Discovery Day
A forum for student ingenuity

2010
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Schedule of Events

8:30 am - 9:00 am  
**Registration (judges and participants)**  
Russell House Lobby (2nd floor)

9:00 am - 11:30 am  
**Creative Presentations**  
Russell House Theatre

9:00 am - 11:30 am  
**Oral Presentations**  
Russell House 201, 203, 205, 302, 303, 304, 305, 315

11:45 am - 1:00 pm  
**Keynote Address by Prof. Susan Anderson**  
Carolina Alive, student directed by Sarah Kervin  
Russell House Theatre

12:00 pm - 3:00 pm  
**Poster Session**  
Russell House Ballroom

3:00 pm - 3:30 pm  
**Reception**  
Russell House Ballroom

3:30 pm - 4:30 pm  
**Awards Ceremony**  
Russell House Theatre

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Keynote Address

Susan Anderson, Professor of Dance; Director, USC Dance Company; 2009 Michael J. Mungo Distinguished Professor; 2009 Governor's Professor of the Year

Considered the highest honor for teaching at USC - Columbia, the Michael J. Mungo Distinguished Professor of the Year Award is given annually to a truly exceptional educator. The 2009 awardee is Professor Susan Anderson from the Department of Theater and Dance. Professor Anderson has been a member of the Columbia Dance scene for over thirty years. She received her MFA from the University of California Irvine under the legendary choreographer Eugene Loring. Her professional dance career was with Ballet Celeste of San Francisco, Los Angeles Dance Theatre, and Moving South.

She has been instrumental in building the dance program at USC. She was the Founding Director of the USC Dance Company, the USC Dance Conservatory, and the South Carolina Summer Dance Conservatory which hosts international students and world renowned faculty and choreographers.

In addition, Professor Anderson was instrumental in implementing the BA major in Dance, the BA degree track in Performance/Choreography, and the BA degree in Dance Education, a K-12 Teacher Certification Program.

Carolina Alive, a Jazz Vocal Group

A Qualitative Comparison of Pedagogic Trends in Collegiate Vocal Jazz Programs

Sarah Kervin, Jazz Studies - Senior
Mentor: Dr. Tina Milhorn-Stallard, Music

Jazz is one of the few distinctly American art forms. It emerged in the early twentieth century through a melding of European and African music traditions, and continues to evolve today. Most jazz education took place "on the bandstand"; young musicians learned to play the music by imitation. Jazz education has since become increasingly academic in nature. Despite this movement into the classroom, there is no codified technique for jazz pedagogy, even less so for the expanding vocal jazz idiom. This project is a qualitative study of trends in jazz pedagogy practices among top collegiate vocal jazz programs in the United States that will further systematization in the developing field of jazz education. Over the course of the project, I visited four universities, observing vocal jazz ensemble rehearsals, private coaching sessions and meeting with renowned vocal jazz educators. My principal findings include the collaborative nature of jazz and the importance of a structured environment for peer criticism, the value of formal training to jazz performers and educators, and pedagogical aspects of the vocal jazz ensemble, including vernacular diction, minimalization of vibrato, performance skills, and the “smile” technique. These findings will refine my role as undergraduate assistant of USC’s vocal jazz group, Carolina Alive. I will also apply the pedagogical aspects as a private music instructor and in my personal practice time to further my development as a teacher and musician.
Oral & Creative Presentations

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Creative Presentations

The Community Service Experience: Understanding the Academic & Professional Benefits

Jennifer Conner, International Business - Junior
Christina Galardi, Public Relations - Sophomore
Laurie Graves, Biological Sciences - Junior
Ji Lim, Business Administration - Sophomore
Jane Lim, Biological Sciences - Sophomore
Ryan Teel, Chemical Engineering - Sophomore
Katie Parham, Political Science - Junior

Community service is a multi-faceted, valuable, and simple way to both better the community and contribute to personal and career growth. As leaders of an on-campus community service organization, we believe that service is undervalued by too many students who fail to take advantage of the plentiful opportunities available to them both locally and outside the region. For this reason, we are examining the value of service as seen through the eyes of USC students and prospective employers. “The Community Service Experience: Understanding the Academic & Professional Benefits” is a short film composed of segments of interviews and actual service activities being performed. To appeal to all groups, students and professionals being interviewed represent a wide variety of academic fields and service experience. By highlighting the diverse opportunities for service both locally and internationally and displaying these testimonies, we hope to disprove the general misconception that service is not mutually beneficial and that it does not apply to all disciplines. As an end result, we intend to raise the value of service as seen by USC students and increase participation in service events.

Stage Combat: A Microscope on Acting

Lauren Koch, Theatre - Sophomore

Stage Combat can be another avenue to actor training. Most training works from a psychological standpoint, like Stanislavsky, or a physical one, such as clowning, but stage combat forces an actor to address moments where one cannot be separated from the other. In moments of violence, everything must be specific, from the characters objective to the body’s breath and if something is missing, the audience will see it. This summer, I attended a three week intensive course on stage combat in which we studied three weapons; rapier and dagger, broadsword, and unarmed. However, more importantly, we learned to approach acting with a whole body awareness that requires intelligence, versatility, and vitality.

Documentary Theatre

Jennifer Miller, Theatre - Senior

Mentor: Dr. Victor Holtcamp, Theatre and Dance

Collaborating with Professor Victor Holtcamp, I assisted in the creation of a new Documentary Theatre course. Through this course, students learned what documentary theatre is, read well-known pieces of this genre, and collaborated as a class to create an original piece of documentary theatre. This genre is known for its use of interviews, newspaper articles, court transcripts and other factually based material in the creation of a play all related to an isolated event in society. With popular precedents such as The Laramie Project and Fires in the Mirror as
examples for the structure and style of a piece, we sought to find a topic which spoke to Columbia and South Carolina and to create a piece which would have a particular resonance for this community. As a class, we decided to explore the roles of women in the South, in particular, examining how these roles were exemplified through debutante balls and the Carolina Cup, events culturally unique to South Carolina. Documentary theatre is a unique genre in that it entirely consists of the voices of the people in a given community, all the while extending its greater ideas and implications to the audience. In featuring such strong voices of the people, it confronts viewers with the inescapable reality of the present.

**Lorca: Environmental for a Modern Audience**

*Sydney Mitchell, Theatre - Senior*

Mentor: Prof. Robert Bourne, Theatre and Dance

How can theatre attract, affect, entertain, educate, and communicate with the modern audience? In a world of expanding media and entertainment, theatre must continue to evolve. Is there a theatrical form for our generation? In pursuit of this question, I wrote an environmental theatre piece. Environmental theatre uses the entire space as performance space, thus intertwining the actor and audience experience. In my play, Lorca: Alone in a Dream, the audience moved through the space with the actors as the story unfolded, thus challenging both the actors and audience to expand themselves beyond their traditional passive roles. The play I wrote, directed, designed, and produced was based on the life of the Spanish writer Federico García Lorca who assassinated under orders from Francisco Franco at the onset of the Spanish Civil War. He was a man who passionately pursued the poetry of life and in doing so, won over the hearts of Spain. This universal adoration threatened the Nationalist regime, and eventually led to Lorca’s assassination. Over the course of three weeks, a group of undergraduate actors and designers, a stage manager, and myself worked diligently to prepare this experience for an audience. Lorca: Alone in a Dream ran for four performances in the Longstreet Catacombs, and was followed each night by a “talk back” designed to discuss the audience and actor experience in this unique theatrical form. Ultimately, environmental theatre was an effective means of engaging and empowering a new generation of audiences and actors toward more fulfilling artistic experiences.

**A Study of the Cultural Influences on Saxophone Music by Asian Composers**

*Andre North, Music Education - Senior*

Mentor: Dr. Clifford Leaman, Music

In the summer of 2009, I attended the 15th World Saxophone Congress hosted in Bangkok, Thailand on a Magellan grant through the university. The event featured the largest gathering of saxophonists from around the world. By participating in the World Saxophone Congress, I sought to discover what cultural trends and innovations helped to shape current saxophone music of Asian composers in order to broaden my understanding and share those ideas with others. As a musician and educator, it has always been a goal of mine to embody the ideals of the university which encourages research and innovation. Furthermore, I have been a big advocate for bridging the gap between music and the real world. I chose to research Asian saxophone music because it was an area not explored or researched by many in the music field. I conducted my studies by attending several
world premiere performances of Asian saxophone music and getting copies of scores and composer notes. I evaluated the cultural influences that led to the compositions and how it reflected the composer’s culture. What I learned was that many of the composers were driven by their own cultural identity, but even more so by the desire to associate American and other western ideals into their own music in an effort to fuse the ideas together. Being a student at the university, I feel it is my responsibility to share my research with others as much of today’s music is a representation of a culture’s mark on society.

**A Survey of Contemporary Chinese Martial Arts**

*James Whelan,* Political Science - Senior  
Mentor: Dr. Krista Hang, Languages, Literatures and Cultures

Over the course of a two week trip to Beijing China I conducted interviews with and filmed the training of, the following types of martial artists: Wushu competitors, Chinese Olympic boxers, traditional kung fu masters, and both Chinese and foreign Mixed Martial Artists. In so doing I created a short documentary that shows the past present and possible future of martial arts in China. One of my conclusions is that there is very little communication between these branches of martial arts and that this must change if traditional arts are to survive the 21st century.
Education

Science In American Education
Joshua Bridges, History - Senior
Mentor: Dr. Ann Johnson, History

Studies of public understanding and perception of science often focus on the role of the media. Clearly the media does play an important role in informing public attitudes about science and technology, but many people’s attitudes toward science are profoundly shaped by their own educational experiences. If this is the case today, surely it is true in times past, as well. The history of education also demonstrates strong path dependencies—curricular and pedagogical decisions are limited by what has been done before and the robustness of previous assumptions and modes of education. Therefore, considering the role of educational experience in forming attitudes toward science requires not just a snapshot of science education today, but also a longitudinal study of how science education came to be.

In order to understand the values and sentiments of previous American generations towards science, I will examine the development of scientific rhetoric American education. In seeing what branches of scientific discourse were included and to what extent, we may compare and contrast the new system of values. Why were these topics chosen and who chose? School superintendents, teachers, and famous scientists all participated in public debates and conversations with interested points of view. I have begun research by reading articles and primary documents from the years 1870-1910, roughly, to trace the development of scientific based curriculum. It was from the planting of these seeds of “science” into educational curriculum that has, in part, shaped how we view science and why.

Learning About Learning: Cognitive Gaming as a Technology of the Self
David Corso, Biological Sciences - Sophomore
Mentors: Dr. Randall Cream, English Language and Literatures
Prof. Simon Tarr, Film and Media Studies

Recent developments in our technology and our culture imply that gaming is undergoing a transformation as a cultural practice. Gaming as a practice stimulates discrete cognitive behaviors and steers individual habits in powerful ways. What elements in video games allow people to learn and develop in the ways they do? My project investigates and identifies the potential for gaming as a cognitive act that has profound capabilities, such as rule-learning behavior and cyclic learning properties. After researching recent works of game theorists and cognitive gaming experts such as Ian Bogost, Tracy Fullerton, Kirk Squire, and several others, I conducted first hand research with a variety of gaming engines, game types, and styles. These ranged from first-person shooters (FPS) such as Counter-Strike to real time strategies (RTS) such as WarCraft to action-adventure games such as Zelda: Ocarina of Time. In combining the theoretical analyses with the mechanisms of game play, I arrived at an analytic framework for determining the game features that map onto learning. My project creates a machinima that discusses the cognitive potential within video games and the methods in which they allow for learning. I’ve termed two processes from this experiment: “Learning How to Learn” and “The Steps of Gaming.” From these findings, I hope to inspire a new direction in video game ideology and development and help
educators understand games that transform and enhance cognitive behaviors from the learning processes they contain.

**iDance South Carolina: Bridging Communities and Making Discoveries while Teaching from a Distance**

*Emily Enloe*, Dance - Senior  
*Bonnie Boiter-Jolley*, Dance - Senior  
**Mentor:** Dr. Mila Parrish, Theatre and Dance

In iDance, we used videoconferencing technology to teach traditional dance activities, provide individual feedback, and expand students’ worldview. In this year-long research, Bonnie Boiter-Jolley and Emily Enloe taught dance in the public dance classroom to discover new ways of teaching and learning about dance under direction of Dr. Mila Parrish, our faculty mentor. Videoconferencing is a 2-way video, audio, and data communication across long distances through a web connection which includes cameras, monitors, microphones, speakers and a data service unit. The goal of iDance is to look specifically at the advantages and limitations for using videoconferencing in dance and how traditional dance activities are possible over videoconferencing. By connecting with students in the classroom we were able to establish relationships with the students in order to teach concepts of improvisation, choreography, dance sharing and discussion, and ballet technique through videoconferencing.

The iDance research team attended to the individual strengths of Boiter-Jolley’s performance major and Enloe’s education focus to widen both the students’ understanding of dance and our ability to better instruct the students. Our discoveries with the research have shown the importance of establishing relationships with students at a distance, taught us new ways of discussing and describing dance with language in addition to demonstration, and has demonstrated to us the importance as well as the difficulties of providing students with individual feedback.

In this thesis research we will discuss advantages and limitations of the videoconferencing equipment for classroom instruction in addition to adaptations of traditional methods for teaching dance.

**A Leadership Education and Development Program for Elementary School Students**

*Catherine Glen*, Psychology - Senior  
**Mentor:** Dr. Brad Smith, Psychology

As a service-learning student in the after-school program at Conder Elementary School, I started a program designed to encourage forth and fifth graders to be leaders within their school and communities. The program has been named “LEAD” in short for leadership, education, and development. The program is split into four main sections: Choosing a role model and defining leadership characteristics, personal commitment to leadership, group development, and practical application. A focus of LEAD is to have students involved in all four steps and allow them to become personally invested in leadership roles. This goal is carried out by having students vote on who they wish to research, having group discussion and analysis of the leader they have chosen, and making a contract.
Comparing American and German Arithmetic Teaching Techniques  
**Nessa Kerr**, Art History - Senior  
Mentor: Dr. Lara Ducate, Languages, Literatures, and Cultures  

After working as an English teaching assistant in Dessau, Germany, I noticed many differences in teaching methods between elementary school math classrooms in the United States and in Germany. I never thought about the impact that different cultures would have on teaching methods before, so I decided to explore the differences in elementary school arithmetic teaching techniques in the United States and Germany in order to give teachers a variety of tools for teaching math. To make an effective comparison, my research methods included observations of elementary school arithmetic classrooms, as well as teacher interviews in specific cities and schools in each country. From the data collected, I have come to the conclusion that in my extended case study, Germany’s technical arithmetic teaching methods are similar to those used in the Singapore Math Program, which has also begun to appear in some schools in the United States – they focus heavily on number grouping and mental math in their classrooms. In the United States, there is great diversity in teaching techniques. I visited classrooms which are now using the Singapore Math Program, as well as classrooms that have moved away from traditional methods to other exploratory methods to promote individual students to discover which method of problem solving works the best. The Comparing Arithmetic Project aims to give interested American teachers access to information about different teaching methods, as well to provide them with cultural insights into the German school system.

The Neglected Use of Chinese Language within Chinese Medical Colleges of the United States  
**Sara Winn**, Chemistry - Senior  
Mentor: Dr. Krista van Fleit Hang, Languages, Literatures, and Cultures  

While advances in Western technology have significantly influenced the way medicine operates in China today, the advent of American advertisements for the benefits of "Chinese herbal cures" and other "Asian antidotes" illustrates that the fascination with other cultures is not one-sided. The incidence of established Chinese medical colleges in the United States has been growing, particularly since the 1980s. In 1986, the American College of Traditional Chinese Medicine was approved as a California Degree-Granting Institution, the first recognition within American higher education of a Masters of Science in Traditional Chinese Medicine. In the development of Chinese medical education in the US, an emphasis on Chinese language is often omitted or overlooked while prominence is placed on
more immediate clinical information. I examine how concepts of Chinese medicine are taught by observing medical students and the use of Chinese language in classes at traditional Chinese medical colleges in the United States. I demonstrate how the variable terminology, multiple translations, and language discrepancies hamper a deeper understanding and more accurate transmission of Chinese medical concepts to students in the US. Students and practitioners should be encouraged to learn Chinese or other East Asian languages as the use of language is an undeniably important part of Chinese medicine. Language acts as the delivery system for the foundation of these future practitioners.

National Fellowships to Taiwan
Sara Winn, Chemistry - Senior
David Ensor, Mathematics - Senior

After spending time abroad, the presenters both decided to pursue Fulbright English Teaching Assistantships in Taiwan for the 2010-2011 academic year, and worked diligently with the Office of Fellowships and Scholar Programs to put together the strongest applications possible. These Fulbright grants would give them the opportunity to spend more time abroad and pursue their language studies before they attend professional school in the United States. In addition to the Fulbright grant, one of the presenters has also applied for a National Security Education Program Boren Scholarship to fund language study at either the National Taiwan University International Chinese Language Program or the National Taiwan Normal University Mandarin Training Center. The Boren Scholarship has a one-year federal government service requirement that encourages applicants to more strongly examine their intended career paths. The other presenter is a future medical student, and the opportunity to teach English while studying Mandarin is a very unique opportunity to focus on her interests outside of science. Difficulties arose for this presenter when the Hong Kong ETA was cancelled abruptly about two weeks before the submission due date. She decided to instead apply for a grant to Taiwan and quickly updated her application to fit this country. Both presenters were able to really examine their interests for their future careers as well as what motivates our passions currently.
Exploring Bivalence in the World of Beowulf through a Card Game  
*Jason Byrd*, Accounting - Senior  
Mentors: Dr. Scott Gwara, English Language and Literatures  
Dr. George Khushf, Philosophy  
What kind of character is Beowulf? The most convincing assertion is that the poet specifically includes both positive and negative aspects of Beowulf. After reading literary criticism about Beowulf, it is evident that many other opinions are out there. In order to show the bivalence implicit in the poem, a card game was made. The collectible card game is composed only of the people, events, artifacts, and other pieces of the poem. It pits Beowulf against his three main opponents from the poem, and Beowulf doesn’t always win. By playing the game multiple times, players can better appreciate how the poet includes multiple facets of Beowulf’s character.

Esotericism and Modern Women Writers  
*Debra Cardell*, English - Senior  
Mentor: Dr. Debra Rae Cohen, English Language and Literatures  
The pattern of social shifts and psychological stresses that make up modernity drew from early 20th-century writers the formal responses we know as Modernism. As these literary experiments indicate, modernity itself demanded new modes of perception and representation, and thus perhaps not surprisingly, esotericism often played a central role in Modernist works. Esotericism was especially important to the writings of those Modernist women writers who were exploring outlets for gender and spirituality that orthodox religion rejected. For my senior thesis, I am researching the place of esotericism in the works of the imagist expatriate poet H.D. (Hilda Doolittle), the newly “rediscovered” novelist Mary Butts and the popular writer and occult leader Dion Fortune (Violet Firth). By studying the archives of Mary Butts and H.D. at the Beinecke library, and Dion Fortunes little known The Magical Battle of Britain along with these writers’ better known works, I have gained a more thorough understanding of esotericism’s role within these writers’ works and have created a foundation for further research at the graduate level. My research reveals that these writers used existing symbol systems to create imaginary structures attuned to the female psyche. Furthermore, the wars were a central catalyst to these writers’ creations, affirming the impact of the wars on the female imagination.

