: Anthony James

Promoters of genes expressed specifically in the salivary glands of the vector mosquito, Aedes aegypti, have been used to drive the expression of effector molecules that interfere with viral replication. I have done hybridizations in situ to identify genes whose transcripts are expressed in the distal-lateral, proximal-lateral, or medial lobes of the adult female salivary glands. Oligonucleotide primers complementary to specific genes were used to amplify probes from mosquito RNA. Amplified fragments were cloned into TOPO-plasmids, E. coli bacteria were transformed with the plasmids, and the plasmids DNA isolated. Digoxigenin (DIG)-labeled antisense RNA probes were then created for 17 genes and used for hybridizations in situ. The hybridizations in situ determined the locations where the genes are expressed in the salivary glands. The results that I have from the hybridizations in situ show the locations of mRNAs for 12 genes. For the remaining five genes, the hybridizations in situ did not provide good results or there were errors in the RNA probe synthesis. It can be concluded that the hybridizations in situ and provided information useful to develop new tools to rid of diseases transmitted by mosquitoes such as dengue, yellow fever and West Nile fever.

Moderate Alcohol Consumption and Cardiovascular Morbidity: Evidence from a Nationally Representative Sample
Irina Maksimets
Mentor: JoAnn Prause

Alcohol has been used in multiple ways throughout human history, and an association between alcohol consumption and cardiovascular diseases could have significant clinical and scientific implications for both consumers and researchers. This study attempted to investigate the relationship between moderate alcohol consumption and cardiovascular morbidity using a nationally representative sample and a longitudinal study design. We hypothesized that: 1) moderate alcohol drinkers would have decreased risk for cardiovascular disease as compared with abstainers and heavy drinkers; and 2) heavy drinkers would increase their risk for cardiovascular disease as compared with abstainers and moderate drinkers. We analyzed the data available from the US National Longitudinal Survey of Youth and only included the responders who had cardiovascular outcomes measured at age 50, and who had drinking data available from age 30 to 50. Descriptive statistics (means, standard deviations, and percent-ages) were used to describe the demographic characteristics, alcohol consumption, and the cardiovascular health of the study sample. Variables believed to be associated with both alcohol consumption and cardiovascular morbidity were statistically controlled using a multiple logistic regression. The results showed no association between alcohol drinking patterns from age 30 to 50, and the presence of cardiovascular symptoms at age 50. This study did find, however, that the individuals who were consistently light or moderate drinkers reported the least amount of cardiovascular symptoms at age 50 as compared to abstainers, heavy drinkers, and participants with mixed drinking patterns. Limitations included the self-reported nature of alcohol drinking and exclusion of responders who might have died from a coronary event.

Characterization of Microbial Community in Deep Subsurface Sediments by Pyrosequencing of 16s rRNA Genes and Methanogenic Genes
Neal Maler
Mentor: Sunny Jiang

Los Angeles Sanitation District is piloting the first deep subsurface biosolid injection project as a means of disposal sewage sludge, sequestrating carbon dioxide and producing methane as biofuel for the future. It is hypothesized that the high temperature and high pressure condition found 5000 ft below the earth surface at Terminal Island, San Pedro, Los Angeles will inactivate microbial pathogens in the sewage sludge, while stimulating the growth of methanogens in the sludge to convert organic waste to methane. Our research is to characterize the microbial community in the sewage sludge before its injection into the deep subsurface and identify the changes of microbial community after mixing with indigenous microbes and storage in the subsurface. The deep subsurface samples were retrieved by Terralog Inc. from deep monitoring wells. The microbial total DNA were extracted and submitted for Pyrosequencing using 454 Titanium sequencing analyzer. Methanogenic bacteria were quantified using mcrA gene by Q-PCR analysis. The results of the study showed that there are diverse microbial populations in the sludge. The diversity is reduced after periods of storage in deep subsurface environment. Unique microorganisms are discovered in the soil core sample retrieved from the 5000 ft below the earth surface. This presentation will detail the microbial phylogenetic diversity and compare the changes before and after the injection into the deep subsurface environment.
Race and Policing in Brazil
Hui-Ling Malone
Mentor: Stan Bailey

Brazil holds the largest population of African Descendants outside the continent of Africa. Afro-descendants make up about half of Brazil’s population of 200 million, but are concentrated in the lower rungs of the socio-economic hierarchy. Nonetheless, most Brazilians have long embraced a myth of racial democracy that frames that context as not having a race problem but indicting class dynamics as being behind racial inequality. In the last decades, however, Brazilian black movements have fought to demystify the tenets of racial democracy and draw attention to the plight of Afro-Brazilians. In this study, I explore one area of possible racial disadvantage: the treatment of Afro-Brazilians at the hands of the police. Towards that end, I interviewed members of black organizations in the region of Salvador, Bahia, some highly committed actors and others only loosely affiliated. I found that all made a distinct connection between one’s racial status and mistreatment at the hands of the police. Specifically, although class discrimination is a well-engrained dynamic in Brazil, these movement actors recount that blacks are more likely to suffer from harassment and violence from police officers than poor whites. Many research subjects had experienced that maltreatment themselves or had family or friends suffer from it; others learned of it from news sources. Overall, the interviews reveal that the myth of racial democracy is far from reality when it comes to police interaction with Afro-descendants in Salvador.

Immigration in the Media: A Cross-Language Analysis of Arizona Senate Bill 1070
Jacklyn Mancilla
Mentor: Susan Coutin

Previous scholarly work, like that of Chavez 1999, Larson 2006, and Rodriguez 1997, and Campbell 1995, reveals that historically there is a lack of representations of racial minorities, especially undocumented immigrants in the news. My research project focused on understanding the coverage given to the issue of immigration through the implementation of the Arizona SB 1070 Law passed April 23, 2010, by cross- analyzing articles from both the Los Angeles Times and La Opinion. Through what they write in their articles, journalists can shape how their readers perceive the issue of immigration and the implementation of SB 1070. My study focuses on what messages journalists convey to their readers and what techniques they use to do so. Through a cross-language analysis of the law, my study found that there were many similarities between what each newspaper covers of immigration, and differences as well. Two key similar themes emerged from both newspapers: racial profiling and state v. federal regulation of immigra-

Analysis of Survey to Determine Adherence to Family-Based Intervention among Latino Families at Risk For Type 2 Diabetes
Adeline Manohar
Mentor: Zuzana Bic

As reported by the American Diabetes Association (ADA), Latinos comprise about 10.4% of the diagnosed cases for type 2 diabetes, and 91% of diabetes is preventable with lifestyle modifications. Many Latinos lack educational resources needed for preventing diabetes. If the right resources are provided at the right time, it would increase and sustain the knowledge for adherence to a healthier lifestyle. The ADA conducted a family-based intervention among six Latino families at risk for type 2 diabetes in the Santa Ana area. The main goal of this study is to determine the efficacy of that family-based intervention and analyze if it helped improve the lifestyle and health of the Latino families. An additional goal is to investigate if weekly diabetes prevention education with practical applications of healthy eating, cooking and exercise for three months could influence the efficacy or adherence to healthy lifestyle. Surveys were administered to assess their education, cooking habits, eating style, and exercise habits. The same questions were asked to each member of the family. The pre- and post- survey results were statistically analyzed for many variables. The evaluation of results of the descriptive study is still in progress. However, our hypothesis is that the participants will increase their knowledge and show a trend of improved healthy eating, increased physical activity, and decreased stress. If the results of the survey support the hypothesis, then this approach could be applied more often to Latino population to decrease risk of diabetes and improve overall health.

Nicaragua’s 2011 Presidential Election
Maritza Mantilla
Mentor: Caesar Sereseres

The Frente Sandinista para la Liberacion National (FSLN) Party was a highly centralized regime directed by a small group, the National Directorate. From the beginning, Sandinista leaders embraced Marxism-Leninism and identified themselves with the Bolshevik takeover in Russia, the Soviet System, and Castro’s revolution and regime in Cuba. The regime fell from power in 1990 thanks to a civil revo-
Golf Putting in a Haptic Environment
Martin Mao
Mentor: David Reinkensmeyer

During motor learning, humans adapt and learn to deal with their surroundings based on touch, perception, and other senses. Given an obstacle, humans change the amount of effort they exert when presented with additional force fields that change the difficulty of the task. This project investigated this phenomenon within the context of a golf-putting task; subjects were required to putt golf balls using a club attached to a haptic robot mounted on a robotically deformable putting green. The goal of the project was to try to develop and test robotic training techniques in order to understand and improve upon the natural motor learning process. The haptic robot used for the project was a Phantom Haptic Device, which provided controlled force fields used to stimulate haptic environment. This robot was programmed to facilitate a motor training strategy known as error amplification. Error amplifications increase the putting error of swings by applying resistive forces to wings that are too slow and assistive forces to putts that too fast. The putting green is also rigged to expand on the error of putts by rising and creating inclines for excessively short putts or falling and making decline for excessively long putts. In conclusion, the goal of this project was to use error amplification to both gain a better understanding of motor learning within the context of functional tasks such as golf-putting and to develop new and promising strategies for movement training.