Anne Tyler: Southern Writer or Not?  
*Kiri Dunlap*, English – Senior; USC Aiken  
Mentor: Dr. Tom Mack, English; USC Aiken  
For this project, I will attempt to define Anne Tyler’s place in the Southern literary tradition. To me, it seems that a given for Southern authors would be that they set their works in a typical Southern place, but Tyler, by setting her works in Baltimore, Maryland, defies this expectation. Essentially, my task in this project is two-fold: first, I must determine whether or not Baltimore exemplifies the characteristics of a Southern town, and second, I must evaluate whether or not Baltimore’s Southerness has any affect on Tyler’s classification as a Southern writer. To do this, I have read and evaluated setting in six Tyler novels, and I have
researched the characteristics of the Southern novel, which indicates that a Southern novel values the historical, communal, and familial roots of its characters, but perhaps more relevant, Southern works possess a sense of place. Armed with this information, I will go to Baltimore and explore the Southerness of the city. The close reading of Tyler’s work and the field study in Baltimore will allow me to come to some definitive answer as to how Tyler’s use of place fulfills the expectations of the Southern novel, and by extension, whether she should be classified as a Southern writer. Ultimately, the aim of this project is to expand the knowledge base that exists on the work of Anne Tyler, to deepen my own understanding of Southern literature, and to contribute to the field of literary studies.

**Examining the Roles of Culpability and Agency in Class-Transgressive Acts within Master-Servant Relationships in The Taming of the Shrew and Twelfth Night**  
*Mary Learner, English - Senior*

Mentors: Dr. Holly Crocker, English Language and Literatures  
Dr. Nina Levine, English Language and Literatures

There is a prevalence of characters in roles of servitude in Shakespeare’s works; service was an integral part of Renaissance culture, and this is apparent in their dramatizations. I am interested in the way in which comedy as a genre allows an exploration of class-transgressive acts between masters and servants, and how the outcome of these socially unacceptable misdemeanors are affected by varying characters’ acceptance or deferral of culpability, as well as their differing amounts of agency to enact these transgressions. Gender, identity, and power all are intricately interlocked in the result of class-transgressive acts, becoming determining factors in the varying amount of success these characters have while pursuing their socially-unsanctioned desires. I am looking at these plays in the historical context of conduct books on household politics from the Renaissance, as well as current scholarly research on the dynamics of service and its implications within Shakespeare’s works. My interpretation is that Shakespeare does offer the potential for social mobility through transgressive acts, but only to characters who both act as their own agents to achieve what they desire and can shift the culpability for their actions onto a higher, and thus less threatening, power. Shakespeare presents an alternative option that Renaissance law does not, one subversive to the social dynamics of his culture. This opens the door not merely to read Shakespeare’s comedies as breaking boundaries for humor only to reinstate them at the play’s close; instead, he offers a radical possibility of social mobility.

**Virginia Woolf and Modernist Metafiction**  
*Kayla Pohl, English - Senior*

Mentor: Dr. Debra Rae Cohen, English Language and Literatures

Critical interpretation of Virginia Woolf’s prolific literary career is often grounded in Modernist or Feminist theory, and it consequently conceives her experimental form and radical themes as achieving provocative insight into the Modern individual experience. I argue that though this is a valid stance to take regarding Woolf’s work, it largely overlooks her noteworthy preoccupation with metafiction. Woolf’s achievement, then, can be recast to include her ability to navigate simultaneously the multiple consciousnesses of her indelible characters for which
she is revered and her own consciousness as visionary artist. I trace this formally and thematically through her fiction and non-fiction, considering Jacob’s Room, Orlando, The Waves, To The Lighthouse, A Room of One’s Own, and Mrs. Dalloway. In these works, Woolf engages the reader and foregrounds her role as artist and the reader’s role as audience in order to extend meaning to the metatextual level. By manipulations such as eradicating plot from a text, presenting numerous and contradictory narrative voices, devoting a text to representation of an already dead character, she is able to: grapple with the problem of representability, reveal the shortcoming of imposing form on representation, and challenge received literary forms.

**Sentiment Maker: Rev. Richard Carroll’s Affect on the Development of Segregation and Race Relations Following Reconstruction**

*JoAnn Zeise*, History - Senior

Mentor: Dr. Janet Hudson, History/Extended University

Understanding Rev. Richard Carroll gives insight into the development of race relations in South Carolina following Reconstruction. His message of severely limited advancement for African Americans complicated the work of black reformists who wanted equality. Carroll was consistently held up by whites as an example of a “sensible negro.” The majority of research is taken from Carroll’s many articles in The State newspaper. Because his message was welcomed by whites, Carroll was allowed a prominent place in the media. But the available contemporary African-American newspapers show that Carroll’s message was not widely accepted by other African Americans. Carroll was an integral voice in the formation of segregation in South Carolina following Reconstruction. He organized race relations conferences with well-known speakers and educators such as Booker T. Washington, as well as political and religious leaders. Carroll was also president of the Colored State Fair and other prominent black societies and clubs. He was not blind to the inequalities between the races. Indeed, he was well aware of the injustices, but his message was one of acceptance. His internal unconscious racism colored his view and his ceaseless work for his various projects paired with his white-friendly agenda made him a factor to be that could not be ignored. This project has allowed me to add pertinent information to our developing understanding of the formation of segregation in South Carolina after Reconstruction. It has also given me the opportunity to hone my research skills and streamline my organization of large amounts of research.
Humanities & Social Sciences II

A Restoration Plan for "Ingagi"
Sarah Allen, Film and Media Studies - Senior
Mentor: Dr. Mark Cooper, Film and Media Studies

How does one attempt to recover and restore a supposedly lost film? The answer, as I have found, isn't simple. My project involved completing the preproduction phases of the restoration of the film Ingagi. Ingagi was released amidst much scandal in 1930 and is of no small importance to film history as it positively influenced RKO’s decision to finance King Kong. The University of South Carolina’s Moving Image Research Collection possesses various reels of the film which I used as my starting point for the project. With guidance from my mentor, I assumed the role of the film archivist and historian. Over the course of the project, I have researched the process of film restoration, closely examined film elements in MIRC’s possession as well as traveled to other film archives and libraries in order to analyze the similarities and/or differences of their film holdings to the elements we possess. My report will allow our archive to, for the first time, accurately describe our holdings and their relationship to available copies. This will help researchers study the history of the film’s international distribution and exhibition and pave the way for the ongoing restoration efforts, including perhaps a DVD project, that will improve access to this rare film.

Understanding Evidence of Religion in Roman Period Bethsaida
Joshua Driscoll, Anthropology - Senior
Mentor: Dr. Terry Weik, Anthropology

Following an exhilarating archaeological experience at the site of Bethsaida in Israel, I felt compelled to more closely examine the religious history of the place. As former home to Apostles Peter and Andrew and a location of Imperial Cult Worship, this city has much to offer. The purpose of my project is to critically review the diverse pieces of data that have been synthesized to establish past religious activity during the Roman Period. Just how sure can we be of current conclusions, and far more importantly, how do we arrive at these results? In a subject of study, which has often been characterized by questionable intuitive leaps, I hope to expose the driving influence of methodology and the subsequent need for its further exploration. Just what does constitute religion? How might this be studied? How do we confidently take a fact from written records and attach it to the landscape through archaeology? I employ a variety of methodological strategies in connecting the evidence to a possible House Church at Bethsaida and a likely Imperial Cult temple to Livia. Throughout this process, I evaluate the plausibility of steps taken by archaeologists and elucidate the assumptions, theories, and possible failings behind each conclusion. I find that while in this case the conclusions generally follow, there is an unfortunate lack of methodological transparency, leading to dangerous airs of certainty rather than likelihood. I therefore advocate a shift in emphasis from an obsession with results to an exploration of methodology.
Digital Edition of the Pinckney Papers

Taylor Kirton, Biological Sciences - Freshman
Mentor: Dr. Neal Millikan, History
South Carolina is an area very rich in history. I was fortunate enough to become involved in the Digital Edition of the Pinckney Papers, a project that is working to make letters from the prominent planter families of early South Carolina available to the public online. These letters are primarily from Harriott Pinckney Horry, daughter of Eliza Lucas Pinckney, and her immediate family, and span from the early 1740’s to the 1830s. These letters provide insight to daily life of some of South Carolina's most prominent landowners and politicians of this time period. As a biology major, I feel as if I gave this project a new perspective. My interest in medicine made me pay special attention to the mention of diseases and their distribution, cures, and consequences. From reading these letters, I was able to see how certain diseases were distributed differently through social classes and age groups. I was able to learn from firsthand accounts what cures were used and the quality of health care that existed during that time period. My participation in this project has allowed me to explore disciplines other than my major. I have realized South Carolina's profound influence on pre and post Revolutionary War America as well as the impact disease has had on South Carolina's development.

French Cathedrals: Religion and National Identity

Mary Stonecypher, Baccalaureus Artium et Scientiae - Senior
Mentor: Dr. Meili Steele, English Language and Literatures
Academic theories assert that French cathedrals are important to modern French citizens because they are memory sites that create national identity. I researched the relationship between religion and national identity by conducting interviews at Chartres Cathedral in Chartres, France and Saint Pierre Church in Dreux, France. These interviews, publications from both sites, and academic research are combined to explain the complex relationship between religion and national identity in modern France. My project shows that the St. Pierre Church and Chartres Cathedral’s impact on their communities is largely unchanged from the religious motivations of the medieval creators hundreds of years ago.

The Evolution of Iconography and Inscriptions on Greco-Roman Numismatics

Brady Tyra, Classics - Junior
Mentor: Dr. Hunter Gardner, Languages, Literatures, and Cultures
As a Classics major with plans on pursuing a graduate degree in Ancient History and Culture, I applied for a Magellan grant to fund a research opportunity. For my project, I wanted to study the evolution of Greco-Roman coin and the reasons for it. First, I visited the Joel Hanshu Collection at the College of Charleston. There, I viewed and documented for my research a 175 piece sample of Mediterranean numismatics. I used this sample as a baseline for the evolution of the coins. From here, I read works of ancient historians and biographers as well as contemporary analysts. This gave me an understanding of the times and a historical context for the coins. Classical Greco-Roman coins were minted for over a millennium. Their respective iconography and inscriptions evolved with their cultural and historical placement; from the birth of Classical Greece to Hellenized Greece, from the fall of the Roman Republic through the rise and fall of the Western Roman Empire. I then came up with some possible political, social and economic reasons for the
evolution within the coin sample. I applied these to three coins in the possession of the Columbia Museum of Art; a traditional Athenian Owl, an Alexandrian drachma and a denarius minted by Tiberius, the second emperor of Rome.

The Availability and Selection of Stone Tool Raw Material in Relation to the Johannes Kolb Archaeological Site (38DA75)

Christopher Young, Anthropology - Senior

Mentor: Dr. Joanna Casey, Anthropology

The focus of this research project is to look at how people that lived in the southeastern United States 8,000 to 10,000 years ago utilized stone resources in their local environment for the manufacture of stone tools. The research uses petrographic analysis to identify archaeological and geological samples from the Great Pee Dee River Drainage and from rock outcrops in the Uwharrie Mountains in order to understand the distance and directions from which Archaic people in South Carolina received their resources. There are currently two models that try to explain Early Archaic subsistence patterns in the Upper Coastal Plain of South Carolina. The first states that people moved along river drainages to obtain food resources and to take advantage of other resources along their seasonal round. The second model states that people moved across river drainages as their seasonal round for subsistence/settlement patterns. Both of these models consider a wide geographic area. I would like to narrow the research area to the Johannes Kolb Site in Darlington County, South Carolina and relate my data to the broader geographic area previously modeled. By collecting samples from the Great Pee Dee River and from flakes and from stone tools recovered from the site, I hope to determine if Early Archaic people where flexible enough to take advantage of local raw stone material and to help determine if one or both of the two subsistence/settlement pattern models fit the Kolb site.
Engineering the Global Climate: Policy and Technological Interventions
Chase Dunn, Mechanical Engineering - Junior
Mentor: Dr. Ann Johnson, History

Geoengineering, or large-scale engineering into Earth’s climate system, involves proposals, ideas, and technologies that have migrated inward from the fringes of science over the past few years to answer the call for climate change solutions. These proposals are generally divided into two categories: Solar Radiation Management (SRM) and Carbon Dioxide Removal (CDR). SRM methods include options that enhance Earth’s Albedo (or reflectivity) from the surface, clouds, or space in an attempt to lower global temperatures by reflecting more radiation back into space. CDR methods involve capturing CO2 from the atmosphere artificially (Atmospheric scrubbers) or biologically (ocean fertilization, reforestation, etc.) and storing it long term in the soil, rocks, and oceans. Another CDR proposal suggests enhancing natural weathering processes that already remove carbon (carbonation of silicates, adjusting oceanic alkalinity, etc.). Proponents of geoengineering advocate emergency intervention in the case that mitigation strategies fail or prove insufficient, while some also regard these options as supplemental to mitigation. While CO2 emission reduction is of paramount priority, geoengineers have been submitting their ideas to be part of a multistep process that include geoengineering options in the overall solution. This process says we reduce our carbon emissions thereby mitigating our impact on the climate system, improve our adaptive capabilities, and geoengineer the global environment to a desirable level.

The first recognition to be made before approaching the topic of geoengineering is the complexity of Earth’s climate system. Our global environment is a non-linear network of inextricable components far too complex to claim control over. This sets boundaries of feasibility when considering which schemes are more tractable than others based on their possible impacts and a notion of reversibility. These obstacles alone shed light on the necessity for more research into geoengineering options.

How can Sustainability Lower the Negative Effects of Climate Change for African-Americans?
Lesley Joseph, Civil and Environmental Engineering - Junior
Mentor: Dr. Sacoby Wilson, Epidemiology and Biostatistics

Background: Research has shown that the negative effects of climate change are becoming more prevalent. African-Americans may be highly affected by climate change due to underlying economic and health disparities. The goal of this project is to determine the positive impacts that sustainability will have on African-Americans.

Methods: A literature review on climate change, the green economy, public health, and sustainability was conducted using search engines (i.e., Web of Science). Employment information was obtained using the US Economic Census data. Data from “green economy” sectors was obtained from the US Bureau of Labor Statistics. A questionnaire was produced to survey community groups and
academics on the public’s knowledge of climate change and its effects on disadvantaged populations.

Results: African-Americans consistently see higher unemployment rates than any other race/ethnicity and are underrepresented in various green industries, with many of these industries having high projected growth outcomes, such as wind and solar. Analysis of survey data reveals knowledge of climate change issues across race/ethnicity and socioeconomic status, but knowledge on mitigation approaches to climate change such as the expansion of green industries is varied.

Conclusions: The growth of the green economy is essential to mitigating the effects of climate change and improving the quality of life for African-Americans, while providing opportunities to those with barriers to employment. In the future, we will examine the viability of state-level green economy initiatives and national bills such as the Green Jobs Act in expanding access to green collar jobs to underserved and disadvantaged workers.

Letting the Garden Speak: Creating an Educational Organic Garden for USC

Lesley Joseph, Civil and Environmental Engineering - Junior
Mentor: Dr. David Whiteman, Political Science
Sustainability and environmental stewardship are becoming increasingly popular ideas and are being implemented all across the campus of USC, as evidenced by programs such as RecycleMania, Clean Carolina, and the Carolina Green Initiative. In an effort to add to the growing knowledge of sustainable living, this project used the Green Quad Community Garden to begin an organic garden and created a full-fledged educational exhibit, chronicling the types of food that can be grown organically and the most efficient and environmentally-friendly methods of growing food. The project had three components: designing the planting layout, creating educational materials, and conducting workshops. First, we worked with Matthew Kip, a certified permaculturist, to design the planting scheme, purchase the seeds, and cultivate our crops. Second, informational placards were posted throughout the garden to describe the individual plants and the rationale for the placement of each plant. The Green Quad composting program was also expanded to produce the topsoil that went into the garden. Third, we worked with our permaculturist throughout the growing phase to design a series of workshops to educate students, faculty, and staff about how to grow food organically and the different methods of composting waste materials. The ultimate objective of this project was to educate the university community about how food can be produced in a sustainable and environmentally-friendly way, and using the organic garden on campus as an educational tool was a great way to teach others about the benefits and relative low-costs of organic gardening.

Reptile and Amphibian Inventory of Red Bluff Lodge in Allendale County, South Carolina

Rebecca Scheffler, Biological Sciences - Junior; USC Aiken
Mentor: Dr. Eran Kilpatrick, Biological Sciences; USC Salkehatchie
The Red Bluff Lodge Herpetofuana Inventory was initiated in May 2009 in Allendale County, South Carolina. The study objectives were to generate a reptile and amphibian species list, assess the importance of wetland habitats for
amphibian breeding, compare diversity across habitats, and detect species with conservation status or limited geographic distribution. Red Bluff Lodge is a private 2,833 hectare tract of land near the Savannah River in the Upper Coastal Plain. Linear drift fence pitfall traps, minnow traps, and hand capture are being used to sample herpetofauna occurring in cypress pond, oxbow lake, bottomland hardwood forest, stream, pine plantation, and man-made impoundment habitat types. Sample sites were randomly selected within each habitat type for a total of 12 sample locations. Sampling has been conducted for no less than two consecutive weeks each month since August 01, 2009. A total of 658 individuals have been captured composing 13 amphibian species and 9 reptile species. Amphibians represented the majority (93.8%) of captures. Commonly captured amphibians include the southern toad (Bufo terrestris), eastern narrowmouth toad (Gastrophryne carolinensis), and mole salamander (Ambystoma talpoideum). Cypress pond habitats produced the most captures (34.8%) followed by the bottomland hardwood forest (17.6%) and man-made impoundment sites (17.6%). The stream and pine plantation sites produced the fewest captures. The property at Red Bluff Lodge supports a diversity of habitats that are important breeding and staging grounds for a variety of herpetofauna. Sampling is in progress and will continue on this study through 2010.

**Current Affairs: The Construction of Knowledge Communities in Marine Science**

**Alyson Tockstein,** History - Senior

*Mentor: Dr. Ann Johnson, History*

Currents are the basic freeways of the oceans. To understand their function and role in climate change researchers from different disciplines come together and construct an interdisciplinary understanding of the global environment. There are four major eastern boundary currents in the world. Two of them, the Humboldt-Peru Current and the California Current are nearly mirror images of one another, yet there are fewer studies on the Humboldt Current than the California Current. Because the knowledge community focused on the Humboldt Current developed more recently than the California Current community, it is a less mature research field. Given the developmental disparity between the two groups, research cooperation between the two has been limited. This is surprising given the interdisciplinary cooperation within the groups. Using actor-network theory this study will attempt to explain the dynamics of interdisciplinarity and to explain comparatively how these particular knowledge communities formed, interact (or not), and how they disseminate knowledge through a variety of media. Both Humboldt and California Current researchers contribute to larger goals in climate science, therefore the question of where and how they interact is important but not obvious. Through the analysis of scientific journal articles and interviews this study will show that smaller knowledge communities are the locus where researchers construct knowledge and their interdisciplinary knowledge feeds into larger networks, towards common research questions in global climate change over the last decade.
Politics & Business

Spinning the Wheels: Does Fuel Tank Capacity Impact Driving Habits?

*Kieran Coscia*, Finance - Senior
Mentor: Dr. David Hudgens, International Business

According to nationmaster.com the United States currently consumes approximately one quarter of the world’s oil. As oil is a non-renewable natural resource, the public has become increasingly concerned with the sustainability of current consumption rates. One way for consumers to ease the nation’s dependence on oil is to minimize unnecessary driving. Conversely, when consumers drive less, car industries are negatively impacted. This project is significant in that the results could suggest an ideal fuel tank capacity to minimize usage and promote sustainability, or an ideal fuel tank capacity to maximize usage and increase revenue for car companies.

USC Offers a High-Deductible Health Insurance Plan: Implications for Risk Pools & Medical Spending

*Jeet Guram*, Interdisciplinary Studies - Senior
Mentor: Dr. Melayne McInnes, Economics

Health insurance blinds individuals to many of the costs of their medical care, so individuals with generous insurance consume services as if the services were free. Health care is not free, though, and we all have to foot the bill as health expenditures soar. “High-Deductible Health Insurance Plans” (HDHPs) require enrollees to spend a high amount before charges are covered. By making individuals sensitive to a greater portion of their medical expenditures, HDHPs could lead to a more efficient allocation of funds to the currently bloated health sector. In 2005, USC began offering employees a new HDHP option in addition to the traditional low-deductible “Standard Plan.” For this study, data on USC employees’ plan choice, demographics, and medical spending from 2003-2008 were obtained. The data were analyzed to characterize the populations in the HDHP and Standard Plans. Also, by looking at individuals who switched from one plan to the other, the hypothesis that HDHPs reduce medical spending was tested. Savings Plan enrollees were found to be younger than Standard Plan enrollees and to have a history of lower medical expenditures, raising concerns that the introduction of the Savings Plan prompted healthier employees to leave the Standard Plan. Standard Plan enrollees experienced a year-to-year increase in health care expenditures from 2007 to 2008 that was fourteen times greater than the increase for Savings Plan enrollees. Therefore, while HDHPs have serious potential to help slow the rise in health spending, HDHPs’ attractiveness to healthy individuals could destabilize risk pools in existing plans.

Was Iceland’s Financial Meltdown Vindicated? A Comparative Analysis

*Bjarni Magnusson*, Economics - Senior
Mentor: Dr. William Hauk, Economics

The aim of this paper was to ascertain as to whether Iceland’s financial meltdown was vindicated as opposed to being a case of self fulfilling prophecy. The researcher used Thailand’s financial crisis of 1997 as a basis for comparative study, with the assumption that Thailand’s financial crisis was caused by genuine macroeconomic imbalances and overvalued asset markets. Both countries current
account balances, international investment positions, currencies and asset markets were studied in this paper. The researcher found that Iceland’s imbalances were greater than that of Thailand’s according to almost every indicator examined which lead to the conclusion that Iceland’s financial crisis was not a case of self fulfilling prophecy.

**How Context Shapes Attitudes**

*Ruthellen Thompson*, Psychology - Junior

Mentor: Dr. Douglas Wedell, Psychology

Models of attitude change propose two routes, a central reason-based route and a heuristic-based peripheral route. In a previous study we demonstrated how providing extreme policy positions changes attitudes toward target policy positions through a peripheral route. The present studies build on the proposal that whether one uses the central or peripheral route depends on respondents’ processing capacity and motivation for that attitude domain. We investigated three research questions. First, do motivation and capacity factors moderate contextual shifts? Second, can these contextual effects be decreased by encouraging use of the central route? Third, does attitude change endure past the initial encoding episode? In two experiments, we surveyed respondents’ level of motivation, capacity, and overall position for each domain. Respondents judged a series of policy positions for several issues. Each issue was structured so that positions varied from low to high (e.g. educational funding varying from $1,200 to $8,000 per pupil). The contextual manipulation consisted of presenting four high or low positions along with four moderate target positions. Respondents rated each policy position. Results from Experiment 1 showed that contextual effects were not moderated by motivation, capacity, or position factors. Thus, presenting extreme positions that are unlikely to be endorsed can have a strong effect on the majority opinion even when respondents have motivation and capacity to evaluate policies. The forthcoming results of Experiment 2 should provide answers to the issues of endurance of these effects and whether use of the central route of evaluation will reduce the effects.

**The 17th Amendment and its Congressional Impact**

*Frank Turek*, Political Science - Senior

Mentor: Dr. Charles Finocchiaro, Political Science

This project examines the extent to which the 17th Amendment impacted the representational behavior of Senators. The Amendment, which was ratified in 1913 and instituted direct election of Senators, provides a unique “natural experiment” in that we can use the House of Representatives as a “control group” to ascertain the validity of the claim that Senators were affected by the move from appointment by state legislatures to direct election. I use the Congressional Record’s list of bills introduced by legislators to compile a picture of representation in Congress around the turn of the 20th Century, and present statistical results of change over time as well as House-Senate comparisons. While I do not yet have final results to discuss, I will be able to present an assessment of measurable difference in bill introduction patterns before and after implementation of the 17th Amendment after accounting for factors known to influence Congress at that time. The analysis helps to paint a more complete picture of this important change, adds to existing knowledge about the topic, and sheds light on modern congressional representation.
Recalibrating Expectations of the International Criminal Court in Light of the Darfur Case

Laura Ware, Political Science - Junior
Mentor: Dr. Anuradha Chakravarty, Political Science

This paper aims to reassess commonly held expectations of the ICC. Practitioners and many scholars hoped at the inception of the ICC (in 2002) that the courts activities would lead to deterrence of future crimes, end violence, and build the rule of law. The research collected focuses solely on the case against Omar Al-Bashir, a case which is currently before the pre-trial chamber at the International Criminal Court. By focusing on one of the courts most high profile cases the paper aims to measure the effectiveness of the court in deterring violence in Darfur. The paper plans to analyze the effectiveness of the court by examining three key parts. First the paper aims to describe the background of the conflict in Darfur by outlining the major actors and events of the conflict thus far. Then the paper will move to discuss the inception of the court and its purpose as outlined by its founding document the Rome Statute. Lastly the paper will focus on the opinions of the courts purpose and effectiveness collected during field research conducted in The Hague. Field research was conducted by interviewing several court officials and collecting their opinions of the courts progress and its mandate to prosecute the human rights violations in Darfur. These three parts will comprise to answer the over arching question of the effectiveness of the courts ability to prosecute and deter violence in Darfur.
Post-Traumatic Stress Disorder (PTSD) affects nearly 1.5 million female survivors of sexual trauma in the United States. Resulting from the psychobiological changes many women undergo after experiencing a sexual assault, PTSD is often characterized by dissociation, chronic muscle tension due to high levels of generalized and trauma-related anxiety and negative body image precipitating harmful health behaviors and poor health outcomes. The purpose of this study is to review current literature to determine the potential benefits of incorporating a structured Pilates-style exercise program within traditional therapies for PTSD. During the first phase, we examine the emotional, cognitive and physical symptoms of patients with post-traumatic stress disorder due to sexual assault and abuse. The second phase reviews current treatment models - traditional and alternative - to determine their efficacy in treating the wide-range of somatic PTSD symptoms. Finally, the study compares the therapeutic needs of PTSD patients with the espoused benefits of Pilates to determine the potential efficacy of incorporating a structured Pilates program into current treatment models. Due to its focus on mind-body awareness and stress reduction, Pilates appears to complement current treatment models for post-traumatic stress disorder, while also providing an additional method for managing the physical symptoms of PTSD. A preliminary review of the current literature suggests that adding Pilates as an adjunct treatment may help patients achieve desired states of relaxation, attune to internal sensations, and improve body image and overall physical health.

Intravenous Gestational Nicotine Increases Adult Rats’ Motivation for Sucrose Reward

Maternal smoking during pregnancy produces negative health consequences for offspring, including ADHD, cognitive deficits, and increased likelihood of substance abuse. The present experiment assessed the effects of prenatal intravenous (IV) nicotine on motivation for sucrose reward as measured by operant responding. Pregnant dams were injected with IV nicotine (0.05 mg/kg/injection) or saline 3x/day on gestational days 8-21. On approximately post natal day 70, offspring acquired operant maintained responding for a 26% sucrose solution. Animals were trained on a Fixed Ratio 3 (FR3) schedule of reinforcement, which required them to respond 3x for 4 seconds of access to sucrose. Rats then responded for varying concentrations of sucrose according to a Latin-square design (0, 3, 10, 30, and 56 % w/v) to assess offspring’s sensitivity to sucrose concentration. Following FR 3 trials, rats were tested using a progressive ratio (PR) schedule of reinforcement to assess motivation for the aforementioned sucrose concentrations. The PR schedule requires rats to complete increasing ratio requirements for sucrose reinforcement, and thus measures how much responding animals exhibit for a particular concentration of sucrose. There were no differences between controls and nicotine treated offspring in sensitivity to
various sucrose concentrations, as assessed by the FR3 schedule. Rats exposed to IV nicotine exhibited increased motivation for sucrose reward relative to controls (i.e. completion of greater PR response requirements). IV gestational nicotine altered the motivation for a highly palatable sucrose reward, and these findings suggest that maternal tobacco smoking during pregnancy may increase the offspring's motivation to consume sucrose-based foods.

**Decoding Affective States from fMRI Data**

*David Blitzer,* Psychology - Senior  
Mentors: Dr. Douglas Wedell, Psychology  
Dr. Svetlana Shinkareva, Psychology  

Neuroimaging studies investigating affect have indicated that a confluence of activation from several regions contribute to the representation of both valence and arousal. The objective of the current study was to extract the internal representation of affective states from data gathered with fMRI and compare it to dimensional models of affect. Moreover, we sought to demonstrate that affective states are dissociable based upon distributed patterns of activation unique to valence and arousal categories using multivoxel pattern analysis (MVPA). The resulting lower dimensional neural representation of affect support behavioral models that posit the separation of affective stimuli based upon the dimensions of valence and arousal. Furthermore, we were successfully able to demonstrate that information unique to valence and arousal lies within distributed patterns of activation and could be used to predict which affective state a participant was experiencing. The results presented here are the first to empirically test the plausibility of the dimensional model of affect with fMRI. Our findings can potentially be extended to investigate how affective states are represented in clinical populations compared to controls.

**Intervention Without Evidence: Current Practice of Sensory Intervention for Students with Autism in Columbia, SC**

*Meredith James,* Psychology - Senior  
Mentor: Dr. Jane Roberts, Psychology  

Extensive and diversified research has found results indicating that as many as 94% of people diagnosed with an Autism Spectrum Disorder (ASD) have some degree of atypical sensory processing. As a result, interventions which target sensory integration have been developed and researched for people with autism. While there are studies which demonstrate positive effects of sensory interventions, the scientific consensus is that sensory integration has not be proven effective for the ASD population. Regardless of a lack of evidence base, sensory strategies are being incorporated into the school setting as one of the most common interventions for students with ASD. The current project seeks to develop a descriptive analysis of the current use of sensory interventions in Columbia’s autism programs. 10 elementary classrooms were observed to determine if and how sensory strategies are being incorporated. Data collected from teacher interviews, specialist interviews, and parent surveys was compiled to reflect the perceptions of sensory therapy of those directly involved with students. Results indicate that while teachers, parents, and some occupational therapists lack knowledge regarding sensory strategies and the research regarding such therapies, all classrooms observed made available sensory tools/techniques.
Furthermore, both teacher knowledge, as well as the ages of students in the classroom affected the amount and scope of sensory strategies used. Trends in the types of tools/techniques used as well as the reasons for their use were also identified.

Biofeedback: Learning to Reduce Tension in String Players

Rachel Myers, Music Education - Freshman
Mentor: Dr. Robert Jesselson, Music

This project investigated the ways in which biofeedback can be used to reduce tension associated with cello playing. Biofeedback is the process of measuring heart rate variability and coherence and using auditory and visual signals to relay this information to the patient. This technique is especially helpful, as the patient can then use these signals to modify his or her physical behaviors in order to reduce stress. Biofeedback is pertinent to musicians because it can help reduce tension in playing, alleviate performance anxiety, and address other serious underlying physical problems such as tendonitis. The research conducted centered around using biofeedback computer software to train six cellists to decrease tension while playing. Each cellist participated in twelve 30-minute biofeedback sessions, and his or her progress in improving coherence and decreasing tension was charted over the course of several weeks. The results of this research demonstrate how biofeedback can be used as an effective strategy for decreasing performance anxiety and tension associated with cello playing. The results of this research were presented to music educators across the nation at the American String Teachers Association National Conference in Santa Clara, California in February of 2010. Overall, this research project helped to create an awareness of how to read body signals in order to facilitate a decrease in stress and tension levels while playing a musical instrument.

Adopt a Culturally Appropriate and Feasible Prenatal Care Service Model for Uninsured Pregnant Latinas in SC

Jelissa Suarez, Interdisciplinary Studies - Senior
Mentors: Dr. Myriam Torres, Epidemiology and Biostatistics
Ms. Julie Smithwick-Leone, South Carolina Public Health Institute,
Perinatal Awareness for Successful Outcomes Program

Latinas have the highest birth and fertility rate in SC, yet they are the least likely to receive adequate or any prenatal care (PNC). Key barriers that prevent them from receiving PNC include health care costs, lack of health insurance, logistical barriers, and language difficulties. To initiate the elimination of these obstacles, the primary aim of this project is to review successful PNC health service models for uninsured pregnant Latinas and analyze which of these might be most feasible for SC to adopt. To determine which PNC model is most appropriate for the state, it is important to identify the issues this population faces in accessing prenatal care in SC, and the PNC services in SC as currently delivered and their limitations in addressing their needs. This will be done by conducting 4 focus groups of uninsured Latinas to understand the physical, social, and cultural barriers of accessing and utilizing PNC services, and by interviewing 8 individuals in the health sector (i.e. interpreters, health care providers/administrators). Secondly, to understand the impact of PNC services, it is important to research the Latino demographics in SC, and analyze the economic, epidemiological, and
maternal/child health implications of not providing prenatal care to this population. By adopting or modifying a PNC service model in SC, prenatal care would become more accessible and utilized by the growing number of Latinas of reproductive age, would promote the well-being of the state, and would contribute to the elimination of health disparities, a primary objective in Healthy People 2010/2020.
Ramanujan Congruences for Partition Related Eta-Quotients

_Hudson Harper_, Mathematics - Junior
Mentor:  Dr. Matthew Boylan, Mathematics

In a 1919 paper, Ramanujan proved his three eponymous congruences for the integer partition function using identities of q-series. Since then, combinatorial identities, properties of Eisenstein series, and other methods have been employed to prove these results. In 1981, Serre proved there exists a finite list of lacunary powers of the eta function. From these lacunary functions, Ramanujans congruences can be proven in a new way. In this talk I will prove how congruences, similar to Ramanujan’s, of general partition functions may be proven using the lacunarity of specific eta-quotients. A background in algebraic number theory or modular forms will not be necessary for the audience. All relevant terms and methods will be introduced.

The Development of SL Dye Displacement Assays and Exploration of Their Competitive Binding Properties

_Morgan Harrell_, Biological Sciences - Senior
Mentor:  Dr. John Lavigne, Chemistry and Biochemistry

Boronic acid functionalized peptide based synthetic lectins (SLs) are under trial as dependable and reproducible tools in the detection of cancer. With the ability to bind glycans and glycoproteins in a specific manner, SLs are capable of detecting cancer through abnormal glycan expression patterns, a consequence of aberrant glycosylation. SLs have great potential to be applicable provided that binding properties and other variables are properly investigated and well understood. Previous work has relied on direct labeling of the analyte which is not as advantageous in real world applications. Research to develop competition assays and understand the competitive binding properties between fluorescent dyes and unlabeled analytes will be presented. This is an integral component to developing SLs into application based sensors.

Synthesis of Dendrimer-Stabilized Rh Nanoparticles in Solution

_Cristina Kubicki_, Chemical Engineering - Junior
Mentors:  Dr. Oleg Alexeev, Chemical Engineering
          Dr. Micheal Amiridis, Provost

Metallic rhodium is used as an active component of heterogeneous catalysts employed in modern cars that are equipped with catalytic converters in order to meet increasingly stringent environmental restrictions on nitric oxides and carbon monoxide emissions. Our goal was to develop a technique for preparation of rhodium-dendrimer nanocomposites having a specific size of rhodium nanoparticles which can be used in the synthesis of highly dispersed heterogeneous catalysts. We focused on the exploration and understanding how the RhCl3 precursor interacted with functional groups of the G4-OH dendrimer in solution. We investigated how the complexation kinetics were influenced by various experimental parameters such as the concentration of Rh, solution pH, temperature, and time. UV-Visible, ion exchange chromatography, and atomic absorption spectroscopy were used for the characterization of such materials during the preparation. The data indicate that controlling the pH of the
complexation solution provided more reactive sites in the dendrimer branches and highly dispersed Rh catalysts with extremely narrow distributions of Rh particles can be successfully prepared via the dendrimer synthetic root. Finally, the impact on the community is the lowering the loss of raw material and in turn the cost of catalytic converters, making regulating emissions more efficient both in use of metal and money.

Using Android Powered Smartphone Devices to Gather and Plot Aggregate User GPS Data

Maliek McKnight, Computer Science - Sophomore
Mentor: Dr. Shrihari Nelakuditi, Computer Science and Engineering

Smartphones have been revolutionizing the mobile marketplace as of late with features such as GPS and other means of location sensing. While these features are currently used to provide location aware services and applications to the user, they may also be used to mine data about users habits and daily routines. This information is of use to researchers and companies looking to provide more context aware and predictive services. This project attempts to provide a useful and concise manner of displaying aggregate GPS data passively collected from a users smartphone. To do so, data is plotted into a “user probability density map” showing where an individual is likely to be at a given time. Through this process, an effective, extensible interface for displaying aggregate user data is designed and implemented on the Android mobile device platform. Upon conclusion of this project, the data and interface will be freely available for use as a template for other smartphone data collection and utilization projects.

Characterization of Molecules that Inhibit Aggregation of the Amyloid-α Protein Involved in Alzheimer's Disease

Brandon Murphy, Chemical Engineering - Senior
Mentor: Dr. Melissa Moss, Chemical Engineering

Alzheimer’s disease (AD) is a progressive degenerative disorder that is characterized by senile plaques that are composed primarily of amyloid-α (Aα) protein, which aggregates from the harmless Aα monomer. Aα aggregation is initiated by nucleation of monomeric Aα. Following nucleation, the Aα protein forms protofibrils, which can continue to grow by two pathways: lateral growth by association and length-wise elongation by monomer addition. These pathways results in the formation of Aα fibrils, which are associated with neuronal toxicity. The objective of the research is to identify and characterize small molecule inhibitors which prevent Aα aggregate formation and growth.

Aggregation of SEC-purified Aα monomer can be induced by agitation and exhibits a lag phase, followed by quick growth, and ending with a plateau. This Aα monomer aggregation assay was performed in the absence and presence of inhibitors to assess their ability to prolong the lag phase indicative of nucleation and reduce the plateau which reflects total aggregate formation. Elongation assays, which measure the length-wise growth of the protofibril by monomer addition, are accomplished by combining Aα protofibril with monomer. This assay assesses the effectiveness of the inhibitor at preventing monomer addition to Aα protofibrils.
Ten cyclic inhibitors were tested for inhibition of Aâ aggregation. Additionally, six of those inhibitors have been assessed for their ability to prevent elongation. Three inhibitors showed lag extension and were capable of plateau reduction. Among these, two structures halted elongation. The structures of effective inhibitors provide insight into structural features that are favorable for inhibition.

**Study of U-O-C-Zr Phase Diagram**  
*Antonio Negrete*, Mechanical Engineering - Senior  
Mentor: Dr. Travis Knight, Nuclear Engineering

It has been estimated that for the next couple of decades energy consumption in the world will increase dramatically. Because of this, research on alternative modes of energy is being widely conducted, especially in the field of nuclear energy. Although nuclear energy is widely used, it has not been taken to its full potential and substantial investigative research is being done in this field. I was interested in this area of research and hoped to get exposure to the field of nuclear energy and to the different studies that are being done. The main objective for the research was to learn about the interaction between uranium, oxygen, carbon, and zirconium (U-O-C-Zr) at different compositions. This was achieved using FactSage 6.1 to create phase diagrams which were later compared with diagrams found in literature. Two types of phase diagrams were studied: binary and ternary phase diagrams. Binary diagrams plot the composition (x-axis) and a temperature range (y-axis) while ternary diagrams plot the composition of three components at a constant temperature and pressure. Once the phase diagrams were made with FactSage 6.1, I would compare different points in the diagram and get the compositions at the points from diagrams found in the literature. I found that the interaction among the mentioned elements vary depending on the composition, temperature, pressure, etc.
Social Perceptions & Cultural Identity

MIRRORS AND WINDOWS: MULTICULTURAL LITERATURE AND THE AFRICAN AMERICAN STUDENT
Kavetta Anderson, English - Junior
Mentor: Dr. Bobby Donaldson, History
The purpose of this research is to investigate the impact of children’s literature on African American students. Focusing primarily on elementary grade level students, the intent of the research is to critically examine the most popular literature used in primary grade classrooms. I find that the most popular used texts hold biases that shape the image development of black students. The image development consequently affects their academic performance. To resolve the problem of academic underperformance multicultural literature must be incorporated into the classroom curriculum. The research will find that there is a correlation between a more confident student and academic prosperity.