Concretizing the Metaphor of Musical Gesture
Philip Marazita
Mentor: Christopher Dobrian

A gesture is a motion that conveys meaning. Musicians often talk about gesture in musical sound, referring to the sense of motion implied by the musical structure itself. We researched whether a computer could detect such a sense of motion in music. We wrote software that analyzes a melody to characterize its gestural qualities. The goal was to determine whether the analyzed traits evoke the same sense of motion when used to produce new melodic phrases. While the computer has certain shortcomings in terms of its musicality compared to a human, it is able to produce new phrases that have a related gestural character, using stored analyses of played melodies. By noting features that imply motion, the program can improvise appropriate new melodies in response to a live player.

From Another Perspective. An Anthropological Inquiry of the Space Race
Valentina Marcheselli
Mentor: Sheila O’Rourke

Science and technology have always been integral to humanity; through new tools and discoveries, men and women change and improve their lives. However, it is important to acknowledge that science and technology are embedded in the relations of power of society, economics and politics. In the mid-20th century, amid dangerously global geopolitical conditions, politics and technology merged in a new enterprise that brought humankind to the very limit of their innovative capacities. The space race, culminating in the moon landing crossed a border considered insurmountable. A different kind of individual emerged to struggle for perfection by travelling towards the heavens. The rest of humanity stood with their eyes turned up to the sky, hoping that this enterprise would bring peace to a planet whose inhabitants had developed the power to destroy it. But peace, ideas of perfection and technoscientific conditions are social constructs determined through a complex process which must be analyzed within the context of their specific cultural and historical backgrounds. A number of sources are available for this analysis, from visual documents, since the space race was the first global project to be completely covered by media and, indeed, performed specifically for it, to the era's science-fiction, which is a codified way to represent society's fears, to architecture and interior design, which articulated constructed divisions between the public and private spheres in ways that impacted and redefined them. From the moment an individual fled the Earth’s atmosphere neither humans nor the planet have been the same.


**Appropriation and Integration: Painting and Photography of Great Britain and India after the 1857 Rebellion**

Sarah Marsh  
*Mentor*: Vinayak Chaturvedi

The Rebellion of 1857 was a pivotal moment in the histories of Great Britain and India, changing not only the political and economic courses of both countries, but drastically affecting the cultural and artistic practices of each nation. Both nations documented the change in the political and cultural landscape through the production of art, specifically painting and photography. This project compares the purposes and executions of British and Indian painting and photography, and how these two media were used to redefine national identities and satisfy the needs of the public. British paintings and photographs situated the British in a position of power over a “declining” Indian people. These images served to bolster the nationalist sentiment of the British, and reassure people in England of the strength of the British Empire. On the other hand, Indian image-makers played with different iconographic styles to redefine their national identity, at first in the academic European style, and later in a style specifically developed to reclaim their nationhood. Through close visual analysis of four paintings and four photographs, this project reveals the powerful influence of art on the creation of national identity.

**Mitochondrial and Nuclear DNA Analysis for Mutations and Modifiers in a Latino Family with Dilated Cardiomyopathy**

Sonia Martinez  
*Mentor*: Michael Zaragoza

More than 5 million Americans suffer from heart failure, with a significant portion diagnosed with Dilated Cardiomyopathy (DCM), a disease that causes weakening and enlargement of the heart. In recent literature, 30-35% of DCM cases have shown to have a familial basis. In this study, we are investigating whether DNA variation, mutations and modifiers, cause and/or influence the differential expression of DCM in a Latino family with both the father (age 21) and his son (age 2) affected. We extracted the patients’ DNA, PCR-amplified and sequenced TNNT2, a nuclear DCM-associated gene and the complete mitochondrial DNA (mtDNA) to detect mutations and to determine their respective mtDNA haplogroups. Using DNA analysis software Sequencher, we found no obvious mutations; however, the father has a homoplasmic *MT-ND1* variant (13708 G>A) previously associated with an increased risk for the mitochondrial disorder LHON, Multiple Sclerosis, and cancer. As expected, we also found the father and son had different mtDNA haplogroups, L3 and C1b, respectively. Since Latino-specific haplogroups are A, B, C, or D, we were surprised by the detection of the L3, an Africa-specific haplogroup. Thus, our results underscore the importance of further investigating both nuclear and mitochondrial DNA variation not only as potential disease-causing mutations but also as population-specific modifiers of disease phenotype including heart failure and cardiomyopathies.

**Tagging RNA with RNA-Bound Lanthanides**

Sarah Massatt  
*Mentor*: Andrej Luptak

RNA molecules have been shown to be involved in several neurological diseases, but as yet no effective method has been developed to track their intracellular movements in vivo. In this project it is theorized that, due to the specialized luminescent properties of certain lanthanides, RNA aptamers could be found that bind with DTPA-chelated lanthanides such that a spectrum with one or more unique excitation peaks is formed. This complex could then be attached to the RNA molecule of interest in vivo and the luminescence of the lanthanide used to track its progress through the cell. To investigate this possibility, RNA aptamers were selected for strength of binding to a DTPA-europium complex, cloned to separate the individual aptamers, and the individual clones tested for unique luminescence spectra. It was found that while free nucleotides closely interact with the DTPA-Eu complex and produce the peaks characteristic to the lanthanides, they obscure the spectra produced by the RNA, making purification of the RNA necessary. It has been determined that concentrations greater than 1 μM of pure RNA are necessary to observe the interaction with DTPA-Eu. The investigation is ongoing, but further research is expected to reveal aptamers that combine with DTPA-Eu to produce unique spectra with the potential to be used as molecular tags.

**Getting Public Student Art on Campus: A Guide to Getting Past the White Cube**

Kelly Mayfield  
*Mentor*: Catherine Lord

It began in the summer of 2010, crashing a graduate luncheon to garner faculty support for a project that would begin to open UC Irvine itself to artistic transformation: a student-designed public art project. This research opportunity has opened up the intricacies of UC Irvine bureaucracy, revealed the architectural controls of our surroundings, and has ultimately led to a guide for students interested in making this campus a space for artistic contestation and resistance. This project began as an attempt to create a public art sculpture, yet through its path to ultimate approval (albeit too late for the project to be realized), this guide was born to give students step-by-step directions on the avenues through which public projects...
Dengue Surveillance, Los Angeles County 2009–2010
Heather Maynard
*Mentor: Anthony James*

Dengue is the most common vector-borne viral disease in the world, causing an estimated 50–100 million infections and 24,000 deaths each year. It has been a notifiable condition in California and Los Angeles County (LAC) for several decades. Between 2000 and 2008, zero to ten cases were confirmed annually, with a mean of 3.9 and median of three cases. Confirmation of dengue requires a clinically compatible case be laboratory confirmed with serological testing of acute and convalescent specimens. Because there is little clinical need to obtain convalescent serology, reported cases of dengue are rarely confirmed in LAC, and current surveillance represents a considerable undercount of cases. In order to provide a more comprehensive picture of dengue in LAC, this report summarizes both probable and confirmed dengue cases from 2009 and 2010.

Anandamide Transporter ARN272 Elevates Anandamide Levels in Vivo
Tamara McBride
*Mentor: Daniele Piomelli*

Endocannabinoids are lipid-based neurotransmitters that modulate synaptic plasticity, metabolism, and other important neuronal processes. Anandamide (AEA) is a major endogenous activator of membrane-bound cannabinoid receptors and is proposed to be hydrolyzed by fatty acid amide hydrolase (FAAH) after transport from the extracellular space. In this study, we determine the effects of AEA transporter inhibitor ARN272 on the levels of anandamide in vivo. After intraperitoneal administration of ARN272 (1mg/kg, 10 mg/kg) in mice, high-performance liquid chromatography (HPLC/MS) analyses demonstrated a significant increase of AEA in plasma, along with other tissues including liver, thalamus, and cerebellum. These results suggest that ARN272 increases anandamide content, potentially through blocking the transport machinery.

The Traditional and Contemporary in Oceania Art of the Pacific Islands
Daniel McMullin
*Mentor: Yong Soon Min*

Oceania Art is the indigenous art practice of the Pacific Islanders, from Hawaii to Papua. Contemporary practitioners use a variety of platforms of expression, but tend to share common positionalities of colonialism and diaspora, and are engaged in struggles for indigenous sovereignty. Using the Samoan Islander narrative of “suifefiloi” as expressed by writer Sia Figiel, which translates as the interweaving of garlands and the interweaving of narratives, this study began with video interviews in the South Pacific in summer 2010. The interviewees are Pacific artists living in the islands and in diaspora internationally, who are Aboriginal, Papua, Maori, and South Pacific Islander. The initial platform, in a “suifefiloi” influenced edit, is a simple documentary short that will eventually become part of a Web project about indigenous communities and art.

Neo-Colonialism in Ghana: Akwasi Agyeman & Worldstock
Olivia Medina
*Mentor: Laura Mitchell*

Using Edward Said’s theory of Orientalism, the relationship between Ghanaian artisan Akwasi Agyeman and American corporation Worldstock is analyzed as a neo-colonial discourse. Akwasi Agyeman, an Ashanti artisan, crafts many different kinds of art, but it is his work on Ashanti stools that engages this discourse the most. Ashanti stools struggle for legitimacy and a sense of “tradition” in the Worldstock market that deems them “tribal” and “primitive.” This new setting for the stool redefines Ashanti art for American consumers in hopes that it is more accessible to a group that may not be familiar with Ghana. However, the frame that Worldstock places around these objects makes generalizations about Ghana as representative of all of Africa and does not actually educate its consumers. Not only are the stools framed in this manner, but the artisan himself is also framed in this neo-colonial discourse. Understanding Akwasi Agyeman and the frame Worldstock places on him requires an understanding of his heritage as an Ashanti and his generation as one of the first to be born in the post-colonial era. There is also the question of “validity” which applies to Worldstock, Ashanti art and to Akwasi Agyeman. Looking at the future of this neo-colonial relationship between Ghanaians and Worldstock, one must look to the next generation of Ghanaians who have created a new approach to this issue that transcends the post-colonial framework.

Age Differences in Concurrent Self-Administration of Alcohol and Nicotine
Maria Menchaca
*Mentor: Frances Leslie*

Adolescence is a period of risk taking behavior, usually accompanied by the initiation of drug use. Alcohol and tobacco are the most commonly abused drugs during adolescence. Though few animal studies have focused on self-administration of these two drugs, clinical studies report that smokers consume more alcohol than non-smokers. Previous studies in our laboratory suggest nicotine (Nic) pretreatment enhances ethanol (EtOH) self-administration...
in adolescent rats. In the current experiment we study the effect of combined nicotine and alcohol self-administration. We hypothesized that alcohol and nicotine co-administration would be more reinforcing than either drug alone, and that adolescents would be more susceptible to the rewarding effects of the drug. Adolescent (postnatal day 28) and adult rats were surgically prepared with a catheter in the jugular vein. After a three-day recovery, animals were allowed to intravenously self-administer EtOH, Nic, or the combination of both for 2 hrs daily at escalating doses over 10 consecutive days (1 mg EtOH, 7.5 µg Nic/kg/inf. days 1-3; 10 mg EtOH, 15 µg Nic/kg/inf. days 4-6; 100 mg EtOH, 30 µg Nic/kg/inf. days 7-10). Contrary to other studies, animals did not receive any pretreatment or training prior to the experiment. This was done to mimic the progression of smoking and alcohol use typically observed in humans. Our results show that adolescent rats that co-administer nicotine with EtOH have a higher alcohol intake than rats on EtOH alone. This effect was not seen with adult rats and suggests adolescents are vulnerable to nicotine enhancement of alcohol consumption.

**Structure-Function Relationship of Mycocerosic Acid Synthase in Mycobacterium tuberculosis**

Nathan Mih  
*Mentor: Sheryl Tsai*

Tuberculosis is a deadly disease, infecting about one-third of the entire world. The highly contagious bacterium, *Mycobacterium tuberculosis* (Mtb) is responsible for this disease. The main reason Mtb is such a difficult pathogen to fight lies in the construction of its waxy cell envelope, which allows Mtb to be resistant to many antibiotics and numerous other treatments, and also able to remain dormant in humans for years until the immune system is compromised. Polyketide synthases (PKS) and fatty acid synthases (FAS) are responsible for biosynthesizing many of the cell wall components and it has been found that almost 10% of Mtb’s genome encodes for these proteins. My research focuses on crystallizing the structure of mycocerosic acid synthase (MAS), a type I iterative PKS that synthesizes mycocerosic acid, which is a major component of the cell wall. Discovering the structure of this protein will allow us to better develop drugs to fight TB. We have tested numerous crystallization methods and are in the process of refining results. Using x-ray diffraction on a refined crystal will then allow us to elucidate the structure of MAS.

**Bringing the Men Back in: Do Men Over-Pursue Mathematics and Science Intensive Careers?**

Matthew Miller  
*Mentor: Andrew Penner*

Existing literature indicates that there is an imbalance between the number of men and women who pursue mathematics and science careers, with males accounting for the majority of this representation. The common conception is that women are underrepresented due to an irrational lack of mathematical persistence; the solution being to bring women’s behaviors into congruency with men’s by encouraging women to pursue these careers. A newer approach suggests that males’ overrepresentation in mathematics fields is actually a form of bolstering their masculinity and men are the ones acting irrationally, shifting the focus away from women. Willer’s research suggests that women are not the only irrational actors and that men may be irrationally pursuing mathematical fields due to its masculine identification. The hypothesis of this study was that men will over-pursue mathematics fields to protect their masculine identity. Based on experimental data with nearly 50 participants I show that it is both men and women who engage in irrational behavior. When presented an academic test composed of math and verbal questions; men will choose to answer more verbal questions when told they are feminine even though they score better on math problems; and women will choose more math questions when told they are masculine even though they score worse on math problems. The results suggest that gender atypicality creates cognitive dissonance within the participants, in which they adopt the typical gendered role of either masculine or feminine despite actually ability on math or verbal problems.

**The Role of CXCR4 in Resident Neural Stem Cell-induced Remyelination**

Juan Miranda  
*Mentor: Thomas Lane*

Multiple Sclerosis (MS) is a debilitating autoimmune disease characterized by demyelination and inflammation in the human central nervous system (CNS). The attack on cells of the oligodendrocyte lineage, e.g. oligodendrocyte precursor cells (OPCs) and oligodendrocytes, eventually leads to loss of motor skills that range from mild to debilitating. A common pathologic feature associated with the majority of MS patients is the failure to remyelinate demyelinated axons. OPCs are important contributors to remyelination in models of demyelination and these cells are detected with the CNS of MS patients, yet there is only limited remyelination suggesting these cells are functionally inert. We have used a well-accepted model of MS to address how inflammation-driven demyelination influences OPC function. We report the kinetics of OPC prolifera-
Evaluation of $^{18}$F-FBM in Triple Transgenic Mice
Shreena Mistry
Mentor: Jogeshwar Mukherjee

Imaging agents such as $^{11}$C-PIB, $^{18}$F-FDDNP and others that target -amyloid senile plaques and neurofibrillary tangles (NFT) are used to image Alzheimer’s disease (AD). There is a need for imaging agents that: 1) provide higher target to nontarget ratios; 2) bind selectively to NFT, and 3) are labeled with fluorine-18. We have developed $^4$-[2-$^{18}$F-fluoroethyl](methyl)amino]-4-phenyl-3-buten-2-malonitrile or $^{18}$F-FBM for potential imaging of NFT. We report imaging studies of $^{18}$F-FBM in triple transgenic mice (3xTg) known to express NFT. Direct radiolabeling of the tosylate precursor using $^{18}$F-fluoride provided $^{18}$F-FBM, which was purified on reverse-phase HPLC. Whole brain 3xTg horizontal and sagittal sections (10μm thick) and wild type (WT) mice brain-region slices were incubated with $^{18}$F-FBM (1-3 Ci/cc) in 40% ethanol-water at 22°C for 75 min. Slices were washed with cold water, 70%, 90%, 70% ethanol and cold water for 2,1,1,1 min, respectively. For nonspecific binding, brain slices were treated with 10 M FDDNP and 10μM thioflavin T. Autoradiograms were quantitated using Optiquant Image analysis program. Adjacent mouse brain sections were immunostained and thioflavin stained to confirm presence of plaques and NFT. $^{18}$F-FBM was also studied in vivo in the 3xTg mice using INVEON MicroPET. WT mice brain showed some nonspecific binding in white matter brain regions (corpus callosum). Extensive binding in the cortical (CO) regions, including hippocampus (HP) was seen in 3xTg brains and lower in the cerebellum (CB) with ratios of CO/CB=1.6 and HP/CB=1.5. MicroPET imaging in the WT mice showed little retention of binding in many brain regions, including white matter regions. Slices radiolabeled with $^{18}$F-FBM matched immunostained regions. Time activity curve of $^{18}$F-FBM in WT mouse showed little retention in the brain. MicroPET imaging of 3xTg mice with $^{18}$F-FBM showed low uptake with ip administration. The studies indicate that $^{18}$F-FBM binds to brain regions that contain NFT in the 3xTg mice. Further in vitro and in vivo evaluation (using iv) of $^{18}$F-FBM on its selectivity to NFT in 3xTg mice are underway.