AFRICAN AMERICAN MALE STEREOTYPES
Trevor Gilchrist, Broadcast Journalism - Freshman
Mentor: Dr. Kendra Cusaac, Psychology
There are negative stereotypes most African Americans males face every day by different people not only in the classroom, but in society. Why are stigmas like these placed on African American males? Is it because of the way the media portrays rap music, gangs, and athletes? In this documentary, I plan on finding out why people place certain stigmas on African American males. The purpose of this project is to also find out how to change this perception. The importance of this documentary is to show people that these negative perceptions of African American males are usually not true and people should not judge a book by its cover.

ADVOCATING HOMELESS STUDENTS IN RICHLAND ONE
Daniel Hains, Social Work - Sophomore
Lauren Fowler, Psychology - Junior
Mentor: Dr. Bret Kloos, Psychology
In the Fall 2009 service-learning course Addressing Homelessness in South Carolina, we learned that there were over 1,200 homeless students in the Richland One School District alone last year. When we were challenged to advocate for homeless members of our community, we chose to try to improve educational conditions for these children. We set out to learn about educators’ perceptions of homeless students, and their ways of helping them. Our ultimate goal was to increase local educators’ awareness and understanding of homeless students, and to enhance their ability to serve them. We created a set of questions about educators’ expectations of homeless students, their experiences with them, their resources for helping the children, and the things they need to help the children more. We then used these questions to interview eleven local educators who ranged from the school board to classroom level, and from unfamiliar to very familiar with homelessness. The interviews revealed educators’ desire to help homeless students; one challenge, however, is the difficulty of identifying homeless students. Educators’ current practices of building trusting relationships with homeless students, modifying assignments for them, and connecting them to
community resources have yielded many success stories. Still, they requested more training and greater connectedness to the Parents and Students Succeed (PASS) project. A need for more school social workers, who can address homelessness directly, was also identified. We can now work to get schools the needed resources, and to expand successful services for homeless students here and nationwide.

**Semester At Sea: Combating Preconceptions in International Exchange**  
*Anna Kruger*, Anthropology - Senior  
Mentor: Dr. Debra Rae Cohen, English Language and Literatures  
During the fall 2009 semester, I lived and attended classes on a ship circumnavigating the globe. Through the Semester At Sea program with the University of Virginia, I was able to stop in 11 countries over the course of almost four months. My project is a portfolio chronicling where I went, what I did, and most importantly reflecting on my time abroad and how this has, or has not, affected my preconceptions of people different than myself. The portfolio will consist of an overall commentary, focusing on the preconceptions I had going into Semester At Sea, and how these were disproven or solidified while abroad. This commentary will also focus on other aspects of multicultural perspectives on an international scale, and my personal experiences with them. Although I tried to combat my preconceptions on this global scale, I also realize now that many have been solidified or simple transformed. My goal is to focus on the assumptions I had, many that I was unaware of at the time, and how my time abroad has affected these. I hope to share the experience I had and how it enhanced my academic experience as an anthropology major and transformed how I see many of the people I have often studied in the classroom.

**Indices of Social Perceptions: /s/-Duration and Word-Final /t/**  
*Eric Ruppe*, French - Senior  
Mentor: Dr. Elaine Chun, English Language and Literatures  
This study is intended to examine the social perceptions that accompany the sounds /s/ and word-final /t/. The various ways that these sounds are pronounced can be correlated to perceived of sexual orientation, level of education, masculinity, friendliness, et al. The study was performed by recording two speakers and manipulating the /s/ and /t/ sounds, to produce 5 different surveys: 1) unaltered recording 2) lengthened /s/-sounds and unreleased /t/ 3) shortened /s/-sounds and unreleased /t/ 4) lengthened /s/ and released /t/ and 5) shortened /s/ and released /t/. The survey will be distributed to about 100 people. Once all the results are in, the different responses will be examined to find any significant correlations. Previous studies, Crist (2007) for example, found significant correlations between /s/ duration and perceived sexual orientation. The released /t/ has been correlated with perceived levels of formality and education. While this study has as its focus perceptions on male sexual orientation, the questions include other social aspects, such as level of education, race/ethnicity, region, and friendliness. The results will help illuminate how, if at all, the two phonetic variables examined (/s/ and /t/) correlate with these factors.
Assessment of Hispanic Community Based Organizations in South Carolina

Anna Walton, Biological Sciences - Senior
Mentor: Dr. DeAnne Messias, Nursing

From 1990 to 2005, the Hispanic population in South Carolina (SC) increased by 342 percent, making it one of the fastest growing Hispanic populations in the country. As a result, a number of community-based organizations (CBOs) were initiated to provide services for this population for whom the existing services left many needs unmet. To date, there has been no published assessment conducted on the reach and efficacy of those CBOs. A systematic assessment of nine CBOs that offer services to Hispanic immigrants in SC was conducted to: (1) Describe the history and mission of Hispanic CBOs in SC Midlands; (2) Analyze the operational structures and processes of these organizations; and (3) Assess methods of collaboration and communication among these organizations. This assessment utilized a multi-method approach including content analysis of materials, qualitative analysis of in-depth interviews with key informants, and social mapping. Materials such as CBO publications, reports, and websites were reviewed for the content analysis. A semi-structured guide was used to conduct 10 interviews with individuals representing various roles within the CBOs (e.g. board members, staff, and volunteers). The descriptive analysis of the data will identify patterns in vision, needs, and challenges of the organization, needs and wants of the Hispanic community, and attitudes towards programs/services currently available. This systematic assessment will be the first evaluation of the organizations and services developed for and in the Hispanic community in South Carolina, providing a starting point for further development of these programs and an opportunity for reflection of progress made.
Apparitions of the Dead and Catholic Reform in Early Modern Europe

**Bradley Abromaitis**, History - Senior
Mentor: Dr. Kathryn Edwards, History

As a Magellan Scholar, I have had the opportunity to pursue historical research and use historical resources that I would not have been able to use without the grant. My research involves a French translation of a Spanish nun’s confessions about ghosts that she claimed visited her from purgatory. I gave this 600-page, early modern French document a close reading and supplemented this with secondary research concerning ghost traditions and sixteenth and seventeenth century Europe. The two principal questions I asked were: can ghosts have a history, and in the case of this French document, what do ghosts have to say about Catholic Reform during the Reformation? Throughout the research process, I was not asking whether or not the ghostly visitations actually occurred, but what ghost traditions reveal about past mentalities, anxieties, societal expectations, and perceptions of death. The purgatorial spirits that visited the nun illustrate the intimacy that early modern Europeans felt with death and the continuity between the this world and the afterlife. Catholic doctrine, especially purgatory, was zealously reaffirmed in response to its denial by Luther and Calvin. The influence of purgatory, the place where souls were purified before entrance to paradise, maintained a pervasive hold on European Catholicism and survived the death of Middle Ages and the onslaught of the Protestant Reformation. This research allows us to appreciate past views about the common human experience of death and realize our contemporary cultural ideas about death are an amalgam of past perspectives.

Voces Femininas: Four Women Write the Spanish Civil War

**Kathleen Kemp**, English - Senior
Mentor: Dr. Debra Rae Cohen, English Language and Literatures

For my Honor’s College thesis, I am exploring and comparing the anti-fascist writings and literary work of Two British women and two Spanish women during the Spanish Civil war of the 1930s: Nancy Cunard, Sylvia Townsend Warner, Federica Montseny and Maria Teresa Leon. My research examines poetry, novels, short stories and numerous articles and columns written in newspapers and magazines and will consist of a research paper and poster. Through this project, I have been extremely impressed by both the content of the Thomas Cooper library and the efficiency of the interlibrary loan system, both of which have enabled me to use a wide variety of primary and secondary sources. One of my primary themes is the role of editorship versus authorship, or, in other words, what it means to give someone else a voice instead of voicing one’s own opinion. What I have found most often is the true power is in selecting the voice to be heard (in other words, editors are not giving the disenfranchised a platform, but choosing the most convenient voice to publish). I am also focusing on the links between nonfiction, fiction and journalism for protest. My Discovery Day poster would be a compliment to my paper; it would display relevant photographs around a detailed timeline of the writings and events discussed. This war was unique in the amount of artistic expression it inspired. My project allows me to analyze that impact from a fresh angle: the role of female writers in the Spanish Civil War.
Fresas: Social Identity of Elite Mexican Youth

Janet Newton, Latin American Studies - Senior
Mentor: Dr. Jennifer Reynolds, Anthropology

This project investigates the performance of social identity of “Fresas,” young members of the Mexican middle and upper classes. While the boundaries of this group are flexible and there are no strict rules for the use of the label, Fresas are characterized by cosmopolitan behaviors and consumption habits, as well as other markers such as a particular variety of Mexican Spanish. This study is designed to find out more about a group of Mexican youth that few anthropologists have studied, as existing research often focuses on members of the working class instead of those in power. Information for the project was gathered from interviews, online sources that Fresas use, and participant observation within Fresa culture during fieldwork in Guadalajara, Mexico. I learned that Fresas are not a distinct social group with specific criteria for belonging, as I had originally considered them, but that it is a subjective label applied on a person-to-person basis. I also discovered that people rarely self-identify as Fresas and often deny group membership though others may label them as Fresas. The research is significant for me in that it has taught me how to think critically about a group of people that I would otherwise just consider a part of normal life. The research is also significant on a larger scale in that it will help fill in a major gap in the study of Mexican youth and it will contribute to an important area of study that has previously been ignored.

The Relationship of Pre-Sight-Reading Behaviors to Keyboard Sight-Reading Achievement

Neil Ostenfeld, Music Performance - Senior
Mentor: Dr. Nancy Baker, Music

The purpose of this study is to explore the relationship of observable pre-sight-reading behaviors to keyboard sight-reading achievement among undergraduate music majors enrolled in group piano. Three working definitions have been established for this study. First, “observable pre-sight-reading behaviors” are overt behaviors that can be documented, such as clapping, tapping, singing, conducting, or using a metronome. Second, “achievement in sight-reading” is participants’ abilities to play accurate pitches and rhythms while maintaining continuity as they sight-read at the piano. Third, “group piano” is a course that develops functional keyboard skills in a lab containing multiple keyboards. We had a few main goals for this project. First, this project will add to a growing small body of empirical research regarding sight reading at the piano. It will analyze, and investigate what is very difficult for pianists to articulate, that being what goes on in their minds before and during the time that they sight-read. It also will serve to educate pianists about the behaviors of high achieving sight-readers before and during the sight-reading process, allowing them to become better equipped to teach the skill of sight-reading to others. This study will videotape a minimum of 50 music majors enrolled in group piano at USC before and during the sight-reading process in order to document and analyze observable behaviors prior to the sight-reading process and examine the relationship of these behaviors to sight-reading achievement.
Tales of Scottish Lore for American Children’s Theatre
Gabrielle Peterson, Theatre - Junior
Mentor: Prof. Robert Bourne, Theatre and Dance
My objective with this project is to work to sustain theatre as a competitive subject and as a viable means for education. I was awarded the Magellan Scholarship to travel to Scotland to research Scottish folklore and oral traditions. I visited historical archeological sites, traveled to museums, attended traditional Scottish performances, and took classes in Scottish dance, archeology, history, and culture. I have used my research to write a play which I will be directing later in the year. This show will be performed for children in the Columbia area as a means to expose them to the importance and value of the art form as well as the history and culture of a country very different from their own. Theatre as an art form promotes important skills in development such as confidence, public speaking ability, the art of persuasion, and the continuation of a time-honored form of expression as well as the element of performance. By including traditional Scottish dance and music in the production, it will also demonstrate the impact these art forms can make in communication and the importance of the different art forms in preserving cultural heritage. It will also demonstrate how the varying forms of artistry can be combined to give a fuller picture of the Scottish culture in all its diverse aspects.

Retelling History: A Victorian Woman’s Approach to Women of the Sixteenth Century
Brandi Pope, English - Senior
Mentor: Dr. Paula Feldman, English Language and Literatures
This project utilized Thomas Cooper Library’s Rare Books collection of nineteenth century literary annuals and giftbooks. These volumes, written primarily by women and for a female audience, constituted a major force in the Victorian literary market, though more established literary figures generally declined to recognize their artistic merit. The Countess of Blessington, one of the more prolific contributors, also edited a volume entitled The Book of Beauty. In the final two years of the annual’s publication, Blessington had sole charge of The Book of Beauty, her former collaborator Charles Heath having passed away. In these years, she published short biographies of British queens, her own contributions being about the lives of the mother, daughter, and wives of King Henry VIII. While not a politically subversive figure, the Countess of Blessington’s portrayal of these powerful women does demonstrate her adherence to the “parallel streams” model of femininity, typical for female authors in the mid-nineteenth century, whereby women separate their femininity from their public lives of accomplishment. Some scholars view this model as restrictive, keeping Victorian women tied to their domestic space no matter what else they might accomplish. The Countess of Blessington, though, uses this model to demonstrate how women’s place in society might effectively be changed from within, providing a useful model for change in a time when outright revolution would not have had the same kind of positive impact.
Change and Reaffirmation: Cultivating a Muslim Identity at an American University  
**Matthew Snider**, Anthropology - Senior  
Mentor: Dr. Maimuna Huq, Anthropology  
The purpose of this research project was to understand the complex and diverse ways in which Muslim American college students manage to navigate the challenges inherent in practicing Islamic tradition within the context of a predominantly non-Muslim American university. My research methodology involved structured and semi-structured interviews with members of the Muslim Student Association on campus. In these interviews, I asked a number of questions related to religious practice, Islamic culture, and the purpose and nature of their involvement in the Muslim Student Association. The research also entailed my attendance and participation in the meetings, lectures, events and other activities hosted by the MSA. Additionally, I examined data from the organization’s recent history, such as its constitution and membership statistics. The results of my research have shown how, in this context, Muslim identity is constituted simultaneously through the selective reaffirmation and transformation of pre-existing Islamic practices within these new settings. The practices and beliefs of the members of this MSA demonstrate how issues of gender, dating, virtue, and pious space are negotiated in ways that express the autonomous nature of young Muslim lives within this university context. This project has illuminated the creative ways in which the next generation of American Muslims defines themselves as pioneers of the intersecting domains of Muslim religious and American college communities.

Tapping the Source: Examining Hawaiian Culture Through Traditional Tattooing  
**Jason Spiro**, English - Senior  
**Joshua Driscoll**, Anthropology - Senior  
Mentor: Dr. Mindy Fenske, English Language and Literatures  
This presentation will discuss the findings of our summer 2009 ethnographic study of the native art of tattooing in Oahu, Hawaii. This study examines the relationship between native folk art and the construction and communication of Hawaiian “native” identity. To accomplish this, we undertook a two and a half week period of on-site, ethnographic field research. This was carried out through formal and informal interviews and careful participant observation. The interviews were conducted to obtain a diverse range of perspectives both from those who self-identify as being “natives” who are tattooed with “traditional” designs, as well as from academics and community members. The findings of this study are preliminary and attest to the complexity of the relationship between art, culture, nation, and identity. We discovered that the concept of a “traditional Hawaiian tattoo” is a modern cultural construct that varies significantly based on the perspective of who we asked. We can tentatively explain this variation by proposing that different subcultures have different conditions for defining a “traditional Hawaiian tattoo” and that the definition is based on subjective expectations. Examples of these expectations were concerned with the proper physical application of the tattoo, the symbolic meaning of the tattoo and the cultural ritual surrounding the act of tattooing. In order to properly contextualize our findings, future research could be conducted studying the contemporary appropriations of other “traditional” arts in Hawaii.
Numeracy in Early 19th-Century America

Yujing Zhao, Business Economics - Junior
Mentor: Dr. Ann Johnson, History

While past research has generated detailed information about the literacy of early Americans, much less is known about their numeracy (or mathematical literacy), a topic that is equally crucial to our understanding of U.S. history. Americans' numeracy shaped their worldview and national identity, as well as the country's economic and political nation-building. Yet because studies of the history of math typically concentrate on the work of prominent mathematicians, there is a knowledge deficit regarding the numeracy of common people. This project sought to depict the extent of American public numeracy in the first half of the 19th century, by examining the comprehension and use of mathematical skills by ordinary citizens. Most of our research was conducted through the analysis of primary sources in the areas of commerce, media, and education. Our analysis suggests that early American numeracy was more extensive, and less dependent on formal education, than contemporary observers usually assume. This project also found that geometry was an especially influential component of public numeracy, a significance that we link to the widespread visual and physical qualities of math practices in the early 19th-century U.S.
Investigating the Roles of Novel DNA Repair Genes Using a Histone-GFP Fusion Protein in Mammalian Cells

Dustin Baker, Biological Sciences - Junior

Mentors: Dr. Douglas Pittman, Pharmaceutical and Biomedical Sciences
Dr. C. Rajesh, Pharmaceutical and Biomedical Sciences

Chemotherapeutic agents such as Mitomycin C are effective treatments due to their ability to induce DNA crosslinks that cause strand breaks and chromosome aberrations. Homologous recombination (HR) proteins are important for repairing this type of DNA damage. From a proteomics screen, our lab identified over 200 candidates that interact with RAD51 HR proteins and potentially play a role in the repair of DNA crosslinks. To investigate two of these candidates, I am using a HeLa cervical cancer cell line that contains the human histone H2B gene fused to the gene encoding the green fluorescent protein (GFP). I have performed siRNA knockdowns of the two candidate genes in these cell lines and treated them with Mitomycin C. Through DAPI staining and fluorescent microscopy, the extent of the damage has been analyzed. The results demonstrate that in the absence of these candidate genes, higher rates of chromosomal damage occur in comparison with the control cells. These data suggest involvement of the candidate proteins in HR repair. Future studies will investigate the co-localization of these proteins with DNA repair marker proteins. The long-term goal of my work is to identify new chemotherapeutic targets that will improve effectiveness of treatment and the survival rate of patients.

Understanding the Role of cPLA2 in Vascular Smooth

Kevin Douglass, Biological Sciences - Senior

Mentor: Dr. Kevin Carnevale, Pathology, Microbiology and Immunology

Restenosis, the narrowing of an artery that sometimes follows a balloon angioplasty procedure, occurs in one-third to one-half of patients within a year after the procedure. A crucial step in the pathogenesis of restenosis is migration of vascular smooth muscle cells from the muscular layer of the artery to the intima, where they subsequently proliferate. If smooth muscle cell migration and proliferation could be inhibited, restenosis could be restricted or arrested. Previous studies have shown that cytosolic phospholipase A2 (cPLA2) enzyme is required for monocyte migration during the inflammation process of atherosclerosis. Thus, the purpose of the following study is to focus on cPLA2 to answer the following question: what role does cPLA2 have on human aortic smooth muscle cell migration and proliferation.

Understanding Restenosis

Nyssa Fox, Chemical Engineering - Senior

Mentor: Dr. Kevin Carnevale, Pathology, Microbiology and Immunology

There are major histological differences between normal murine aorta and femoral artery. There are also major differences in the effects of atherosclerosis on these two arteries, with aneurysm formation affecting the aorta and long complex atherosclerotic lesions, which result in lumen narrowing, affecting the femoral artery. Our overall understanding of the different proteins expressed in these two arteries is not well understood. In these studies we investigated the difference in
protein expression in normal murine abdominal aorta compared to femoral artery. We found that tropomyosin alpha 1 and beta subunits migrate to different locations on 2D gel electrophoresis. Further investigation using Western blot analysis shows that these two proteins co-migrate in unidimensional gels. We hypothesize that another protein(s) is bound to tropomyosin in femoral artery and not in abdominal aorta to form a complex which makes it migrate differently on 2D analysis.

Implementation of a Method for Generation of Aß Oligomers for the Study of Alzheimer’s Disease
Sukhi Guram, Biological Sciences - Sophomore
Mentor: Dr. Melissa Moss, Chemical Engineering
The objective of my research project was to implement and optimize an in vitro method for generating amyloid-ß (Aß) oligomers from monomeric protein and to characterize the size and distribution of these oligomer preparations. Two published protocols were tested and compared using western blots to observe oligomer size and yield. The primary difference between the two protocols was the addition of PBS versus F-12K cell culture medium to promote oligomer formation. Experiments were first performed with Aß(1-40); however, results indicated that Aß(1-42) was essential for oligomer formation. Western Blot data indicated that both protocols produced similar size oligomers with bands at 12 kDa and 25 kDa, and a smear continuing from the 40-200 kDa range. Optimization of oligomer formation was continued with the protocol utilizing PBS since contents in the PBS solution could more easily be controlled. The effect of incubation time, Aß(1-42) concentration, and solution ionic strength on oligomer size and yield was investigated. The highest concentration of small oligomers was observed at 30 µM Aß(1-42), a salt concentration of 40 µM, and the addition of Tween, to halt the reaction, after 2 hours. The optimized oligomer formation assay will be used to determine the ability of small molecules to halt this early step in Aß aggregation.

The Impact of GATA6 on the Ovarian IGF-I Signaling System
Lindsey Harward, Biological Sciences - Senior
Mentor: Dr. Holly LaVoie, Cell Biology and Anatomy
Polycystic Ovarian Syndrome (PCOS) is a common cause of infertility in women, resulting in abnormal follicular development and steroidogenesis. One common aspect of PCOS is hyperinsulinemia. In culture, high insulin concentrations can bind to Insulin-like Growth Factor-I (IGF-I) receptors, influencing steroidogenesis by theca and granulosa cells. Typically, IGF-I functions together with the gonadotropins, Follicle Stimulating Hormone (FSH) and Luteinizing Hormone (LH), to upregulate genes mediating steroidogenesis (e.g., progesterone, androgen and estrogen) within the ovary. GATA4 and GATA6 are two ovarian transcription factors that regulate steroidogenic gene expression by binding the sequence (A/T) GATA(A/G). Our laboratory has shown that the IGF-I mRNA, which is stimulated by cyclic AMP, is decreased in GATA6 depleted granulosa cells. The gene for IGF-I has two GATA consensus DNA binding sequences in its 5-region. Other studies have found that GATA6 was increased in theca cells of women with PCOS, indicating the possibility that GATA6 could impact IGF-I production. This study utilized Chromatin Immunoprecipitation (ChIP) to determine whether GATA6 directly interacts with the porcine ovarian IGF-I gene upstream region. Real-time
PCR was performed to compare the amount of DNA precipitated by control (IgG), GATA6, and GATA4 antibodies. By ChIP, it was discovered that there was some interaction between GATA6 and GATA4 and the IGF-I gene 5'-region. Gel shift assays also showed that both GATA6 and GATA4 were able to bind to the more proximal GATA site, with a preference for GATA6 binding. These findings suggest that GATA6 is involved in the regulation of the ovarian IGF-I signaling system.

**Role of P-glycoprotein in the Transport of Amyloid-β Protein in Cerebral Amyloid Angiopathy**

*Emily Matherly,* Biomedical Engineering - Junior  
Mentor: Dr. Melissa Moss, Chemical Engineering

Cerebral amyloid angiopathy (CAA), a cerebrovascular deposition of the amyloid-β (Aβ) protein, is a well-known cause of hemorrhagic stroke. Altered Aβ transport may be responsible for vascular Aβ accumulation. However, it remains unclear how the transport of Aβ from the brain to the vasculature is impeded, facilitating Aβ accumulation. If the transport of Aβ monomer is reduced, an accumulation of soluble protein could occur, but more importantly, reduction in the transport of soluble aggregates could leave behind seeds that would dramatically accelerate amyloid formation that leads to deposition. P-glycoprotein (Pgp), an ATPase transporter, interacts with amphipathic molecules and regulates their removal from the brain. It was hypothesized that Pgp is involved in the transport of Aβ soluble aggregates through the BBB. Aβ assembly state(s) transported from the basolateral to the apical side of confluent monolayers of human brain microvascular endothelial cells were compared using endothelial permeability coefficients (Pe). Both Aβ monomer and Aβ aggregates were transported across monolayers. In addition, Aβ assembly state(s) that interact with Pgp were identified using an in vitro assay that measures ATPase activity of Pgp. These results revealed that Pgp preferentially binds soluble Aβ aggregates, but not monomer of fibril. Together, these findings suggest a role for Pgp in transporting soluble Aβ aggregates across the BBB.

**Changes in Oxidative Metabolism with the Progression of Cachexia in the ApcMin/+ Mouse**

*Aniruddh Patel,* Chemistry - Senior  
Mentor: Dr. James Carson, Exercise Science

Cachexia is characterized as an overall state of ill health accompanied by loss of lean body and fat mass, fatigue, anemia, metabolic irregularities, inflammation, and impaired immune function, with or without anorexia. The muscle wasting seen with progression of cachexia upsets the balance between muscle protein synthesis and degradation resulting in muscle atrophy. This imbalance could affect important processes related to oxidative metabolism in mitochondria. However, less is known about the change in cellular metabolism with the onset of cachexia. The purpose of this study is to determine the changes in oxidative metabolism during the development of cachexia. Male ApcMin/+ mice, an established mouse model for colorectal cancer and cachexia, were sacrificed at 12, 14 and 20 weeks of age. The gastrocnemius muscle were harvested and analyzed for levels of cytochrome c protein and AMPK activity. Cytochrome c protein showed no significant change in the 12 and 14 week old ApcMin/+ mice compared to wild type type mice. However, the 20 week old mice had a 72% reduction in the levels of
cytochrome c protein. Similarly, no significant changes were seen for the 12 and 14 week old cachectic group in the levels of AMPK phosphorylation compared to the wild type. However, the 20 week old group showed an 82% increase in AMPK phosphorylation. In summary, the reduction in oxidative capacity as represented by the decrease in cytochrome c protein with the onset of cachexia could activate energy sensitive proteins such as AMPK which could potentially lead to late stage cachexia.

**The Modulation of Glucocorticoid Receptor Activity by Site-Specific Phosphorylation at Ser220**  
Michelle Trojanowsky, Baccalaureus Artium et Scientiae - Junior  
Mentor: Dr. Paul Housley, Pharmacology, Physiology and Neuroscience  
The glucocorticoid receptor (GR) is a steroid hormone receptor that, when bound by hormone, acts as a transcription factor to alter target gene expression. The GR has eight phosphorylation sites that have the potential to alter receptor activity. However, the role of individual sites in modulating GR activity is unclear. My research explores the effect of phosphorylation at Serine 220 on the half-life of the murine GR protein. We isolated and characterized stably transfected clonal cell lines expressing either the wild-type GR or GR with an Alanine substitution at Ser220, which prevents phosphorylation at 220. These cells were tested for total GR protein content after varying hours of treatment with dexamethasone. The GR was immunoprecipitated from the protein extracts, run in an electrophoresis gel, and transferred to nitrocellulose. This blot was probed with antibody to GR and analyzed for GR levels using chemiluminescence and x-ray film. Densitometry with the MCID7.0 Elite system was used to determine the relative GR content of the cells at each time point. This information will be used to compare the half-lives of the wild-type and mutant GRs. Ultimately, we aim to discover how phosphorylation at Ser220 modulates hormone-induced target gene expression within the cells. Any findings that implicate site-specific phosphorylation in the modulation of intracellular responses to glucocorticoids have to potential to explain how phosphorylation of the GR can alter many of the basic biological responses to the hormone in the living system.

**The Effects of HuR Overexpression on Cell Proliferation and Angiogenesis in a Mouse Model of Colorectal Carcinogenesis**  
Rachael Weigle, Biological Sciences - Senior  
Mentor: Dr. Dan Dixon, Biological Sciences  
Colon cancer research has identified the genes cyclooxygenase 2 (COX-2) and vascular endothelial growth factor (VEGF) to be constitutively overexpressed in tumors. These factors are associated with inflammation and angiogenesis, and their overexpression in tumors provides a growth advantage. In normal cells, these genes are controlled by targeting their mRNA for rapid decay. However in tumors, the RNA-stability factor HuR is also overexpressed and can potentially protect the COX-2 and VEGF gene transcripts from degradation. Based on this, we hypothesize that HuR overexpression in colon cancer promotes COX-2 and VEGF expression resulting in enhanced cell proliferation and angiogenesis. To test this, a transgenic mouse was generated that overexpresses HuR in the gastrointestinal tract and this mouse was crossed with an established model of colon cancer, the APCMIN/+ mouse. Mice derived from these crosses were used to test the contribution of HuR...
upon intestinal epithelial cell proliferation and vascular density within the normal tissue and tumors of the gastrointestinal tract. Immunohistochemical analysis of proliferation using BrdU incorporation and angiogenesis using a blood vessel marker, PECAM, demonstrated that HuR overexpression does promote cellular proliferation within intestinal tumors. Additionally, HuR enhanced blood microvessel density in intestinal tumors of HuR-transgenic/APCMin/+ mice compared to tumors of APCMin/+ non-transgenic mice. RNA analysis agreed with these phenotypic observations, as COX-2 and VEGF mRNA levels are increased in the HuR transgenic/APCMin/+ mice. These results indicate that HuR overexpression contributes to enhanced tumor cell proliferation and angiogenesis in part by promoting COX-2 and VEGF expression within the tumor microenvironment.

**Phosphorylation at S412 Modulates Glucocorticoid Receptor Activity**

*Hailey Woollen,* Public Health - Senior

Mentor: Dr. Paul Housley, Pharmacology, Physiology and Neuroscience

The glucocorticoid receptor (GR) is an essential ligand-dependent transcription factor central to regulating several biological processes. While the GR is ubiquitous, the response to glucocorticoids is cell-specific. The GR exhibits many activities, including specific ligand binding, intracellular trafficking, and ultimately regulation of target gene expression. The GR is phosphorylated on several sites in the amino-terminal domain of the protein, and studies have shown that GR phosphorylation by different kinases affects receptor protein stability. In order to define the role of phosphorylation at S412, we constructed a set of vectors for GFP-tagged murine GR expressing the wild-type GR or GR substituted with alanine (S412A) or aspartate (S412D). In COS-1 cells transfected with GFP-GR constructs, the GFP-GR fluorescence is cytoplasmic in hormone-free cells and nuclear in hormone-treated cells. The signal from antibody to total GR co-localized with GFP fluorescence, whereas the signal from anti-phosphoS412 showed a subpopulation of nuclear receptors phosphorylated on S412 in the absence of hormone. Hormone withdrawal experiments showed some impairment in nuclear export for the mutant GR, suggesting that the phosphorylation state of S412 in the GR is involved in GR recycling. Real-time PCR of RNA samples from stably transfected clones expressing equal levels of wild-type or S412A GR show similar patterns of down-regulation in response to hormone. Similarly, immunoblots from 10-hour time courses show comparable protein half-lives in both the wild-type and S412A GR. These results suggest that the nuclear localization properties of the GR phosphorylated on Ser412 are not linked to GR mRNA or protein stability.
Functional Self-Assembled Poly(Lactide-co-Glycolide) Fumarate Nanoparticles as Carriers for Targeted Tumor Delivery

**Ryan Cassaro**, Biomedical Engineering - Junior
Mentor: Dr. Esmaiel Jabbari, Chemical Engineering

This investigative study sought to augment advanced drug delivery mechanisms. By implementing functional nanoparticles (NPs) as a delivery device for an antitumor complex, the selectivity toward tumor tissue can be increased. This decreases the damage to the surrounding unaffected tissues. To put these systems to practice, selectivity should be enhanced, which can be achieved by taking advantage of the self-assembly properties of biodegradable NPs, the presence of specific ligands on the tumor surface, and the distinct metabolic pathways of tumor cells that differentiate them from normal cells. Research consisted of synthesis, characterization, and in vitro studies of the modified anti-tumor complex. It began with the synthesis and characterization of biodegradable poly(lactide-co-glycolide fumarate) (PLGF) macromers. Afterwards, the peptide sequence CV6K2, known to self-assemble in aqueous environment, was synthesized and conjugated to the macromers. Results showed that NPs less than 200 nm in diameter, with very low size distribution, could be made with these polymer-peptide hybrids. Next, release studies were performed for two antitumor agents by encapsulation in NPs, Doxorubicin (Dox) and LA-Dox prodrug. Both drugs showed encapsulation efficiencies of about 55%, with release sustained for 4 weeks when in aqueous solution. Lastly, preliminary studies were done with Dox-loaded NPs exposed to tumor cells in vitro. Results showed that peptide-polymer hybrid NPs could be uptaken completely in 24 hours and showed more efficiency at destroying tumor cells than free drug in solution. The results of this research have increased the understanding of the effects of anti-tumor complexes conjugated with functional particles.

Development of a Polymer Solution with Potential Application Towards Continuous Glucose Monitoring

**Erin Davis**, Biomedical Engineering - Junior
Mentor: Dr. Qian Wang, Chemistry and Biochemistry

Diabetes affects millions of people worldwide. The current methods for testing glucose levels, which is a major factor for the treatment of diabetic patients, in many cases are painful and inconvenient for the patients. Our main objective in this project is to develop a sensing fluid that can selectively detect glucose in order to incorporate this fluid into a microelectromechanical system (MEMS) viscometric sensor. This MEMS device has the potential to be implanted subcutaneously in order to continuously monitor blood glucose levels.

N-Hydroxyethyl acrylamide (HEAA) and N-3-acrylamidophenylboronic Acid (AAPBA) were used to synthesize a random copolymer, pHEAA-ran-pAAPBA. Upon testing the viscometric response it has been shown that this polymer does respond to the addition of glucose selectively. This response is due to the formation of cyclic boronic esters between glucose and the boronic acid component of the copolymer, causing an increase in the viscosity. Molecular weight, composition, and concentration were seen to be important factors in the viscometric response in these types of polymers. These preliminary results show
that there is a potential for the use of this copolymer as a sensing fluid in the MEMS device.

**Intracellular Delivery of Trehalose Using a Thermally Responsive Nanocapsule for Cell Preservation at Ambient Temperature**

*Anthony Egal*, Biomedical Engineering - Junior  
Mentor: Dr. Xiaoming He, Mechanical Engineering

Long term preservation of cell samples at low temperatures is vitally important to the future success of biomedical sciences such as regenerative medicine, cell transplantation, and tissue engineering. Current cell preservation technologies typically involve the use of cytotoxic cryoprotectants. Trehalose is a disaccharide of glucose which has been found to be present in organisms able to survive in extremely dry or cold environments. Trehalose must be present in both the intracellular and extracellular space to function properly in cell preservation. Mammalian cells do not produce trehalose and the properties of the sugar prevent it from being permeable to the cell membrane. The purpose of this study was to synthesize and utilize a thermally responsive nanocapsule (with variable wall permeability, size, and surface charge) to encapsulate and deliver trehalose in the intracellular space with a controlled release profile. Pluronic F127-PEI (polyethylenimine) nanocapsules were synthesized using a modified emulsification/solvent evaporation method. All studies utilized NIH3T3 fibroblast cells. Cellular uptake and intracellular distribution of the nanocapsules were qualified using the fluorescent dye FITC (fluorescein isothiocyanate). The cytotoxic effect of the nanocapsules was measured in terms of immediate cell viability and long term cell proliferation. The trehalose assay kit was used to demonstrate controlled release and to quantify the concentration of intracellular trehalose after delivery. The procedures developed and the Pluronic F127-PEI nanocapsules were found to be able to delivery acceptable amounts of trehalose to the intracellular space (approximately 0.3 M) necessary for improving long term cell preservation at low temperatures.

**Establishment of Optimal Tissue Encapsulation Conditions for Islet Models**

*Romone Fancy*, Chemistry - Senior  
Mentor: Dr. James Blanchette, Chemical Engineering

Transplantation of pancreatic islets is a promising treatment option for patients with Type-1 Diabetes Mellitus. Encapsulating islets before transplantation helps prevent immune-mediated rejection. Consequently, encapsulation prevents revascularization leading to insufficient nutrition supply and loss of function in islets, particularly within central regions. Experiments have demonstrated that transplanted smaller islets have more insulin production per beta cell than do larger islets due to increased oxygen availability per cell. Therefore dissociation of larger islets into individual cells and then aggregating these cells into smaller clusters would increase the amount of nutrients available to each individual cell, increasing the viability and insulin production per cell. The concern is that dissociation of the islets would interfere with the cell-to-cell signaling between different cell types in islets leading to apoptosis, an event termed anoikis. Aggregated Murine Insulinoma (MIN-6) cells were used as Islet models. MIN-6 cells were each aggregated into 50 µm, 100 µm, and 200 µm diameter aggregates, encapsulated and then tested for viability via Alamar-blue testing and for insulin
release via daily glucose stimulation testing. It was observed that the 100ìm aggregates sustained the highest viability readings with the 50ìm aggregates displaying the lowest. The glucose stimulated insulin release results corresponded with the viability results with the 100ìm aggregates having the highest average insulin release. Following these results, varying densities of encapsulated MIN6 cells in 100ìm aggregates were tested for insulin release. It was observed that insulin production increased non-linear fashion as the density of the aggregates encapsulated increased.

**Oocyte Cryopreservation and Embryo Transfer in Peromyscus Maniculatus**

**Audrey Graft,** Biological Sciences - Senior  
Mentors: Dr. Michael Felder, Biological Sciences  
Dr. Gabor Szalai, Biological Sciences

The Peromyscus Genetic Stock Center provides a genetically diverse population of Peromyscus, commonly known as deer mice, to the scientific community for investigative and research purposes. Due to the outbred nature of this population, the reproductive physiology of the Peromyscus is more diverse than that of the archetypal laboratory rat or mouse. Investigatory studies involving oocytes and embryos of deer mice provide insight more relevant to human reproductive physiology and offer potential for Peromyscus to be an integral basis for the systematic study of human embryonic development. Peromyscus females were stimulated with gonadotropin hormones to align reproductive cycles to a predictable schedule for optimized ovulation. Oocytes were collect and used in research efforts of cryopreservation through peptide encapsulation by Dr. Xiaoming He in the USC Department of Mechanical Engineering. Embryos were collected and cultured to blastocysts, the stage in development optimal for implantation, for transfer to a pseudo-pregnant foster female. Embryos reached compacted morulae and blastocyst stage when cultured in M16 for a minimum of 36 hours when originating from a 4- to 8-cell stage of development. Embryonic viability and developmental potential were highly influenced by temperature and micro-drop volume of the medium in culture. Successful implantation and birth have not yet resulted from embryo transfers. Current efforts continue to identify conditions that mimic the natural environment of the uterus for implantation of blastocysts and to produce a more consistent pseudo-pregnant state in foster females. Successful embryo transfers in Peromyscus will allow access to further research in transgenics, embryonic development, and genomic imprinting. With the potential to alleviate many social and legal concerns surrounding embryo cryopreservation, the successful cryopreservation and reanimation of oocytes is currently another significant topic of human interest.