Donor Variability of Endothelial Progenitor Cells in Prevascularized Fibrin Tissue
Katie Mo
Mentor: Steven George

Tissue engineering holds the potential to alleviate the donor organ shortage and reduce host immune problems. However, tissues thicker than 2 mm cannot sustain themselves solely through nutrient and oxygen diffusion as internal cells become hypoxic and start to undergo apoptosis or programmed cell death. One strategy to overcome this limitation is creating a three-dimensional vessel network by coculturing endothelial progenitor cells (EPCs) and normal human lung fibroblasts (NHLFs) in a fibrin matrix 

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The SUV3, PNPase, and mtPAP Complex Regulates the Poly(A) Tail Lengths of Mitochondrial mRNA Transcripts in an Energy Dependent Manner
Aram Modrek
Mentor: Wen-Hwa Lee

ATP production via oxidative phosphorylation is highly regulated to match the level of cellular energy expenditure. It has been demonstrated that the rate of oxidative phosphorylation is fine-tuned by the mitochondrial matrix ADP and inorganic phosphate levels, as they are indicative of the cellular energy state. We here report that SUV3, mtPAP, and PNPase form a complex in vivo to regulate the poly(A) tail lengths of mitochondrial RNA (mtRNA) transcripts in an energy dependent manner. Results from whole cell size-exclusion fractionation followed by co-immunoprecipitation suggest the majority of SUV3 and PNPase exist in the respective dimeric and trimeric forms, and only a small fraction of those interacts with each other to form a stable complex. mtPAP, on the other hand, is always associated with a large molecular weight complex and prefers to interact with the SUV3/PNPase complex to form a stable complex. mtPAP, on the other hand, is always associated with a large molecular weight complex and prefers to interact with the SUV3/PNPase complex upon azide and 2-D-deoxyglucose treatment. Short deletions (5 a.a.) in the N- and C-terminal portions of SUV3 disrupt its interactions with mtPAP and PNPase, respectively, and render the mitochondria unable to process the mtRNA poly(A) tails. The collective results suggest the following hypothesis: when the matrix inorganic phosphate
level increases, usually as a result of increased cellular workload, the SUV3/PNPase complex functions to degrade the poly(A) tails of mtRNA transcripts to maintain the adenosine pool for ATP synthesis. As the ATP level rises and matrix inorganic phosphate level wanes, the SUV3/PNPase complex interacts with mtPAP to incorporate the excess ATP in the poly-(A) tails of mtRNA. This study elucidates a novel mechanism for the mitochondria to maintain the adenosine pool inside the matrix for efficient energy production, and establishes a potential link between ATP synthesis and mitochondrial RNA degradation and processing.

Development of a Decision Instrument for Chest Radiography in Blunt Trauma
Roxanne Mogtaderi
Mentors: Bharath Chakravarthy, Mark Langdorf & Shahram Lotfipour

Approximately 22 million chest radiographs (CXR) are ordered in emergency departments each year in the U.S, with an estimated $3 billion annual cost. Less than 13% of patients have pathologic findings in these CXR. The purpose of this project is to create a clinically-based decision rule for patients with blunt trauma to identify those with little to no risk of significant intrathoracic injury (SITI) requiring urgent care. I used a prospective convenience sample of trauma activation patients ≥ 15 years old from a Level I trauma center ED (all received CXR) and basic life support ambulance patients with acute blunt trauma who received CXR from 2009-10. Candidate variables were patient age > 60, presence of rapid deceleration mechanism, chest pain, distracting painful injury, clinical intoxication, altered mental status (AMS), and chest wall tenderness as judged by the treating emergency physician without further definition, before either viewing the CXR or report. CXR reports were then scrutinized for presence of pneumothorax, pleural effusion (presumed hemothorax), suspicion of aortic injury, two or more rib fractures, sternal fracture, pulmonary contusion, or ruptured diaphragm. Data on 1,000 patients have been collected. The first 300 were analyzed, 20 of which were excluded, leaving 280 patients. Preliminary analysis of this derivation set indicates that patients with none of the seven criteria suggesting SITI would still need CXR to avoid up to 9% risk of missing an injury. A larger sample and validation phase is in progress and clearly required before rejection of this rule.

Salvadoran Students: Obstacles Faced in the Pursuit of Higher Education
Andrea Moreno
Mentor: Leo Chavez

In today’s high-tech society, with such high demand for educated workers, obtaining undergraduate and advanced degrees is crucial. However, the percentage of Latinos extending their education past high school has been very low. According to one source, “only 6 percent of Latinos who enter kindergarten in this country eventually earn a bachelor’s degree…”. While the research on Latinos and higher education is extensive, there is relatively little research on the educational experiences of Salvadorans in the United States. This project examines Salvadoran students of the 1.5 (migrated as children) and second generation (U.S.-born) who are attending a college or university and those who are not in order to discover what obstacles are preventing many Salvadoran students from pursuing these higher levels of education. Ethnographic interviews were conducted with ten Salvadoran male and female students of the 1.5 or second generation, between the ages of 18 and 35, who are currently going to a college or university and ten who decided not to continue their education past high school. Overall, it was found that those Salvadorans not in a college or university lacked personal initiative and were not properly instructed by their high schools about higher education. This shows the educational system’s failure to provide its students with the necessary resources and guidance needed to obtain a higher education. We therefore need to improve the information about attending colleges and universities provided to all high school students, not just the privileged few.

Increased Detection Using a Computerized Alcohol Screening and Brief Intervention Program versus Medical Screening Examination in the Emergency Department
Felipe Moreno
Mentors: Bharath Chakravarthy, Shahram Lotfipour & Samer Roumani

There are approximately 860 million alcohol related emergency department visits. Alcohol screening and brief negotiated interventions have been shown to decrease alcohol use and associated morbidity and mortality. Current methods of alcohol screening include a brief negotiated person-to-person Medical Screening Examination (MSE), or Computerized Alcohol Screening and Intervention (CASI). This study compares these two modalities for the number of patients that consume alcohol, and also those that are at-risk for alcohol related disease consistent with the World Health Organization definitions by consumption of more than seven drinks per week for females, more than 14 drinks per week for males, or an AUDIT score greater than or equal to 8. CASI showed increased detection of alcohol consumption and at risk drinking over MSE across all ages, gender, and language.
Dichotic listening is a behavioral technique where a subject listens simultaneously to two different stimuli, one in each ear, via headphones. This procedure can be used to test the auditory system for selective attention. The purpose is to examine the plausibility of a generalized tonal language skill as compared to a language specific tonal language skill. The main analysis of this study focuses on the laterality index for each condition, where 0 equals complete left ear advantage (LEA), 0.5 equals no ear advantage, and 1 equals complete right ear advantage (REA). This is achieved for each participant by first removing the dichotic pairs with the same tone in both ears from the data, then by taking the number of times a participant responded to the right ear stimuli and dividing it by the total number of stimuli for which they answered a correct response for either ear. Using a one-way ANOVA, the study found that Mandarin speakers do not show a significantly higher REA than English speakers and therefore there no evidence to support a generalized tonal language skill.

**Molecular Dynamics Simulation of Water and 1-Ethyl-3-Methylimidazolium Composite Particles**

John Morrison

*Mentor: Douglas Tobias*

Imidazolium-based ionic liquids (ILs) are currently of great interest to the environmental and scientific community due to their potential for use as green solvents. However, their fundamental properties, such as their interactions with water, have not yet been fully investigated. The goal of this work is to investigate the structure of IL/water mixtures on the molecular scale by means of molecular dynamics (MD) simulations, which consist of generating atomic trajectories by numerically solving the classical equations of motion on a computer. To this end, we modeled 1-ethyl-3-methylimidazolium (EMIM) ions using force field parameters developed by Stassen et al. To initiate the simulations, we constructed lattices containing equal numbers of water molecules, EMIM cations, and either BF₄ or Cl⁻ anions, and then used MD simulations at elevated pressure to produce liquid-state configurations. The systems were subsequently simulated at equilibrium at a constant pressure of 1 atm and a constant temperature of 100 °C for approximately 40 ns each. Analysis of the trajectories reveals that the identity of the anion has a strong effect on the behavior of water in the systems. With the BF₄ system, the water interacted more with itself, forming water clusters and longer chains of hydrogen bonds, while with the Cl⁻ system, the water had a strong interaction with the Cl⁻ ions.
Brain-Derived Neurotrophic Factor (BDNF) Val66Met Polymorphism is Associated with Skilled Motor Learning
Sarah Mortero
Mentor: Steven Cramer
This project investigated motor learning effects of a naturally occurring single nucleotide polymorphism, the brain derived neurotrophic factor (BDNF) val66met polymorphism. BDNF has previously been associated with synaptic plasticity, which is thought to underlie some forms of learning and memory. The BDNF val66met polymorphism reduces activity dependent BDNF secretion and in effect can alter these learning processes. Motor learning effects of the BDNF val66met polymorphism in healthy humans were determined by comparing Rotor Pursuit (RP) and Marble Navigation skilled motor task performances. A methionine (met) nucleotide substitution in one or both of the BDNF gene(s) results in the val/met or met/met genotype, respectively. Val/met and met/met individuals, met carriers, were expected to perform worse than val/met individuals. RP performances across five training trials (RP slopes), but not Marble Navigation performances, were significantly lower for met carriers. RP results suggest that the BDNF val66met polymorphism is associated with reduced motor skill acquisition and that these effects may be more prominent in carriers of two met alleles, though further research is needed. Exploring BDNF effects on motor learning in healthy individuals offers a genetic approach to helping motor impaired individuals recover from neuronal injury such as stroke. The clinical implications of these results suggest therapeutic treatment may vary between individuals of different BDNF genotypes. Future studies should investigate pharmaceutical therapies to supplement physical therapies as an option to counter the reduced of activity-dependent BDNF secretion found in met allele carriers.