**Engineered Nanoparticles for Targeted Tumor Delivery**

**Sowjanya Kadali,** Biomedical Engineering - Junior  
Mentor: Dr. Esmaiel Jabbari, Chemical Engineering

Over 550,000 Americans die of cancer every year. Current methods of treatment require patients to undergo chemotherapy, which limits the efficacy of the employed method, increases dosage periods, and raises costs of treatment. The overall objective of this project is to develop a targeted drug delivery system to treat tumor cells without harming healthy cells. To reach this goal, self-assembled poly(lactide-co-glycolide fumarate) (PLGF) nanoparticles (NPs) that are less than
400nm in size, biodegradable and biocompatible are used to encapsulate drugs. These NPs were compared to those made with PLGF macromers conjugated to a CV6K2, a peptide sequence that can self-assemble into nanospheres. Select aspects of the drug delivery process were the focus of this project. First, the NPs were characterized by particle sizing, size distribution, and degradation kinetics after self-assembly in aqueous environment. The NPs were also exposed to normal and tumor cells to measure their uptake in vitro. Results indicated that particles were approximately 100-300 nm in diameter, with a relatively low distribution and degradation in about 5-7 weeks. Then, NPs with Paclitaxel, an antitumor drug, were placed in aqueous solution to determine the release efficiency of the drug. The release corresponded well to the degradation kinetics of the drugs, with complete release after 4-5 weeks. Also, the viability of cells in vitro was examined by using a chemical marker. Results showed that the NPs were more effective at eradicating tumor cells after 3 days. The NPs acted as reservoirs while providing a sustained dosage in a more effective manner.

Novel 3D Model for Studying Cellular Response to Myocardial Infarcts

Matthew Smith, Biomedical Engineering - Senior
Mentor: Dr. Sarah Baxter, Mechanical Engineering

The purpose of the experiment was to determine the suitability of three-dimensional fibrin matrices as model systems for studying fibroblast behavior after myocardial infarction. Cardiac fibroblasts are responsible for producing collagen within the heart and reorganizing the extracellular matrix after they have incurred damage. Neonatal rat cardiac fibroblasts were cultured and placed into a fibrin gel with a cell density of 2 million cells/mL. Infarct damage was simulated by directly applying a 6mm diameter piece of dry ice for 30 seconds. After freezing, the cells within the gel were tested for viability using an alamar blue assay as well as confocal microscope imaging of the cells directly in and around the vicinity of the site of injury. The mechanical environment in and around the injured area was examined by analyzing local strain fields. The results of this study show an increase of cell death at the site of tissue damage, with cells undergoing apoptosis in the immediate surrounding areas.
Rapid Qualitative Identification of Polymer and Dye Types for Forensic Analysis of Trace Fibers

Amanda M. Craig, Chemistry - Senior
Mentor: Dr. Stephen L. Morgan, Chemistry and Biochemistry

Trace fiber evidence has been probative in cases ranging from the JFK assassination to the 2002 Washington, DC, sniper case. Fibers may be transferred from clothing of an assailant to its victim during a struggle. The presence of fibers in crime scenes, provide evidence of an association between victim and/or crime scene with the suspect. Commonly, fiber examination starts with visual comparisons using polarized microscopy (PLM) and infrared spectroscopy (IR). Current forensic investigations suggest that even tiny traces (2 mm) of single fibers (15 µm diameter) can have forensic significance. The sheer difficulty of reproducibly handling and analyzing samples of this size has been a barrier limiting application of many analytical techniques. Preliminary identification of the polymer and the class dye is often required prior to proceeding with extraction and other characterization steps. The research question addressed by this work is whether rapid tests for the qualitative identification of fiber polymers type, and perhaps the class of dye with which it is dyed, can be developed. To accomplish this goal, a “fiber-guillotine” has been designed to reproducibly cut 2-5 mm pieces of fibers. PLM and IR were used to identify the fiber polymer substrate, followed by immersion of the fibers in different solvent/reagent mixtures until a positive result was obtained. A blind study (with samples of known fibers and dyes) was conducted to evaluate the performance (error rate) of the designed qualitative identification chart.

Hydroxide Flux Crystal Growth and Characterization of Metal Oxides

Adam Fox, Biological Sciences - Senior
Mentor: Dr. Hans-Conrad zur Loye, Chemistry and Biochemistry

The purpose of my project was to explore single crystal growth of metal oxides utilizing molten hydroxide fluxes. Crystal structures were solved for several novel and known compounds using single crystal x-ray crystallography. This poster will focus on crystal growth from molten hydroxide fluxes and structural characterizations of solved compounds α-La3IrO7, β-La3IrO7, LaYO3, LaHoO3, LaErO3, LaTmO3, LaYbO3, LaLuO3, Pr2MgIrO6, Nd2MgIrO6, Sm2MgIrO6, Eu2MgIrO6, and Gd2MgIrO6.

A small molecule protein-folding model

Judith Gomes, Biological Sciences - Senior
Mentor: Dr. Ken Shimizu, Chemistry and Biochemistry

Proteins fold into specific three-dimensional structures in an extremely complex process. Although there are many possible folded structures, most proteins will fold into one specific structure, and any error in that particular structure can cause numerous implications. Despite the importance of the protein-folding process, we still cannot accurately predict the folding or misfolding of a polypeptide. The goal for this project was to synthesize a molecular balance which could exist in a folded or unfolded state, in order to measure the strength of the interactions in the folding process. The ratio between these two forms is found from Nuclear
Magnetic Resonance (NMR), and from this ratio the strength of the interactions can be derived. Presented is the synthesis of a series of these molecular balances and a composition of the strength of the non-covalent interactions in these systems. In addition to synthesizing these systems, the inclusion of electron donating and withdrawing groups, such as a Chloro or Amino group, showed that changing the electrostatic potential of an arene ring can change the strength of the interactions it forms.

**Capillary Electrophoresis for the Forensic Identification of Fluorescent Brighteners on Trace Evidence Fibers**  
*Micheline Goulart*, Chemistry - Junior  
**Mentor: Dr. Stephen L. Morgan, Chemistry and Biochemistry**  
Textile fibers have become an important aspect of forensic science due to their abundance at crime scenes. Fibers are fundamental evidence as they could offer supportive evidence involving personal contact, whether between suspect and victim, or victim and inanimate objects such as cars, windows, and screen doors. Fibers fluoresce either because the colored dyes on them, the fiber polymer itself or the fluorescent brighteners (FBs) that have been added to the fiber. Due to the fact that FBs are the only dyes present on white fibers in most cases and the high number of compounds that can be used as FBs makes the probability of a matching combination of two or more apparently unrelated fibers highly improbable by coincidence alone. Neat white cotton fabrics available at our lab were subject to simulated laundering by actual FBs industrially used on fibers. Preliminary identification of FBs was performed using UV/Visible and fluorescence microspectrophotometry and data analysis was performed using multivariate statistics. Microextractions of optical brighteners from fibers were performed on small scale threads (1 mm - 5 cm) followed by analysis through capillary electrophoresis (CE) with diode array detection (DAD). The FBs present in the fibers were qualitatively identified and their relative quantitative composition was estimated. The ability to discriminate white fibers from one another adds a new dimension to current fiber characterization technology.

**The Characterization and Chemical Activity of Ni-Au and Pt-Au Bimetallic Clusters on TiO2(110)**  
*Corey Lucas*, Chemistry - Senior  
**Mentor: Dr. Donna Chen, Chemistry and Biochemistry**  
The nucleation, growth and surface composition of Ni-Au and Pt-Au bimetallic clusters on TiO2(110) was investigated. Scanning tunneling microscopy (STM) studies show that bimetallic Ni-Au and Pt-Au clusters supported on TiO2(110) are formed by deposition of Au on top of Ni and Pt clusters, respectively. Deposited Au is nucleated at existing Ni and Pt clusters due to the higher mobility of Au compared to Ni and Pt on TiO2(110). The cluster surfaces were nearly pure Au at Ni and Pt compositions less than 50%. Adsorption of CO and methanol onto the Ni-Au and Pt-Au clusters appear to induce the diffusion of Ni and Pt to the cluster surface. Annealing the Ni-Au and Pt-Au clusters to 800K causes the Ni and Pt in the bimetallic clusters to become selectively encapsulated by titania while the Au remains at the cluster surface. With an extended network of Au-titania sites, the resulting clusters are believed to be the active sites in oxidation reactions that take place on titania-supported Au clusters. Because the production of formaldehyde is
believed to occur at the Au-titania interface, the nature of the interfacial sites is probed with methanol.

**Screening of the Reactivity of Tobacco Mosaic Virus Cysteine Mutant**

**Giang Nguyen**, Chemistry - Senior
Mentor: Dr. Qian Wang, Chemistry and Biochemistry

Plant viruses are nano-scaled, highly-ordered structures made of many repeating subunits, which when derivatized, can serve as a scaffold for orthogonal and multivalent display of the functional moieties. Through conventional bioconjugation techniques, viruses can be conjugated with diverse functionalities through reactive residues on their coat protein with different reagents. Additionally, thorough screening and optimization of conjugation conditions permit control over the display density of functional groups. In our previous effort for anti-tumor vaccine development, wildtype tobacco mosaic virus (wt-TMV) has been used as scaffold to display carbohydrate-based Tn-antigen at tyrosine-139. However, a weak immune response was observed in the initial animal study. It has been reported that the location of antigen display on the capsid of TMV may affect its immunogenicity. Therefore, we are seeking the possibility to engineer reactive residues at different locations of TMV in order to conjugate the carbohydrates at different positions. As the first step of this project, the reactivity of a genetically engineered TMV-1Cys mutant, which allows for conjugation at a newly-inserted cysteine residue 3, was studied. TMV-1Cys was propagated in host plants, purified, and analyzed with MALDI-TOF to confirm the cysteine residue insertion. Modifications were carried out with bromoacetamide- and maleimide-derivatized fluorescent dyes as well as other small molecules. Sequential reactions using “Click Chemistry” was also tested. The products were purified through Nap 5 gravity columns, quantified with UV-vis, and confirmed with MALDI-TOF analyses. Results showed that the newly inserted cysteine residue is reactive towards chemical modifications.

**Receiver Operator Characteristic Graphs for Forensic Decision-Making**

**Patricia M. Shelley**, Chemistry - Junior
Mentor: Dr. Stephen L. Morgan, Chemistry and Biochemistry

The recent publication of the National Academy of Sciences report on the status of forensic science was critical of the lack of statistical reasoning and quantitative decision-making in forensic comparisons (1). Specifically criticized in the report was the prevalence of testimony involving trace evidence, such as hair and fibers, to be based on qualitative comparisons that were often judgment calls on the part of a forensic investigator. The most common forensic decision in such cases is whether or not a match exists between a questioned fiber (i.e., one found at a crime scene, but of unknown origin) and a known fiber (i.e., a comparison fiber taken from the crime scene, or from suspect or the victim). A Receiver Operating Characteristic (ROC) graph allows an investigator to explore trade-offs between competing true positive and false positive decisions at various decision thresholds when a quantitative variable is used to judge a decision. This approach originated during WWII and is widely used in medical diagnostics. The objective of this presentation is to demonstrate ROC graphs (2) for evaluation of data from forensic trace fiber examinations based on infrared spectroscopy and UV/visible microspectrophotometry.
Bis-Carbonates as Assembly Units and as Synthetic Intermediates
Caitlyn Smith, Biological Sciences - Senior
Mentor: Dr. Linda Shimizu, Chemistry and Biochemistry
During my Discovery Day presentation I will discuss Bis-Carbonates as assembly units and as synthetic intermediates within the larger construct of general Organic Chemistry. It has been known for quite a while that Urea groups are good assembly units to construct columnar crystals. The project to which I was assigned concerns Carbonate groups and the possibility for them to direct similar assemblies. Over the course of this project we created two Carbonate assembly units: 1) Stilbene Carbonate; and 2) Phenyl Ether Carbonate. It was then discovered that the Stilbene Carbonate forms a columnar crystal structure when treated with CH2CL2. Continuing with Cis Stilbene Carbonate, we found that after a [2+2] photocycloaddition of this assembly unit we received selectivity with the product of this reaction. This increased selectivity of product could lead to future work concerning the product of the [2+2] photocycloaddition as a possible building block for more complex molecules such as medal organic frameworks. Thus our conclusion is two fold: 1) Carbonates can assemble into columnar structures; and 2) Carbonates can give stereoselective reactions.
Searching for Supersymmetry Using Multivariate Techniques

**Reginald Bain**, Physics - Sophomore

Mentor: Dr. Milind Purohit, Physics and Astronomy

This project investigated using multivariate statistical techniques to interpret simulated proton collision data from the ATLAS (A Toroidal Large Hadron Collider Apparatus) project at CERN’s (European Center for Nuclear Research) LHC (Large Hadron Collider) in Geneva, Switzerland. One of the major goals of the ATLAS experiment is to document the existence of numerous “shadow” particles predicted by a theory called Supersymmetry (SUSY). Work was done to study the utility of multivariate statistical techniques in separating signatures of known particles from the signatures of particles theorized by SUSY. This process is typically called signal/background separation. Multivariate techniques are complex computerized statistical algorithms that can be “trained” to separate collision events based on multiple variables and particle characteristics. The following four multivariate techniques were applied: the Fisher Discriminant (Fisher), the Binary Decision Tree (BDT), the k-Nearest Neighbor Algorithm (KNN), and the Multi-Layer Perceptron Artificial Neural Network (MLP). Analysis of simulated data and the research of signal/background separation techniques are of the utmost importance to the study of SUSY. Analyzing simulated data will aid in developing a search strategy for SUSY particles. Thus far, multivariate techniques have shown much promise and will hopefully mature into the preferred method for signal/background separation over current typical methods of separating signal and background particle signals.

Advanced Time-Frequency Mutual Information Measures for Condition Based Maintenance of Helicopter Drive Trains

**David Coats**, Electrical Engineering - Senior

Mentors: Dr. Abdel Bayoumi, Electrical Engineering
        Dr. Yong-June Shin, Electrical Engineering

In this paper, a new concept of non-parametric detection and classification of signals using mutual information measures in the time-frequency domain toward the application of condition based maintenance (CBM) in helicopter drive trains is refined, tested, and qualified. This multidisciplinary project involves collecting real-world vibration data obtained from a dedicated condition based maintenance experimental dynamometer tail rotor drive train test stand, analyzing this data and refining CBM time-frequency based mutual information measure algorithms to interpret results, and generating statistical bounding regions for the initial implementation of CBM procedures. Time-frequency-based self and mutual information measure were previously defined in terms of cross time-frequency distributions to detect transient changes in mechanical testbed configurations. Based on time-frequency mutual information theory, this paper presents applications of the proposed technique to classification of baseline, unbalanced, and misaligned experimental settings of drive train bearings and shafts tested on campus. These settings are quantitatively distinguished by the proposed mutual information techniques with unbalance in actual helicopter hanger bearings quantifiable by variance in the in-phase mutual information and misalignment in shaft position quantifiable by variance in the quadrature mutual information.
developed and presented herein. Machine health classification is accomplished using statistical bounding regions. An offline fault detection program was developed to analyze data and give health classifications to extend existing Digital Source Collector (DSC) systems such as Vibration Management Enhancement Program (VMEP), Modern Signal Processing Unit (MSPU), and Integrated Health Monitoring System - Health Usage Monitoring System (IVHMS-HUMS) for CBM in AH-64 and UH-60 model aircraft.

**Electrodialysis of Copper (II) Chloride Solutions**

*Rebecca Freeman, Chemical Engineering - Senior*

**Mentor:** Dr. Francis Gadala-Maria, Chemical Engineering

Heat from the sun or nuclear reactors can be used to produce hydrogen for transportation and other uses. One way to do this is to use the heat to produce electricity, and then use the electricity to break down water into hydrogen and oxygen by electrolysis. This path is not very energy efficient. Thermochemical cycles and hybrid chemical cycles may be an option to produce more hydrogen from the same amount of heat. This project is related to the Cu-Cl (copper-chlorine) cycle, a hybrid cycle that involves two reactions that require heat and one that requires electricity. The overall reaction for this process is the same as the electrolysis of water. The cycle requires the addition of water and the removal of hydrogen and oxygen, but all other compounds are recycled from one part of the process to another and do not need to be replenished. The project focuses on the use of electrodialysis to concentrate the copper chloride solutions for recycling within the process. An electrodialysis stack with appropriate membranes was built and used to concentrate copper chloride solutions. Solutions initially containing 6.3 wt% copper chloride were concentrated to approximately 30 wt% copper chloride. To facilitate the analysis of the data, a method for determining the concentration of copper chloride in water using a UV-Visible spectrometer was developed. The method is based on an empirical correlation between the molarity of copper chloride in the solutions and their absorbance of visible light with a wavelength of 550 nm.

**Using the Tobacco Mosaic Virus as a Scaffold for the Development of Conductive Nanowires**

*Jeremy Gleaton, Chemistry - Senior*

**Mentor:** Dr. Qian Wang, Chemistry and Biochemistry

With the onset of increasing needs for green chemistry and the invention of smaller electronics for a variety of applications, there is a need for the development of well-defined shaped and sized one-dimensional (1D) nanomaterials. We are interested in developing 1D nanowires using tobacco mosaic virus (TMV) as the nature available building block. To assist the metal deposition on the surface of TMV, various electron rich ligands will be conjugated to the surface of TMV using Cu(I) catalyzed azide-alkyne cycloaddition reaction. In this study, we are working on the design and synthesis of these electron rich ligands. We picked a variety of small molecules which were electron rich and also were carboxylic acid derivatives. Carboxylic acid chemistry is well understood in organic chemistry. Here we tried to link the carboxylic acid with the amine terminus of our ligand. After the synthesis of this linked ligand to the small molecule, we plan to attach the azide to the alkyne functional group present on the
surface of the TMV. A successful route for the synthesis of these electron rich ligands, primarily through EDC coupling, is still being studied. It has been shown in the past that the successful addition of a small molecule linker to the surface of TMV is possible. Based on this previous research, we have tried to develop similar methods and conditions for these syntheses.

**A New Polybenzimidazole Derivative for High Temperature PEM Fuel Cells**  
*Alexander Gulledge*, Chemistry - Senior  
Mentor: Dr. Brian Benicewicz, Chemistry and Biochemistry  
Polybenzimidazole (PBI) polymers are excellent candidates for PEM (proton exchange membrane) fuel cells capable of operating at temperatures up to 200°C. The ability to operate at high temperatures provides benefits such as faster electrode kinetics and greater tolerance to impurities in the fuel stream. In addition, PBI membranes doped with phosphoric acid can operate efficiently without the need for external humidification and the related engineering hardware to monitor and control the hydration levels in the membrane. In this research, a new sequence-isomer of AB-PBI was developed as a candidate for high temperature membrane fuel cells. A diacid monomer, 2,2-bisbenzimidazole-5,5’-dicarboxylic acid (BBDCA), was synthesized and the structure confirmed via 1H-NMR and FTIR spectral analysis. A purification scheme for the new diacid monomer (BBDCA) was developed and purity was verified via elemental analysis. The monomer was used to prepare the new AB-PBI sequence isomer and membranes were made via a sol-gel casting method. The new AB-PBI was found to be mechanically stronger, had higher acid doping levels, and showed better fuel cell performance than of the known AB-PBI.’

**The Integration of Ground Damage Assessment into Tornado Classification Methods**  
*Lesley Joseph*, Civil and Environmental Engineering - Junior  
*Samuel Foster*, Civil and Environmental Engineering - Senior  
Mentor: Dr. Charles Pierce, Civil and Environmental Engineering  
Tornadoes have been occurring more frequently and have become more damaging over the last few decades. The average number of tornadoes each year range from 800 to 1400. To rate the intensity of these tornadoes, the Fujita (F) Scale was developed by Theodore Fujita in 1971, which used a single damage indicator to produce ratings between F0 and F5. More recently, researchers at Texas Tech University produced the Enhanced Fujita (EF) scale, which incorporated a wide variety of damage indicators and wind speed ranges for each rating. However, these indicators are based solely on structural damage and cannot be effectively applied to events that occur in areas where these indicators may be minimal, such as farmlands and open fields. Tornadoes are capable of creating and transporting large amounts of debris that can be ejected at high velocities, and while several studies have been conducted on missile transport and impact, ground damage has not been well documented in the field. This project will explore ways of improving the EF-scale by assessing the ground damage due to tornado-borne projectiles that are associated with tornado events. Photographs and eyewitness accounts were used to identify and characterize potential tornado-borne projectiles, and WebSoil Survey 2.0 was used to obtain the surrounding soil properties during these events. Empirical equations cited from several scientific articles were used to produce
relationships between projectile velocities and penetration depths in order to model tornado wind speeds, which can be utilized for tornado classifications in the absence of damage indicators.

**Optimized SEIRA Substrate Fabrication by Physical Vapor Deposition**

*Michelle Killian*, Chemistry – Senior; USC Aiken
Mentor: Dr. Chad Leverette, Chemistry; USC Aiken

Surface-enhanced infrared absorption (SEIRA) is a spectroscopic technique that provides low-level molecular analysis by enhancing the IR signal for molecules adsorbed onto metal surfaces. SEIRA is prevented from becoming a viable ultrasensitive sensor technology primarily by an incomplete understanding regarding the factors that influence SEIRA response. Physical vapor deposition is the most common method for fabricating SEIRA substrates. However, to make optimized substrates using PVD, practical questions still remain regarding the choice of IR substrate used, the rate and thickness of the deposited film, and more fundamentally, how these factors affect the morphology of the film that provides the SEIRA response. Using PVD, we deposited Ag and/or Au films simultaneously onto six common IR substrates (CaF2, BaF2, ZnSe, KRS-5, Ge, Amtir) at a controlled rate, and compared their SEIRA response as a function of film thickness. Ag and Au deposited onto CaF2 provided the highest SEIRA enhancement factors (EFs) for para-nitrobenzoic acid cast films. Ag film morphology was observed using atomic force microscopy. Differences in SEIRA response between substrates were attributed to differences in the morphology of particles on each substrate at each film thickness, which appears to be influenced by the chemical composition and temperature properties of the underlying substrate. We determined that a two-step deposition process for Ag (EF, 165) nearly doubles the SEIRA EFs produced from a single-step deposition (EF, 90). Experimental data from this study is expected to help increase understanding of the fundamental factors which influence SEIRA response while providing a larger reference for further SEIRA development.
Computer Science & Engineering

An Intelligent Decision Support Model for Predicting Type-2 Diabetes Clinical Charge Profiles

**Kerr Ballenger**, Mathematics - Senior; USC Upstate
Mentor: Dr. Wei Zhong, Mathematics & Computer Science; USC Upstate

Current methods for predicting healthcare costs for patients with Type-2 Diabetes often fail to produce valid results at the national level. This project mined national medical databases in hopes of developing a decision-tree based model for better predicting clinical charge profiles, like length of stay and hospital charges, for these patients. JAVA code was written to examine the relationship between the each patient received and their respective length of stay based on patient information from the Healthcare Cost and Utilization Project (HCUP-3) databases. Then, the data was analyzed using the C4.5 Decision Tree software to classify the relationship between the mined data. This project proves to provide relevant clinical knowledge to identify the predominant variables, facts, and knowledge that affect prediction outcomes. With this knowledge, a better list of procedures and length of stay prediction can be made which will lower out of pocket expenses for patients and better coverage by insurance companies.

Secure Software Development: iPhone Applications

**Dwayne Bates**, Computer Science - Senior
Mentor: Dr. Csilla Farkas, Computer Science and Engineering

In this research, I address the need to develop secure software applications. Software security incorporates two orthogonal research areas: malicious code detection and removal, and secure software development. Software-level vulnerabilities are a result of improper design, development, maintenance, and operation of the software application. Secure software development process incorporates security concerns in the Software Development Life Cycle (SDLC). My main research area focuses on how to apply secure software development principles to game development. More specifically, I study the security needs of on-line game development software that is distributed in a heterogeneous and ubiquitous environment. It has been shown that software, developed with security in mind, is higher quality than software developed with security in mind. Thus, incorporating in security at the early stages of SDLC will be beneficial to the organizations. Software prone to security vulnerabilities will result in higher cost for fixes and patches at a later phase of the software life cycle. I will study the security needs of application being developed for the iPhone and the impact of security attacks.

Action Rules and Meta-Actions

**Jennifer Burkett**, Information Management and Systems - Senior; USC Upstate
Mentor: Dr. Angelina Tzacheva, Informatics; USC Upstate

Action rules describe possible transitions of objects from one state to another with respect to a distinguished attribute. Early research on action rule discovery followed a rule-based approach and it required the extraction of classification rules from a decision system before constructing any action rule. Newest algorithms follow an object-based approach and they extract action rules directly from a decision system. This work adds a post-processing step to action rule
discovery by incorporating so-called meta-actions. Meta actions are used to introduce the cost of action rules. They are associated with nodes in a graph describing higher-level knowledge about correlations among attributes in a decision system. We produce a meta-action based decision system consisting of: an information system S; a set of meta actions associated with it; and, an influence matrix linking them. Meta-actions jointly with the influence matrix are used as a post-processing tool in action rule discovery. This novel method increases the usefulness or feasibility of the suggested actions.

**Bioinformatics Web Server for Protein Sorting Motif Analysis**

*Stephanie Henrichs*, Computer Science - Junior  
Mentor: Dr. Jianjun Hu, Computer Science and Engineering  
A typical cell has a size of only 10um while it contains about a billion proteins. It is still not well understood how these proteins are transported from their synthesis sites to their target locations within or outside of the cell. Experiments pioneered by Günter Blobel, the 1999 Nobel Prize Laureate in Physiology showed that translocation of nascent proteins is usually guided by targeting/sorting signals encoded within the amino acid sequences of proteins. Genome-wide identification and decoding of these molecular “zip codes” are fundamental to the understanding of the cell. Experimentally identifying protein sorting signals is labor and cost intensive. We have been developing computational bioinformatics algorithms for biologists to generate testable biological hypotheses, to guide their experiments, and to find novel protein sorting motifs and their functions. These tools can help to identify protein mis-targeting signals identified as the cause of many genetic diseases such as the Huntington’s diseases. Bioinformatics algorithms for discovering, comparing and analyzing signal peptides can help biologists to develop optimized sorting signals with high secretion efficiency so that enzyme productivity can be improved, which will benefit pharmaceutical, biofuel, detergent, and related industries. Bioinformatics tools can also help to design drugs to be precisely delivered to desired locations in the cell. This project is to continue development of a web server that will allow users to input, update, search, retrieve and discover sorting motifs. The interactive web interface will allow biologists to easily use our algorithms to identify known sorting motifs and discover new ones.

**Voice Analysis**

*Ekshita Kumar*, Computer Science - Senior  
Mentor: Dr. Duncan Buell, Computer Science and Engineering  
As a Computer Science major, my aim is to apply technology to solve real problems. As one of the first steps, I have researched an interesting computational linguistics problem involving voice data analysis based on formants, pitch and wavelength in sound files to automate generating data for linguists to allow them to analyze and categorize relational data scrutinizing graphs. The majority of this project involved researching Praat, C++,and statistical functions characterizing the connotations of words. Further research analysis and software to study common relationships between different properties of sound files.
The Feasibility of Injecting False Information to the Tire-Pressure Monitor System of Automobiles

Travis Taylor, Computer Information Systems - Sophomore
Mentor: Dr. Wenyuan Xu, Computer Engineering

Tire-Pressure Monitor Systems (TPMS) are systems that detail to the driver the current state of his tires. As TPMS systems have been installed on all new cars, one serious concern facing their successful deployment and correct usage is the need to secure the wireless communication used in the system. Due to its broadcast-based nature, wireless communication is vulnerable to eavesdrop and false packet injection. For instance, successful injecting a low tire pressure message to the control unit wirelessly can cause the car computer to display a false alert to the driver, which can create un-trust towards TPMS or life threatening situation when the driver stops its car in a dangerous area. Additionally, car manufacturers are continuing to apply wireless technologies to other aspects of a car. It is, therefore, critically important to analyze the security level and potential vulnerabilities of TPMS communication protocols. Over the course of the Spring semester under this grant, I have learned the TPMS implementations of Toyota and Acura brand cars, I have created packet signals generated with Universal Software Radio Peripheral (USRP) hardware that corresponded to low pressure signals, and have found the hardware necessary to transmit at the 315 MHz spectrum needed to complete this project. I now wish to complete this research, have it published, and have greater security implemented into the vehicular wireless communications.

A Novel Robotic Approach to Contour Recovery using Structured Light

Nicole Tobias, Computer Science – Senior; USC Upstate
Mentor: Dr. Sebastian van Delden, Mathematics & Computer Science; USC Upstate

We have developed a novel approach to depth recovery using structured light in which a single camera and simple laser dot pointer are mounted to the end of a robotic manipulator. This approach is very novel, but interesting because unlike most structured light approaches it requires no camera/laser calibration. The algorithm has been implemented and tested on a Stäubli RX60 robotic manipulator with CS7B controller onto which an inexpensive off-the-shelf USB camera and laser-dot pointer are mounted with a bracket. Once depth has been recovered a 3D digital model of the surface is re-constructed which can be viewed by an operator. Experimental test results are reported.

Dynamic Generation of Association Strengths

Alex Wong, Computer Science - Senior
Mentor: Dr. Manton Matthews, Computer Science and Engineering

Information retrieval (IR) systems are used to search a set of documents and provide a relevance ordering to documents in relation to a query. Such IR systems are often found in search engines to generate results that are relevant to a query. On a traditional computer processor, a query in an IR system is time-consuming because it requires iterating through many elements to compute the results. In this project, I have designed and implemented an association strength calculation system on Nvidia’s CUDA platform to accelerate a computationally expensive portion of an IR system. The CUDA platform harnesses the power of stream processors found on graphics devices, which are ideal for tasks that can be split into many similar, simple pieces and executed simultaneously. The query
processing and ordering component of an IR system is such a task. The IR system will be used to produce the necessary links between documents in part of the “Tenth Dimension” project. The IR system will generate relations and relevance scores between documents catalogued for this project. The remainder of my project will be to interface the association strength calculation program to the rest of the IR system.
Experiential Showcase

Capstone Scholars Maymester to Peru

**Lauren Bravoco**, Management - Sophomore

**Melissa Karl**, Retailing - Sophomore

Mentor: Dr. Patrick Hickey, Nursing

The purpose of our poster is to share our experiences from Peru and to hopefully impress upon fellow students the true value of a study abroad experience. Our visit to South America has helped open our eyes to the beauty and the poverty in other parts of the world. We will briefly cover interacting with the locals, studying the Spanish architecture, exploring Machu Picchu, climbing Puta Cuzi, and sampling the food and drinks. We will provide photos from our trip and explain the impact it has made on our lives since our return.

Innovative and Award-Winning Writing and Reading Achievement Program (WRAP)

**Linda Cheek**, Psychology - Senior

**Seantel Davis**, Psychology - Senior

**Michael Elko**, Psychology - Senior

**Stephen Hartman**, Psychology - Senior

**LaShika Palmer**, Psychology - Senior

**Zachary Rahn**, Psychology - Senior

Mentors: Dr. Brad Smith, Psychology

Mr. Jason Bird, Psychology

Within the classrooms, through the hallways and down the walkways at the University of South Carolina, future leaders in education and community service learning are emerging to the forefront and reaching new heights of innovation in educational research. Last summer in the Department of Psychology, the Writing and Reading Achievement Program (WRAP) was recognized by the South Carolina Education Oversight Committee (EOC) as the sole recipient of the 2009 SC Literacy Champions Award. The EOC held an awards banquet at Irmo Middle and provided the after-school program with a $10,000 grant to assist in the funding of reading materials and incentives for student participants. Over the past year, a research committee of Psychology and Education majors has been assembled to implement the literacy curriculum and collect data concerning the overall efficacy of provided services. WRAPs primary goal focuses upon shaping young students into lifelong learners and promoting the enjoyment of reading and writing through adolescents.

Alcolu Revitalization Project

**Mataesha Green**, Hotel, Restaurant, and Tourism Management - Senior

Mentor: Dr. Reenea Harrison, Retailing

The Have Faith Community Development Corporation is working on the Alcolu Revitalization Project. This project is involving over 500 acres of land with community, educational and economic development programs.
Fashion Design in London

*Tara Lance*, Retailing - Senior
Mentor: Dr. Reenea Harrison, Retailing

In Fall 2009, I studied at American Intercontinental University (AIU) in London, United Kingdom. London is one of the fashion capitals of the world. While abroad, I was able to gain academic credit while taking fashion design courses that USC doesn’t offer. Through this presentation, I will educate students about the opportunities offered through study abroad. Although the University of South Carolina is not located in a fashion capital like London, we as students don’t have to limit ourselves. I would like to stress to my peers the process of studying abroad, the financial assistance that is available, and the support which is available at USC to aspiring fashion students like me. About my personal experience: As a senior, my area of emphasis is fashion merchandising. Although I do not attend a design school, this has not stopped my dream of becoming a fashion designer and having a successful fashion label. By attending a design university abroad, I was able to overcome this challenge. Through foundation courses, I gained confidence. I was able to experience the London culture first hand, and adopt their value of art. European culture gave me a new perspective. It’s not the job you have or the amount of money that is made, it is about the joy the position brings you. I learned more about myself academically, professionally and personally.

Visual Translations: Painting the Theogony

*Jaime Morgan*, Art Studio - Senior
Mentor: Prof. Pam Bowers, Art

During the summer of 2009, I traveled to the American School of Classical Studies in Athens, Greece to conduct research on "The Theogony", a Greek origin poem by the poet Hesiod. "The Theogony", a work I first read in Dr. Mark Becks Mythology class at the University of South Carolina, struck me as intensely visual. I applied and was accepted as a Visiting Associate Student Member at the American School to study the poem, as well as observe Greek art first hand. Working in the Blegen Library in Athens, as well as from sculpture in various museums and site specific locations, I finalized my compositions for paintings influenced by the work. Drawing from these compositions, I have completed paintings from selections of the Theogony, utilizing my experiences this summer to deepen their complexity. A show of these paintings will be scheduled in Columbia, SC. A section of this show will travel to the American School of Classical Studies in Athens in the summer of 2010.

Rotary Scholarships: Perspectives on the Application and the Journey

*Marin Mueller*, Economics - Junior

*Kimberly Vinci*, Exercise Science - Senior

The Rotary Foundation is a not-for-profit organization that seeks to promote world understanding and peace. One of the mechanisms through which this goal is supported is the Rotary Ambassadorial Scholarship program. These scholarships allow students to travel abroad to conduct academic study at virtually any university in the world. This presentation will explore the process of applying for a Rotary Scholarship, preparing for departure, and spending time abroad as a Rotary Scholar.
Taiwan
Adrienne Phillips, International Studies - Junior
When I told others in America that my study abroad destination was in Taiwan, some of my responses were “Where is that?” and “Oh, you’re going to Bangkok?” This shows how badly informed Americans are of the world around them. In this presentation, the importance of studying abroad is stressed to get students in America to travel and be more open minded. This presentation is also meant to bring more recognition to Taiwan, a country that has a rich history and unique culture that should be acknowledged and appreciated more. To this day, Taiwan still struggles to be completely independent from China and has a long history of occupation by China and Japan. These countries, as well as Korea, have influenced Taiwan’s culture and scenery. Taiwan’s cities and countryside have so many beautiful, unforgettable sights, foods and people that go unrecognized. Hopefully this presentation will teach others about Taiwan, and encourage them to study abroad in order to expand their horizons.

The Art of Conservation
Samantha Skelton, Art History - Junior
Mentor: Dr. Ed Munn Sanchez, Philosophy
Since August 2008, I have studied as an intern at Crawford Conservation, an art conservation studio located in Swansea, SC. Crawford Conservation provides painting, book and paper conservation to a variety of public and private organizations as well as individual collectors. Throughout my time there I have participated in the conservation of a number of paintings and works of art as well as studied the correct procedure for evaluating the condition of a work of art and determining appropriate treatments. Focusing on the conservation and restoration of oil paintings, I was able to pursue an Honors College thesis project in conjunction with this internship by performing a full restoration on a volunteered work of art. This painting offered opportunities for learning and executing cleaning, repaint and varnish removal, tear and hole repair, canvas lining, paint consolidation and inpainting. Having the opportunity to learn conservation methods and develop restoration techniques first-hand has solidified my decision to pursue a graduate degree in art conservation and a future career in the field.

Waverly After School Center
Jessica Steele, Baccalaureus Artium et Scientiae - Senior
The Waverly After School Program was begun nearly six years ago by five USC freshmen. Inspired by local community leader Eddie B. Lloyd, they began offering tutoring at his community center four days a week. Over the next several years, the number of volunteers expanded and program offerings grew to include reading programs, regular field trips and special events, and additional programs such as Cub Scouts and Girl Scouts. In 2005, Mr. Lloyd passed away. Since that time, USC students have run and expanded the Center in memory of Mr. Lloyd and with the hope of continuing his mission of giving Waverly children academic opportunities. In the past few years, the Center has grown to include over 50 regular volunteers, a Public Health Initiative and a Summer Scholarship Fund. While none of Waverly's volunteers are reimbursed monetarily for their efforts, they are motivated by the individual interactions and small successes they see in Waverly students each and every day. All of our volunteers are passionate about education, and enjoy sharing
this fervor with younger community members who also dream of one day graduating high school and attending college. In the fall, Waverly applied for and received a $10,000 grant from State Farm to help with several new initiatives including free healthy snacks, field trips, a community garden, college preparation and new academic tools.
Effect of ACE Inhibitors on Renal Function in a Surgical Critical Care Population

Katie Barber, Pharmacy - Senior
Mentors: Dr. Brandon Bookstaver, Pharmacy
Dr. April Miller, Pharmacy

Purpose: Patients admitted to the surgical/trauma intensive care unit (STICU) are often placed on ACE inhibitors for antihypertensive therapy. The objective of this study is to determine the effect of ACE inhibitors on renal function when treating hypertension in a STICU population.

Methods: Data was collected from existing medical records for all patients in the STICU that received ACE Inhibitor therapy after 72 hours of ICU admission for control of acute hypertension between January 1, 2007 and June 30, 2009. A retrospective chart review was used to collect renal function data for the primary endpoint of acute renal failure which has been defined using the Risk, Injury, Failure, Loss, End Stage Renal Disease (RIFLE) Criteria and creatinine clearance estimated with the Cockcroft-Gault formula. Confounding disease states such as congestive heart failure, diabetes, myocardial infarction, volume depletion and bilateral renal artery stenosis has been collected and controlled for.

Successful Treatment of Vancomycin-Resistant Enterococcus Faecium (VRE) Meningitis Using Intravenous (IV) Daptomycin

Mohamed Hashem, Pharmacy - Senior
Mentor: Dr. Brandon Bookstaver, Pharmacy

This case report documents the use of IV daptomycin to treat VRE meningitis. As well as an extensive literature review of several case reports that demonstrate the successful treatment of VRE meningitis using other agents. To our knowledge, we report the first case of daptomycin to treat VRE meningitis. We examined the case of a 78 year old male who suffered VRE meningitis following his third laminectomy and decompression of the lumbar spine. We conducted a review of the patient’s medical history during his hospitalization. We conducted a literature review using MEDLINE of other successful cases of treating VRE meningitis and daptomycin. Daptomycin successfully treated VRE meningitis after a 30 day IV administration. The patient received daptomycin 640 mg IV daily (9 mg/kg) and gentamicin 450mg IV daily for synergy. Gentamicin was discontinued after 9 days while daptomycin was decreased to 420 mg (6mg/kg) IV every 48 hours due to an acute kidney injury (serum creatinine 5.2 mg/dl). Daptomycin levels in the serum and cerebrospinal fluid were drawn while the patient was receiving 9 mg/kg as well as a CPK level which was close to baseline. A follow up lumbar puncture showed improvement; the patient’s renal function returned to baseline after treatment and all subsequent cultures were negative. Daptomycin is a viable alternative for the treatment of VRE meningitis. The use of high dose daptomycin to treat VRE meningitis demonstrated great safety and efficacy.
Clinical and Economic Outcomes of Concurrent Use of Clopidogrel and Proton Pump Inhibitors

**Kendra Manigault**, Pharmacy - Senior
Mentor: Dr. Scott Sutton, Pharmacy

Background: There has been emerging evidence of a potential drug-drug interaction between clopidogrel and proton pump inhibitors (PPIs) which renders clopidogrel ineffective. Clopidogrel failure puts patients at an increased risk of cardiovascular and cerebrovascular complications which can lead to myocardial infarctions, strokes, and death.