Autism: A National Comparison in the United States
Novine Movahedi
Mentors: Kristin Peterson, Mohammad Safarzadeh & Paul Shirey
Autism is one of the most severe development disorders, which involves impairments in social communication and interaction. For the past decade, the autism rates have risen at an alarming rate among children in the United States and have reached a high of 1 out of 110 children on average. Although a definite cause and course for treatment have not yet been discovered, studies have shown such factors such as ethnicity, income, and even parental age to have a correlation with autism. My research aims to explain a broader wide variation of autism rates across the United States by comparing different state characteristics; for example, GDP, income, percentage of health coverage, and location. I collected the state reported autism levels from the Center of Disease and Control and ran a cross-sectional regression model (ordinarily least squares) for the years 2000 and 2008. My results yielded that percentage of people with health coverage was significant in both years, yet the location of the state became significant only in 2008. The exterior states of the United States have a higher rate of autism than the interior states, most likely due to differences in certain socioeconomic and environmental factors. Further research with specific cases will be implemented to explain this difference.

Implementing Electric Bicycles on UCI Campus
Mithil Munshi
Mentor: Wenlong Jin
Electric bicycles are rare in the United States; only a small percentage of riders use the practicality of a motor assisted bicycle. E-bikes are standard bicycles that use an electric motor either to propel the bicycle or assist the rider in pedaling. However, in other countries, there is a giant market for these E-bikes. Due to UCI’s hilly, decentralized campus and warm climate, E-bikes offer a less stressful and greener way to travel. In order to study the feasibility of E-bikes on UCI campus, my research project involved analyzing UCI terrain using Google GPS software, studying the mechanics and practicality of E-bikes, and estimating emissions saved due to increased bike use and decreased commuting. For the first part of my research, I used the Google Latitude software for Android to get GPS terrain data. This data helped find elevation changes and distance on routes around campus. The second phase of the research involved studying the reliability, safety, and practicality of using E-bikes as opposed to manual bikes. The third phase of the research involved analyzing greenhouse gas emissions of commuters and calculating the emission reduction to account for more bicyclists. This project showed that even though electric bicycles are more efficient for transportation and greener than cars, the relatively high cost of an E-bike, diminishing life of lithium-ion batteries, and problems with finding proper charging locations make E-bikes a difficult concept to implement on campus.

IOS: An Alternate Pulmonary Function
Shruthi Murali
Mentor: Steven George
Despite advances and efforts in its treatment, asthma remains a significant problem in the U.S., and improved methods of assessment would contribute to better control of asthma symptoms. Impulse oscillometry system (IOS) is a non-invasive measurement of lung function, which requires a minimum amount of cooperation compared to conventional spirometry. In addition, it has the potential to examine both small and large airway obstruction sepa-
Small airway dysfunction detected by IOS is associated with uncontrolled asthma in children. Spirometry (FEV1, FVC, FEV1/FVC, FEF25-75, BDR) and IOS (R5, R20, R5-20, X5, RF, AX) measurements were collected in triplicate before and after bronchodilator. The physicians’ assessment of being controlled or uncontrolled asthma was based on ATS guidelines, but they were blinded to the IOS data. Asthma control was also determined using the Childhood Asthma Control Test (Age ≤11) and Asthma Control Test (Age >12). Uncontrolled asthma is associated with small airway dysfunction, and IOS might be a more reliable and predictive method than regular spirometry in discriminating controlled vs. uncontrolled asthma in children.

**Localization of Nrf1 in the Cell**

Emily Myers  
*Mentor:* Jefferson Chan

Nrf1 (nuclear factor-erythroid 2 related factor 1) is a cap and collar basic leucine zipper transcription factor that regulates genes important for cellular stress response. The main protein isoform of Nrf1 resides in the endoplasmic reticulum as a type-II membrane protein. How Nrf1 is targeted to the nucleus for gene expression is not known. We hypothesize that Nrf1 trafficking involves retrotranslocation of deglycosylated substrates through components of the ER-associated degradation pathway. To test this, I am: 1) generating point mutations in glycosylation motifs of Nrf1 to determine the effect of these mutations on localization of Nrf1 in the cell; and 2) performing co-immunoprecipitation assays to identify proteins that interact with Nrf1 in the ER lumen. This study will delineate the role of glycosylation in Nrf1 trafficking, as well as identify potential proteins required for retrotranslocation.

**Synthesis of Pickering Emulsions for Confocal Microscopy and Rheology**

Kaela Napolitano  
*Mentor:* Ali Mohraz

Pickering emulsions are particle-stabilized mixtures of immiscible fluids. These emulsions have wide-spread potential technological applications including personal care products, food sciences, and advanced methods of drug delivery. This project focused on synthesizing model materials that would allow the relationship between the microstructure and rheology of Pickering emulsions to be experimentally investigated. The colloidal particles used in the Pickering emulsions were synthesized from a hydrolysis and condensation reaction of tetraethyl orthosilicate (TEOS), water, ethanol, and ammonia in the presence of a fluorescent dye solution made of rhodamine-B-isothiocyanate (RITC) and aminopropylsilane (APS). It was necessary to modify the surface chemistry of the silica particles through a silane coupling reaction using dichlorodimethylsilane (DCDMS) in order to make the particles neutrally wetting to the two immiscible liquid phases. The particles were then suspended in a two-phase liquid mixture of four constituents, whose ratios were carefully matched to create stable Pickering emulsions. The microstructure of the Pickering emulsions was studied at various ratios of organic to aqueous phases and mass percent of silica. The flow characteristics (rheology) of the emulsions were also analyzed using a rheometer. We found that the mass percent of silica present had a direct relationship to the strength of the emulsion, regardless of the ratio of organic to aqueous liquids present. Therefore, our findings establish a direct relationship between the microstructure and rheological characteristics of a Pickering emulsion.

**From Cars to Buses: Using Mile-Weighted Ridership to Analyze the Emission Benefits of Bus Transportation**

John Naviaux  
*Mentor:* David Brownstone

The emissions benefits of public transportation are primarily realized during periods of high ridership. This research seeks to quantify the emission benefits of buses by calculating the mile-weighted average ridership for the Orange County Transportation Authority (OCTA) bus system in Southern California. Ten OCTA routes were randomly selected for sampling, and data was collected on passenger counts, boardings, alighting, time of day, and distance between stops. The average ridership was calculated to be 14.49 riders per mile. Once non-revenue vehicle miles are accounted for, OCTA buses emit 20–51,000 fewer metric tons of CO2 than if an equivalent number of passengers had been transported by car. Using EPA valuations for the social cost of carbon, this decrease in emissions provides an annual savings of $142,740–$279,990 domestically, and $941,460–$1,846,710 globally. OCTA receives approximately $480 million in subsidies from state and federal sources each year. While buses provide an invaluable service to the local population, an analysis focusing solely on CO2 emissions must conclude that OCTA’s emission benefits are not enough on their own to justify their subsidy. The emission benefits calculated for OCTA likely represent the ideal case. OCTA ranks 16th in the U.S. in number of passenger miles traveled, and has completely switched its buses from diesel to compressed natural gas and liquid natural gas fuels. Other bus systems using less emission-efficient fuels will provide an even smaller benefit.
Assessment Tools to Help Analyze Learning Strategies for Successful Classroom Outcomes in C7 (Introduction to Criminology, Law and Society), a Course Offered at UCI
Linda Naylor
Mentor: Donna Schuele

At the University of California, Irvine, a required course for graduation for all disciplines within the School of Social Ecology includes successful completion of C7 (Introduction to Criminology, Law and Society). C7 is a popular General Education elective within the University. The interest background of the instructor teaching the course determines a discretionary power of course instruction, which affects delivery of its three main core topics of departmental interest: law making, law breaking and the justice system. To help assess the deliverance of classroom lessons, I administered pre- and post-test tools to participants enrolled in three separate C7 classes (Summer I, II, and Fall 2010), obtaining 912 results. All tools used to obtain empirical data were composed of 20 substantive questions independently chosen by each C7 facilitator out of a test bank of 29. CLS majors, who took the course in both sessions of summer 2010, had the same results at course end; whereas in Fall 2010, all test performances improved dramatically. The research I conducted proved the need for continuity of teaching strategies between all faculty members who participate in C7 instruction, as a wide variety of undergraduate students are dependent upon collaborative teaching efforts.

The Role of Agrin/α3 Na, K ATPase Interaction in Learning and Memory
Marina Nemetalla
Mentor: Martin Smith

Neuronal activity depends on the presence of a large electrochemical gradient of Na⁺, and K⁺ ions across the cell membrane that is maintained by the activity of the Na, K-ATPase (NKA) or sodium pump. Thus, changes in NKA activity are likely to have dramatic effects on neuron function. Previous studies in our laboratory have shown that a brain protein called agrin inhibits the function of the α3 NKA, a neuron specific isoform of the pump, suggesting a role for the agrin/α3 NKA pathway in regulating neuron excitability. Consistent with this hypothesis, I have shown that treatment with C-Ag15, a fragment of agrin that acts as an agrin antagonist, raises electrogenic seizure threshold in mice. Preliminary data show that agrin/α3 Na, K-ATPase interactions might influence learning and memory. To test this hypothesis I examined the effect of hippocampal injection of C-Ag15 on the performance of a simple object location recognition task that tests the ability to discriminate between a moved and non-moved object. Preliminary data show that while treatment with C-Ag15 prior to the training has no effect on locomotor or exploratory activity, it effectively blocks performance of the object location task. These results provide strong evidence that agrin/α3 NKA signaling is important for contextual memory.

Vaccinia Virus Protein Quantification and Abundance Quantitation by Proteomic Analysis Using Mass Spectrometry
Tuan Ngo
Mentor: Paul Gershon

The aim of this study was to investigate the effect of vaccinia virus infection on host cell protein expression and homeostasis. This was accomplished using three different dimethyl mass tags (CH3, CD3, 13CD3) for quantitation of uninfected, early, and late-infected cells, followed by three-dimensional (SCX, SDB, C18) peptide fractionation then nanoLC-MS/MS using the LTQ tandem mass spectrometer. The experiment confidently identified 4,326 proteins with confident quantitation of 3,403 of these. The infected cell proteome was remarkably stable, with a few notable exceptions and some apparent ontology-specific trends. The methods used were developed with adaptation from multiple established protocols.

Patient-Physician Language Concordance and Relationship Quality among Mexican-American Diabetics
An Nguyen
Mentor: John Billimek

In addition to suffering a high prevalence of diabetes and its complications, Hispanic Americans, of whom 30.2% are limited-English proficient, experience significant barriers to doctor-patient communication that interfere with management of the disease. Although many clinics provide interpreter services for these patients, interpreter quality varies considerably. In this study, we examined how language barriers during a medical visit impacted the relationship between patients and their physicians as measured by the patients’ trust in their physician, their satisfaction with interpersonal care, and the participatory decision-making style in three groups: 1) English-language concordant; 2) Spanish-language concordant, and 3) Spanish-language discordant. These three relationship quality indicators were also examined in association with interpreter satisfaction among the language discordant group. Data were collected from 631 Mexican-American patients with type 2 diabetes.
in the Reducing Racial/Ethnic Disparities in Diabetes: The Coached Care Project, a randomized control, two-year study. Analysis of variance revealed that compared to language discordant patients, English-language concordant and Spanish-language concordant patients reported higher ratings of physician trust, interpersonal care, and their physicians’ participatory decision-making style. Furthermore, results from t-tests revealed that language discordant patients who reported high satisfaction with their interpreters rated their physicians higher on the three relationship quality indicators than language discordant patients who reported low satisfaction with their interpreters. The findings suggest that, to provide high quality care and communicate effectively, physicians must consider the role of language in their interactions with chronically-ill Hispanic-American patients.

Role of Parabrachial Nucleus in Processing Cardiac Sympathoexcitatory Reflexes
An Nguyen
Mentor: Liang-Wu Fu
Myocardial ischemia is the cause of angina pectoris, one of the cardiovascular diseases, that contributes to one of the leading causes of death in the United States. Bradykinin (BK), a metabolite produced during myocardial ischemia, evokes sympathoexcitatory reflex responses including increase in arterial pressure and sympathetic nerve activity. The parabrachial nucleus (PBN), which is located in the pons of the brain stem, has been found to be activated by stimulation of cardiac sympathetic sensory nerve fibers. This study investigates the role of the PBN and the associated neurotransmitter mechanisms in processing sympathoexcitatory reflexes evoked by cardiac BK. In four groups of cats, sympathoexcitatory reflex responses to repeat cardiac BK stimulation before and after separate microinjection of vehicle, glutamate receptor non-selective antagonist kynurenic acid (Kyn), selective NMDA glutamate receptor antagonist AP5 (6-cyano-7-nitroquinoxaline-2,3-dione), and selective AMPA receptor antagonist NBQX (1,2,3,4-tetrahydro-6-nitro-2,3-dioxobenzo(f)quinoxaline-7-sulphonamide) into the PBN were recorded. We observed that microinjection of Kyn, AP5, and NBQX into the PBN attenuated the cardiac BK-mediated sympathoexcitatory reflex responses including the increases in MAP and integrated renal sympathetic nerve activity (RSNA). In contrast, the reflex responses to cardiac BK were consistent after microinjection of vehicle into the PBN. These findings suggest that the PBN plays an important role in processing cardiac sympathoexcitatory reflexes through ionotropic glutamate receptor mechanisms.

Localization Patterns of Proteins Encoded by Herpes Simplex Virus 1 Latency-Associated Transcript Open Reading Frames
Anh Nguyen
Mentors: Dale Carpenter & Steven Wechsler
Herpes Simplex Virus (HSV) is recognized for its ability to establish life-long, latent infection in sensory neuronal cells, from which the virus can periodically reactivate and cause reoccurring diseases. During latency, the HSV genome stays in a quiescent state and only the latency-associated-transcripts (LATs) are transcribed. The mechanisms underlying the processes of establishment and reactivation of HSV latency remain elusive; however, previous works suggest that LAT may play an important role in both HSV latency establishment and reactivation. It is plausible that the functions of LAT are protein-mediated. The goal of this project is to determine the localization patterns of potential proteins encoded by HSV1 LAT open reading frames. Select open reading frames within the LAT locus were fused with the gene encoding green fluorescent protein (GFP) in mammalian expression plasmids and their expression in rabbit skin cells was observed. Several of these proteins exhibit interesting localization patterns. Some appear to localize in the cytoplasm while others localize in the nucleus. These experiments serve as a preliminary study to identify potential proteins encoded by LAT open reading frames based on their localization pattern.

The Study of Resveratrol's Metabolites and their Cytotoxic Effects on Melanoma
David Nguyen
Mentor: John Fruehauf
Resveratrol, a naturally occurring polyphenol, has been reported to be an anti-tumor and chemopreventive agent. The anti-tumor activity of resveratrol is still observed in vivo despite undergoing extensive sulfation and glucuronidation by first pass metabolism via the liver. This study was designed to examine the metabolites of resveratrol and their cytotoxic effects on melanoma cell line A375. The studies were carried out under normoxic and hypoxic conditions to examine whether either environment affects the efficacy of resveratrol and its metabolites against melanoma. From the study, it was found that resveratrol-3-O-sulfate was less potent compared to resveratrol but more potent than resveratrol-3-O-glucuronide against A375 cells. Resveratrol-3-O-glucuronide had very low cytotoxicity towards A375 reaching a maximum of seventy-percent inhibition at high concentrations. Interestingly, resveratrol and its metabolites all exhibited a higher cytotoxic activity under hypoxic conditions compared to normoxic conditions; with resveratrol and resveratrol-3-O-sulfate having the most noticeable differences. In summary, the glucuronidated and sulfated metabolites, in contrast to res-
veratrol, showed relatively poor cytotoxicity against human melanoma cell line A375. However, the activity of the metabolites in vitro may not parallel their effects in vivo, as sulfatases and glucuronidases that can convert these metabolites back to their parent molecule exists in human systems.

Development of the East Asian Relationship Norms Inventory
Hoa Nha Nguyen
Mentor: Jeanett Castellanos

East Asians are among the largest Asian groups in the United States, originating from countries such as China, Japan, Korea, Vietnam and Mongolia. These individuals share common values engrained in the traditions of Confucianism, Daoism and Buddhism, which are manifested in the following relationship norms: interpersonal harmony, relational hierarchy, long-term reciprocity, communal interdependency, well-defined roles, propriety, face management, and other-centeredness. The purpose of the study is to develop a multidimensional inventory that measures East Asian relationship norms (EARNs) based on the Theory of Planned Behavior framework. To develop the measure, participants were asked to complete a preliminary version of the EARN inventory (EARNi). Preliminary results from 78 Asian American college students indicate that students perceived their families’ normative beliefs to adhere more strongly to EARNs than their friends’. Also, the degree to which students’ adhere to EARNs appear to fall in-between their families’ and friends’ level of adherence. The next stage of the study is to examine the factor structure, reliability, and validity of the EARNi. Clinical implications and directions for future research using the new inventory will be discussed.

Sleep Does a Memory Good: Examining the Roles of Napping and Immediate Imitation on Recall Memory in 10-Month-Olds
Hoa Nha Nguyen
Mentor: Angela Lukowski

Ten-month-old infants remember the temporal order of a two-step event sequence for approximately three months. Nevertheless, variability in mnemonic performance is still apparent. One possible mechanism underlying the observed differential formation and maintenance of sustainable memories in infancy may be sleep. Research conducted with adults indicates that participants who sleep after learning perform better on recall memory tasks relative to participants who do not, yet the influence of sleep on recall memory in infancy has not yet been investigated. The primary goal of this research was to examine the relation between sleep and recall memory in approximately sixty 10-month-old infants. At the first session, infants were presented with four two-step event sequences. The researcher demonstrated how to complete the actions for each sequence, and all of the infants were allowed the opportunity to imitate them immediately after modeling. At the second session, infants were tested on their memory for the sequences that were presented earlier. During the delay, each infant wore an actigraph around his or her ankle; half of the infants were expected to sleep during the two-hour delay between the sessions whereas the other infants were not. Data collection and reduction is ongoing but is expected to be complete within two weeks. Our primary hypothesis is that infants who sleep during the delay will perform better on the recall memory assessment relative to those who stay awake. Implications will be discussed in relation to the potential functional significance of infant sleep on recall memory in infancy.

Characterization of Novel BMP Activity in the Adult Mouse Hippocampus
Kevin Nguyen
Mentor: Edwin Monuki

Bone morphogenetic proteins (BMPs) are growth factors involved with vertebrate neural development, but their function in the adult mouse hippocampus is relatively unknown. A novel BMP reporter mouse line expressing nuclear LacZ (BLZ) was used to read BMP signaling in the brain. Examination of BLZ expression in the postnatal brain revealed that BLZ expression in the hippocampus begins after birth, with the strongest expression in the dentate gyrus (DG). The BLZ expression pattern was corroborated by pSmad activity in the same regions. Further characterization defined the BMP responsive cells in the DG as granule neurons. Interestingly, we also found that BMP activity was absent in stem cells of the DG. Taken together, the study shows that there is active BMP transcriptional activity in the adult hippocampus, which appears to increase in strength from birth to adulthood. We have also identified the dentate gyrus granule neurons as a novel population of BMP responsive cells.

The Anti-Proliferative Effects of a Novel Cyclooxygenase Inhibitor Analogue on Prostate Cancer Cells
Linda Nguyen
Mentor: Xiaolin Zi

Coxib, an FDA approved cyclooxygenase-inhibitory analgesic, has been demonstrated as a lead compound for its anti-proliferative effect against many cancers, including prostate cancer. However, there have been concerns that the clinically relevant dose and duration of Coxib required to produce notable anticancer effects significantly increases the risk of heart attack and stroke through excessive COX inhibition. However, Coxib’s anti-proliferative effect was
shown to be both independent and dependent of its COX inhibitory activity. Therefore, it is possible to design novel Coxib analogues that have more potent anti-proliferative effects against cancer cells but produce none or fewer cardiovascular and cerebral vascular side effects. Based on this rationale, we tested the effects of 55 Coxib analogues on the growth of two prostate cancer cell lines: PC3 that was derived from a bone-metastasis prostate cancer specimen and DU145 that was derived from a brain-metastasis prostate cancer specimen. Our testing consisted of two parts. Firstly, potent Coxib analogues were isolated through MTT assays that revealed cell viability. Secondly, compounds with IC₅₀ (concentration with 50% cell viability inhibition) less than 50 μM were labeled as potent and analyzed further via flow cytometry and Western blot for regulatory proteins. Results indicate that one analogue, Coxib L-DJ, demonstrated consistent potency with an IC₅₀ approximately 6 times lower than the IC₅₀ of the original Coxib for both cell lines. In addition, flow cytometry and Western blot suggest that Coxib L-DJ specifically induces apoptosis in PC3 cells and G1 arrest in DU145 cells. Therefore, Coxib L-DJ may have targeted anti-cancer effects against different prostate cancer metastasis and deserves further study to fully elucidate the mechanism of its action and its in vivo anti-tumor efficacy in animal models.

Efficient Synthesis of Norfluorocurarine
Lucas Nguyen
*Mentor:* Chris Vanderwal

Norfluorocurarine and valparicine are indole monoterpene alkaloids, or nitrogen-containing organic molecules, that can be isolated from a group of closely related plants, including the *Strychnos* family. Valparicine is of particular interest for its strong cytotoxicity toward certain human cancer cell lines. A previous synthesis of norfluorocurarine was beset by a problematic iododesilylation and a lengthy workaround. The revised synthesis involves an intramolecular Diels-Alder of an indolic Zincke aldehyde and a one-pot palladium-catalyzed deallylation and realkylation, making for a more concise and versatile route. The resulting vinyl iodide can undergo a Heck reaction to yield norfluorocurarine in a total of five steps or undergo a related sequence to yield valparicine in seven steps. Ongoing experiments aim to further increase the yield of a key Heck reaction toward valparicine through ligand selection, reagent optimization, and development of new solvent systems for purification. Once finished, this work offers a potent, bioactive molecule as well as a pathway toward synthetic analogs for collaborators and presents another case for the robustness of this general synthetic pathway toward *Strychnos* alkaloids.

Assessing the Health Status and Literacy of Individuals At-Risk & Diagnosed with Respiratory and Related Cancers: Human Physiology Impacts of Air Pollution Particulates on Body Fat Percent Solubility
Michael Nguyen
*Mentor:* Zuzana Bic

This study seeks to examine the health status and history of individuals currently at risk and/or diagnosed with respiratory and related cancers, in order to determine the best ways of education, either preventative or coping mechanisms with their diagnosis, treatment, and/or disease stage. The exposure of air pollution particulate, which comes from sources including secondhand smoke, and other carcinogens, is being assessed to the solubility of body fat percentages in both men and women. The main examination methods included reviews of medical literature/statistics and observations of various public-area environments of exposure to smoke and/or cancer-causing agents. Such public accessible locations used, including government-funded universities, are located within the Greater Los Angeles Area, California. Also, this study seeks to use the acquired results to conduct a comparative analysis of 100 individuals, 50 each from 18–25, and 65+ years of age. This is currently a pilot study, which will soon incorporate a comprehensive verbal evaluation method that will consist of interviews with individuals for long-term follow-up. This study is anticipated to continue into Summer 2011, and seeks in the future to show how information found can be used by society to instill lifestyle modifications.

Effects of Absent GCLM and NNT and their Interaction on Oxidative Lipid Damage in the Female Mouse Ovary
Michael Nguyen
*Mentor:* Ulrike Luderer

This study examines the combined effects of deletion of the *Gclm* gene and a mutation in the Nnt gene in the C57BL/6J mouse line. The glutamate cysteine ligase modifier subunit (*Gclm*) along with the catalytic subunit comprise the ligase needed for synthesis of the antioxidant glutathione. Glutathione (GSH) is the most abundant thiol in the body that plays a role in reducing reactive oxygen species, and requires a supply of NADPH to maintain proper GSH levels in the body. Because Nnt codes for the protein that catalyzes hydride shifts to create NADPH, this gene plays an indirect role in the regulation of proper GSH levels as well. According to unpublished studies in our laboratory, the *Gclm* knockout genotype has displayed decreased fertility due to increased oxidative stress from reactive oxygen species. Because the C57BL/6J mice are known to have a mutation in the Nnt gene, further studies
have been conducted to determine whether or not there is an interaction between the Nnt mutation and the Gelm knockout genotypes on decreased fertility in female mice. This study found that the number of litters and pups decreased in knockout mice compared to their wild type litter mates. The study was inconclusive in measuring oxidative lipid damage of ovarian follicles because further replications are needed.

**Activation of 16HBE14lo- Bronchial Epithelial Cells via Dendritic Cells in Old and Young Patients**
Michelle Nguyen  
*Mentor: Anshu Agrawal*

Epithelial cells serve as the primary line of defense in the immune system, functioning as antigen presenting cells and barriers to foreign pathogens. Previous studies have shown a greater vulnerability to secondary infections in the elderly, which can, in part, be attributed to a decrease in the efficacy of these epithelial cells to prevent infection. 16HBE14 lo-bronchial epithelial cells were used to investigate the varying expression of E-Cadherin, HLA-A, HLA-B, and HLA-C, and I-CAM in response to activation by dendritic cell supernatant of old and young patients. The epithelial cell samples were exposed to the supernatant of dendritic cells stimulated with influenza virus and an unstimulated control. Samples from older patients showed a decrease in the expression of tight junction proteins with unstimulated supernatant compared to younger patients. Furthermore, the expression of HLA molecules in younger patients was higher than older patients. These results suggest that older patients exhibit chronic activation of epithelial cells even in the absence of foreign pathogens; yet, during an infection, their response to foreign molecules is relatively low.

**Selfing Levels and Self-Compatibility in Oxalis alpina (Oxalidaceae)**
Michelle Nguyen  
*Mentors: Ann Sakai & Stephen Weller*

Hermaphroditism potentially enables flowering plants to self- as well as cross-fertilize. The largely self-incompatible heterostylous breeding system of Oxalis alpina promotes cross-fertilization and prevents the expression of inbreeding depression. Tristylos and distylos breeding systems occur within O. alpina, with loss of the mid-styled morph leading to distyly. In tristylos populations frequency of the mid-styled morph is highly variable, indicating different stages in the evolution of distyly. Partial self-compatibility of the mid-styled morph was studied to determine whether loss of self-incompatibility of these mid-styled plants has played a role in the retention of the mid-styled morph in some populations. Progeny of mid-styled plants with known outcrossing levels were self- and cross-pollinated to determine the extent of self-compatibility. No relationship was found between highly selfing field plants and the extent of self-compatibility of their progeny grown in the greenhouse. Seed production following selfing of the mid-styled plants indicated that these plants were highly self-compatible, consistent with previous studies. Cryptic self-incompatibility, the occurrence of outcrossing in plants that are capable of self-fertilization, may explain the occurrence of high levels of outcrossing for plants in natural populations, despite evidence for strong self-compatibility following greenhouse crosses.

**Time, Motions, and Activities: Understanding EMR-Based Clinical Workflow in an Emergency Department**
Steven Nguyen  
*Mentor: Yunan Chen*

The implementations of Electronic Medical record (EMR) systems are often associated with unintended consequences on clinical practices. While much research, such as the commonly used time-and-motion method, has already been employed to examine the impacts of EMR on clinical work, activities were often studied separately without considering the relationships and sequences among these tasks. The objective of this study was to understand clinical workflow from a goal-oriented perspective. To do so we conducted a three-month time-and-motion study on nursing work practice at a local Emergency Department. During the data collection period we tracked nurses’ work activities with the start and end time of each activity. We analyzed time-and-motion data according to the functional goals and mapped out the workflow in the complex clinical environment. Nurses were found to have 51 different activities that can be mapped into four main goals: assessment, treatment, care-coordination, and patient transfer. Modeling the work activities by functional goals helped us understand how work activities are connected sequentially in the complex social-technical working system, which is applicable to information system design and analysis processes. This workflow model also provides us with new insights on studying multi-tasking and interruptions in clinical workflows. While much research, such as the commonly used time-and-motion method, has already been employed to examine the impacts of EMR on clinical work, activities were often studied separately without considering the relationships and sequences among these tasks. The objective of this study was to understand clinical workflow from a goal-oriented perspective. To do so we conducted a three-month time-and-motion study on nursing work practice at a local Emergency Department. During the data collection period we tracked nurses’ work activities with the start and end time of each activity. We analyzed time-and-motion data according to the functional goals and mapped out the workflow in the complex clinical environment. Nurses were found to have 51 different activities that can be mapped into four main goals: assessment, treatment, care-coordination, and patient transfer. Modeling the work activities by functional goals helped us understand how work activities are connected sequentially in the complex social-technical working system, which is applicable to information system design and analysis processes. This workflow model also provides us with new insights on studying multi-tasking and interruptions in clinical workflows. We are currently working on analyzing and quantifying the degrees of interruptions and multitasking in workflow, which can be identified by finding overlaps in tasks that belong to separate goals.

**Assessing the Softening Effect of Bovine Tendon following Electromechanical Reshaping**
Tony Nguyen  
*Mentor: Brian Wong*

Tendons and ligaments are connective tissues that provide the human body with mechanical stability and joint movement. They routinely undergo massive stress and strain
that can result in injury. The use of a recently developed technique, known as electromechanical reshaping (EMR), has been studied and demonstrated to provide a softening effect in an ex vivo bovine tissue model. EMR utilizes milliamp DC currents in the form of platinum electrodes that produce an electrochemical reaction within the tendon. During EMR, redox chemistry driven changes in the structure of matrix molecules, as well as transient localized changes in tissue pH at the electrodes alter the tendon’s mechanical behavior. To assess the degree of softening within the tissue, the tendon’s Young’s modulus was measured using a precision mechanical testing platform. One future possible application for EMR is to treat Dupuytren’s contracture that causes the palmar fascia, a connective tissue in the hand to stiffen and limit hand movement. Thus, the use of EMR to alter mechanical properties of tendon offers several advantages in non-invasive and non-destructive methods to stiffen connective tissues.

In Vivo Monitoring of Microvascular Hemodynamics following Photothermal Injury to Blood Vessels
Katherine Nielsen
Mentor: Bernard Choi

The initiation of new blood vessel growth is closely associated with vascular endothelial growth factor (VEGF). VEGF plays a prominent role in initiating blood vessel growth, to provide nutrients to the injured site. When injured, mice carrying the transgene upregulate production of green fluorescent protein (GFP) in and around the wounded areas; GFP serves as a visible marker of VEGF promoter activity. Imaging of the vascular repair process following selective laser injury on transgenic VEGF-GFP mice allowed us to monitor multiple factors related to the microvasculature, including blood flow, vascular architecture, and gene expression. Collectively, the in vivo data suggest that the response to selective laser injury redistributes blood flow, and the degree of injury is a key-governing factor for the ensuing degree of angiogenesis. Recent experiments focus on monitoring of oxygen saturation dynamics, enabling mapping of tissue metabolic activity. Our findings enhance our understanding of the wound-healing response to laser surgery protocols and are expected to impact clinical research related to vascular malformations and cancer.

Age-Related Maculopathy Susceptibility 2 Polymorphism in Age-Related Macular Degeneration
Andrew Nobe
Mentor: Cristina Kenney

Age-related macular degeneration (AMD) is a leading cause of vision loss in the elderly and a major clinical problem in developed countries. Risk factors include both environmental and genetic elements. Several genetic variations are thought to play a pathogenic role in the development of AMD. In this study, we focused on the age-related maculopathy susceptibility 2 (ARMS2) gene, which has been linked to AMD and is located on human chromosome 10q26. The purpose of this study was to determine the association between ARMS2 gene (G>T; Ala69Ser, rs10490924) and AMD. DNA from 75 AMD and 92 age-matched control subjects were used for the study. The region flanking rs10490924 was amplified via polymerase chain reaction and evaluated by PvuII restriction fragment length analysis on all 167 DNA samples. The ARMS2 polymorphism was scored as GG (homozygous wildtype), GT (heterozygous), and TT (homozygous risk allele). Our results showed a statistically significant association between TT and AMD compared with the controls (19/75, 25.3% vs 4/92, 4.4%; odds ratio [OR] = 4.29; P = 0.00008). Independently, there were statistically significant associations between TT and early (7/32, 21.9% vs 4/92, 4.4%; OR = 4.11, P = 0.006) and late (8/32, 25.0% vs 4/92, 4.4%; OR = 4.79, P = 0.002) stage AMD compared with the controls. We conclude that the ARMS2 (rs10490924) polymorphism is strongly associated with both early and late stage AMD, which suggests the possibility of ARMS2 playing a major role in pathogenesis of AMD within our patient population.

From Repetition to Reconciliation: Deconstructing and Redefining Identities in the Collective Black Body
Jamie Noh
Mentor: Adriana Johnson

In examining the two novels, The Madonna of Excelsior by Zakes Mda and Corregidora by Gayl Jones, we can see how the exploitation of black female bodies and the exclusion based on the hierarchy of color are two forms of oppression residual from African colonization that are re-articulated within contemporary black communities; in this case, particularly the South African black community in Mda’s novel and the African diaspora in the U.S. in Jones’ novel. Other scholars, like Hershini Bhana Young, have written on the injured black female body by comparing different novels from the diverse regions of the African diaspora. However, she and many others have compared novels by strictly black female writers because of the theory that men and women tend to have different forms of writing; while women’s writing is more of an emotional chronicling of a life story, an unconscious outpouring, men’s writing is said to be more theoretically mediated with overt politicization and conscious structural techniques. The fact that I take a different approach to this topic by comparing novels from a black male South African perspective and a black female African-American per-
spective, yet both emphasize the existence of a cycle of exclusion and violence, and the necessity for reconciliation, further supports the need for a redefinition of identities in hopes of fostering healthy, non-exploitive relationships in the future.

Law Enforcement's Interaction with Homicide Cases: Factors Influencing Homicide Clearance Rates
Joseph-Martin Novelo
*Mentor: Mona Lynch*

Homicide clearance rates in California have been in rapid decline over the years from nearly 80% in the 1970s to the low 50% in 2007. In 2007 Los Angeles County had less than half its 944 homicides cleared compared to a nearly 60% clearance rate in 1990. This research explores what factors may be attributing to low and dwindling homicide clearance rates in Los Angeles County, the most populous county in the nation. Specifically, the purpose of this study is to investigate law enforcement’s involvement in homicide clearance and the various factors that may or may not affect law enforcement’s efforts to clear or solve homicide cases in Los Angeles County for the year 2007. This research is different from the extant literature on homicide clearance in that it incorporates multiple data sources and focuses on a single county in order to analyze the phenomenon of low homicide clearance using a grounded theory. The data comprises a mixture of publicly accessible archival data from the news media, law enforcement reports, and primary data collected through interviews with various Los Angeles County homicide investigators employed by various law enforcement agencies within Los Angeles County using a snowball method. The research is in the final stages of data collection and is entering the preliminary stages of data analysis. Findings will explore whether homicide clearance in Los Angeles is partly dependent on geography and demographics. Furthermore, findings will address whether community complaints regarding law enforcement not focusing on certain homicide cases is plausible and whether community relations with police may hinder law enforcement from obtaining valuable leads. Interview data will be analyzed to assess how homicide investigators pursue cases, and will provide insight into what factors may elicit successful investigations and what factors impede clearance. Findings will then be used to suggest policy implications that may improve homicide clearance.