Objective: The objective of this research is to analyze primary literature to identify patients’ risk of cardiovascular and cerebrovascular events as a result of combination use of clopidogrel and PPIs. Methods: A literature search on PubMed using search terms “proton pump inhibitors and clopidogrel" was used to retrieve primary and review articles. Results of previous clinical studies were analyzed to classify patients’ risk of adverse events. Data was collected on the approximate cost of cardiovascular and cerebrovascular events to quantify the economic cost of increased events.

Results: Most clinical studies showed an increase in the amount of adverse events in patients receiving clopidogrel and PPIs which supports the theory that there is a harmful interaction between these medications. The substantial economic costs of recurrent cardiovascular and cerebrovascular events provide further support of the need to provide clinicians with concrete recommendations for the use of these medications.

Conclusions: Data from the analyzed trials highlight the importance of future randomized trials to make a conclusive decision concerning the safety and economic benefit of combining clopidogrel and PPIs in patients. Clinicians should consider alternative medications and assess the risk and benefits of concurrent use of clopidogrel and PPIs before prescribing these medications in combination.

Effect of Delayed Prophylaxis on Venous Thromboembolism (VTE) Rates

**Elisa Morgan**, Pharmacy - Senior
**Chad Morris**, Pharmacy - Senior
Mentor: Dr. April Miller, Clinical Pharmacy and Outcomes Sciences

Purpose: Pharmacological VTE prophylaxis decreases risk of VTE in hospitalized patients. However, potential bleeding risks or a perceived low risk of VTE often delay its initiation. Many doses are held for either administrative or clinical reasons. The effects of delays in therapy and missed doses on VTE rates are unknown. The primary objective of this study is to compare VTE rates in patients receiving early versus delayed pharmacologic VTE prophylaxis. The secondary objective is to compare VTE rates among patients with held or omitted doses.

Methods: This retrospective, case control study consists of fifty case patients with hospital-acquired VTE as a discharge diagnosis matched with 200 controls based on age and reason for admission. Medical records will be reviewed and the rate of the early (within 48 hours of admission) versus delayed (>48 hours of admission) initiation of pharmacologic prophylaxis and the rate of missed doses will be compared between groups. This sample size will provide 82% power to detect a
20% difference using a Chi square analysis to compare VTE rates in patients receiving early versus delayed pharmacologic prophylaxis. Results: To date, data on time of pharmacologic prophylaxis has been collected for all case patients. One-third of case patients had orders for pharmacological VTE prophylaxis >48 hours of admission. Data collection on control patients and missed doses is ongoing and will be complete by April 2010. We anticipate that delayed pharmacologic prophylaxis will increase VTE rates. Conclusion: The results from this study could guide practitioners in balancing both bleeding and VTE risk in choosing when to initiate pharmacologic prophylaxis. They can also help raise awareness of the importance of administering all ordered doses.

**Evaluating Vancomycin’s Pharmacokinetic Variability and Implications of Predicting Serum Concentrations**

*William Parker*, Pharmacy - Senior  
*Mentor: Dr. Scott Sutton, Pharmacy*

Vancomycin is a glycopeptide antibiotic used for the treatment of Methicillin-Resistant Staphylococcus aureus (MRSA). The incidence of MRSA has increased in recent years, with approximately 126,000 hospitalizations annually and an estimated 18,650 deaths. In addition, the incidence of MRSA is consistently higher among African Americans when compared to Caucasians in various age groups, who represent a large portion of the patient population of South Carolina. Due to vancomycin’s highly variable pharmacokinetic profile, it is imperative to identify a model that accurately predicts serum vancomycin concentrations. There are many models that have been purposed for such predictions. These models provide varying predictions from patient to patient. The objective of this study is to determine which volume of distribution and estimated glomerular filtration rate (GFR) models most accurately predict serum vancomycin concentrations. This retrospective, observational study is being conducted by calculation of the elimination rate constant (Ke) of vancomycin for each subject, using glomerular filtration rate (GFR) and population based volume of distribution models. The estimated Ke will then be used to predict serum vancomycin concentrations. A statistical analysis will conducted by comparison of these predicted concentrations to vancomycin trough levels obtained from the studied population, via calculation of the mean squared error (MSE).

**Adenocarcinoma of the Pancreatic Head: Comparison of EUS, CT and Pathologic TNM Staging in a Single Institution**

*Stacy Webb*, Biological Sciences - Sophomore  
*Mentor: Dr. Loren Knapp, Biological Sciences*

Accurate initial staging of pancreatic adenocarcinoma is critical because the patients’ only chance of surviving is tumor resection. The five-year survival rate is around 5%, making pancreatic cancer the Senior leading cause of cancer death. The five-year survival rate rises to about 25% with resection of the tumor. There are discrepancies between whether EUS or CT is more effective at diagnosing pancreatic adenocarcinoma due to the differences in the imaging modalities’ specialties. EUS is superior in detecting smaller tumors (2 to 3mm), while CT is capable of viewing metastases. We performed a single-institution, retrospective review of patients diagnosed with pancreatic adenocarcinoma from 1/1/05 through 12/31/08. We reviewed the patients’ electronic charts to record patient
demographics, disease information, laboratory tests, and imaging data. We staged based on the TNM staging criteria from the AJCC 6th edition. We included patients who were diagnosed with adenocarcinoma of the pancreas head or neck and underwent EUS. Using pathologic assessment as the gold standard, the overall accuracy of CT and EUS were determined. Forty-eight patients were identified, however, only 15 had pathological stages (resected tumors) to compare to the imaging modalities' staging. EUS and CT combined predicted the T stage correctly in 33% of the patients; EUS correctly staged 20%, while CT correctly staged 13%. CT and EUS were did not appear to be very accurate at T staging when compared to pathology; however, without the other 33 patients' pathological staging there is no way to determine how accurate they were.

A Retrospective Review of Gastric Cancer Management at a Regional Teaching Hospital
Shalika Whig, Psychology - Junior
Mentor: Dr. Loren Knapp, Biological Sciences
Gastric cancer is given minimal attention in the Western world due to a traditionally low occurrence as compared to other types of cancer. However, because it is often detected only in its later stages, poor prognosis quite often results. This unfortunate fact indicates that research of this subtype of cancer must not be neglected. Though the overall rate of gastric cancer has decreased in past 75 years, a worrisome epidemiological shift in the sub-type has occurred: a higher diagnosis of cancer of the proximal stomach than of the distal occurs. This shift is attributed genetic predisposition, dietary negligence, and health factors such as smoking, Heliobacter Pylori infection, obesity, and gastric reflux. The most effective treatment for gastric cancer continues to be resection with clear (R0) margins. However, recent studies have illuminated the possibility of an improved prognosis in individuals receiving a more multimodal approach to treatment. This multimodal approach includes chemotherapy and radiation therapy in neoadjuvant and adjuvant settings (before resection and simultaneously with resection, respectively). Our study retrospectively evaluates the management of gastric cancer patients at a community hospital (Greenville Memorial Hospital) over a ten year period. We focused on eliciting the level of inclusion of neoadjuvant and adjuvant therapies in physicians’ treatment plans. Results indicate that multimodal therapies have been included increasingly over the 10 year period, though resection remains the primary mode of treatment. Additionally, PET and CT scans for staging purposes have become more common.
Exploring the Changes in Distributions of Mytilus trossulus and Mytilus galloprovincialis in Northern California

Cecil Ballew, Biological Sciences - Junior
Mentor: Dr. Thomas Hilbish, Biological Sciences

We collected samples of blue salt-water mussels from nine sites in Northern California and tested the Glu-5’ locuto determine if the samples were Mytilus trossulus or Mytilus galloprovincialis. After determining the identification of the samples, the population distribution was compared to a study from a previous year as well as samples from 10 years previous. After determining whether there had been a dramatic shift in the distribution of the species, we conducted a climate analysis to determine if a change in the climate was a factor in the population shift.

A Biomimetic Data Logger to Estimate Soft Tissue Desiccation in Intertidal Bivalve Mollusks

Nicholas Burnett, Biological Sciences - Sophomore
Mentor: Dr. David Wethey, Biological Sciences

Intertidal organisms regularly experience both marine and terrestrial habitats and can be affected by extreme conditions in either habitat. In particular, sessile intertidal organisms, such as bivalve mollusks, that can not actively escape or avoid stressful conditions are considered an indicator species for the effects of climate change on species distribution in the intertidal zone. Previously, biomimetic data loggers created to measure environmental stresses on bivalve mollusks in the intertidal have measured only body temperature. Desiccation is an environmentally induced stress that is not necessarily coupled with ambient or body temperature. We describe the use of miniature electronic humidity sensors to estimate the soft tissue desiccation rate in mussels.

Olfactory Receptor Gene Characterization in Four Species of Snake to Indicate their Reliance on Olfactory Receptors

Taylor Byerly, Nursing – Junior; USC Aiken
Mentor: Dr. Michelle Vieyra, Biology/Geology; USC Aiken

Though it is well known that snakes detect odor via the vomeronasal system, the study of their use of olfactory reception to smell has been severely neglected. The primary purpose of this study was to estimate the reliance on an olfactory receptor system by Water snakes (Nerodia fasciata), King snakes (Lampropeltis getula) Copperhead snakes (Agkistrodon contortrix), and Hognosed snakes (Heterodon platirhinos); and to generalize these results to make an early hypothesis about the snake family as a whole. Olfactory receptor (OR) genes were amplified from the isolated DNA of the aforementioned species and replicated. Samples were purified and sequenced. The sequenced results were screened for integrity and monitored for the presence of stop codons (marking them ‘pseudogenes’). Similar gene sequences were aligned, and a phylogenetic tree (visually representing their relationship) was created. A total of 112 unique olfactory receptor genes were isolated: 36 Copperhead Snake, 34 King Snake, 16 Water Snake, and 26 Hognosed Snake. Only one of the genes (belonging to a Copperhead Snake) was identified as being a pseudogene. As pseudogenes are non-functional genes, a species’ percentage of pseudogenes that code for a given trait should have an inverse
relationship with that species’ reliance on that system. Based on the percentages found in this study, it was determined that these four species use olfactory reception as a method of odor detection. Generalizing the results from these four species of snake to all species of snake, we would hypothesize that all snakes have the capacity to use olfactory reception.

Investigating the Importance of Mangrove Habitat to Basic Ecological Aspects of the Longtail Goby in Coastal Ecuador

**Amanda Kelly**, Marine Science - Junior  
Mentor: Dr. Virginia Shervette, Environmental Health Sciences

Mangrove wetlands provide essential ecosystem functions, and the accelerated loss of these wetlands is detrimental for all life on earth. Only by understanding the specific implications this habitat loss and alteration has on the species which depend on them for their existence can we wholly grasp the ramifications of their loss. In this research, I am investigating the potential impact that mangrove wetland habitat loss has on the longtail goby (*Ctenogobius sagitulla*), a common fish species from coastal Ecuador. Through examining diet and aspects of reproduction in this species across two habitats, a small remaining mangrove stand and an adjacent tidal river, I am able to characterize the relative importance mangroves play in their life history. Longtail gobies were seven times more abundant in mangrove areas compared to the tidal river. In general, gobies from mangrove areas were significantly smaller. Mostly large female gobies were collected from the tidal river habitat. The information obtained for this work is important in the conservation and management efforts of mangroves in coastal Ecuador because it emphasizes the extreme importance of mangroves to the life history of this common species. I am also providing basic ecological information about a species of fish on which no diet and reproduction information exists in the peer-reviewed published literature.

Demographic Model of Thalassinid Shrimp in the Eastern North Pacific

**Elizabeth LaBone**, Biological Sciences - Senior  
Mentors: Dr. Sarah Woodin, Biological Sciences  
Dr. David Wethey, Biological Sciences

The Thalassinid shrimp *Neotrypaea californiensis* is found on the Western coast of North America. It is an important ecosystem engineer and a pest in the oyster industry. A stage-based population model was created for several estuaries in Oregon and one in Washington using data from the literature. Fecundity was found to be dependent on size and not age, so stages based on carapace length were used. Probability of retention in stage and moving on from a stage were calculated based on Caswell (1989). Some estuaries were population sinks, and others were population sources. The lowest lambda value, 0.89, was found for Willapa Bay, where pesticides are sprayed to control for the shrimp. The two highest values of lambda were found for Siletz Bay, 1.22, and Alsea Bay, 1.23, which have the greatest fecundities of the populations with data available. The model was then used to look at possible affects of increased predation and addition of pesticides.
Building A DNA Barcoding Database for Atlantic Billfishes

**Kyra Marsigliano**, Marine Science - Sophomore
Mentor: Dr. Joseph Quattro, Biological Sciences

Effective management of the world’s important fisheries hinges on having appropriate data about the structure and status of individual stocks. Stocks of Atlantic billfish, a collective term applied to two families of large, highly migratory, predaceous fish with a large, sword-like upper rostrum, are negatively impacted by recreational and commercial fisheries. In an effort to manage these species, larval density is oftentimes used as a proxy for reproductive output, and therefore counts and geographical location are used in the formulation of comprehensive management strategies. Unfortunately, visual identification of larval billfish, frequently 2-6 mm in length, is often impractical and imprecise. Employment of a genetic barcode – a means for identifying larval individuals to species based on short DNA sequences – could circumvent this issue. I have developed a genetic barcode for billfishes based on sequences of the mitochondrial ATCO locus. This locus has been useful for identification of larval tunas and, in our experience, provides more accurate species identification among closely related taxa. The ATCO locus was amplified with universal primer sets, sequences aligned, and unambiguously changing DNA differences between taxa identified using the computer program CAOS. Individual unknown larval samples were compared to reference sequences from adult specimens collected in cooperation with NOAA and NMFS and reliably assigned to species. I discuss the results of these comparisons and focus on the potential for visual misidentification of certain species pairs.

Role of Diet Shift in Reducing Invasive Crab Populations

**Hallie Mosblack**, Marine Science - Junior
Mentor: Dr. Blaine Griffen, Biological Sciences

Two invasive crab species, Carcinus maenas and Hemigrapsus sanguineus live along the New England Coast. Current trends show that Carcinus populations are decreasing when in the presence of Hemigrapsus populations. The purpose of this study was to determine the cause of these trends. Previous research has shown that when Carcinus and Hemigrapsus inhabit the same area Carcinus will change its diet from mussel consumption to algal consumption. Experimental evidence demonstrates that when algae rather than mussels are consumed, crabs store less energy in the hepatopancreas (an energy storage organ). We collected roughly 300 female Carcinus and quantified their gonads (reproductive effort) and hepatopancreas (energy stores). We discovered that as the energy store of the hepatopancreas decreased, the reproductive effort increased, meaning that the crab is obtaining its reproductive energy directly from the hepatopancreas. This suggests that the decreased energy provided by an algal diet to the hepatopancreas is responsible for a decline in Carcinus reproduction, which may be responsible for the decreasing population sizes. The findings of this study increase our knowledge of invasive species. Together with other ongoing research, this project has improved our understanding of the roles that these two species play in the ecosystems that they have invaded, and the possible negative impacts of their invasions.
Systemin as a Defense Response Eliciting Component in the Oral Secretions of Manduca Sexta Larvae

Azka Nazir, Biological Sciences - Junior
Mentor: Dr. Johannes Stratmann, Biological Sciences

Plant herbivores halt the growth of plants. As a consequence, plants have evolved defense mechanisms to protect themselves. Systemin is an anti-herbivore response eliciting peptide, released by the plant at the wound site, in response to herbivore attack. When caterpillars feed on tomato leaves, the leaves come in contact with their oral secretions. These oral secretions have been shown to be active in inducing anti-herbivore defenses in plants, and are known to contain fatty acid-amino acid conjugates (FACs). In tomato plants, these FACs were tested and found to be inactive in eliciting defense responses. Therefore, we hypothesized that systemin is the defense response-inducing component in the oral secretions, which gets taken up by the caterpillars as they feed on plants. In order to test that, I obtained oral secretions from caterpillars raised on plants with different levels of systemin. The plant groups included wild type tomato, systemin overexpressing tomato, and wild type tobacco (which lacked systemin). The oral secretions were tested for defense compounds using radial immunodiffusion assay (RIDA). We expected that oral secretions from systemin overexpressors would be more active in inducing synthesis of defense compounds than wild type tomato, and tobacco would be almost inactive. However, our results did not support the hypothesis, and we found similar levels of defense compounds induced by oral secretions from all three plant groups. We have been trying to understand the intricate relationship between plants, and their environment, and a better knowledge of that interaction can help us breed more herbivore-resistant crops.

Regulation of the COP9 Signalosome in Response to Stress in Tomato Plants

Sarah Pulliam, Biological Sciences - Senior
Mentor: Dr. Johannes Stratmann, Biological Sciences

Plants have evolved a variety of defense responses to protect against stresses such as herbivorous insect attack. I studied the effects of biotic and abiotic stresses on tomato plants to better understand the molecular processes underlying defense strategies. Ultimately, my goal is to increase plant resistance to diseases and insects in crop plants. The CSN5 protein is part of the COP9 Signalosome (CSN) complex which is involved in various developmental processes. We have shown previously that this protein is involved in plant defense responses. The CSN is also known to be essential for proper plant development. Therefore, it can be assumed that the CSN is tightly regulated to coordinate all these processes. One level of regulation may be gene expression, another one may be protein stability. By varying the life span of proteins, their functions can be altered. To approach this, I analyzed CSN5 protein and transcript levels in response to stresses. Two-week old seedlings were exposed to a variety of stresses, including systemin, flagellin, salt, MeJA, and caterpillar wounding, in multiple time course experiments. Northern blotting and immunoblotting techniques were used to analyze CSN5 transcript and protein levels, respectively, in both treated and untreated tissue samples. Both CSN5 transcript and protein levels were shown to be unchanged in response to all stresses tested. These results indicate that gene expression and protein stability are likely to not play a role for the regulation of CSN function.
Phycoerythrin Extraction and Storage

Erin Fedewa, Marine Science - Sophomore
Mentor: Dr. Tammi Richardson, Biological Sciences
Phycoerythrin, a red protein from the phycobiliprotein family, is an accessory pigment to the major light harvesting pigments responsible for photosynthesis. Phycoerythrin is present in cyanobacteria, cryptophytes and red algae, often giving them a pink or red appearance. It has an absorption peak at 545 nm, which we can use to quantify the amount of pigment in phytoplankton cells. There are several techniques to extract phycoerythrin from cultures. In this project, I compared different extraction protocols to see which one would yield the highest extraction efficiency. Often, pigment samples must be stored for several weeks before they can be processed. During this time, pigment degradation can occur. Thus, I also examined how long samples can be stored before degradation occurs upon determining the optimal extraction protocol. Using a culture of Rhodomonos salina, it was determined that the freeze-thaw method for extraction is the most efficient, while samples showed little or no degradation over the course of the 12 week experiment.

Chalcophile Elements in Peridotites as a Proxy for Sulfide Mineralization During Serpentinization

Caitlin Gionfriddo, Chemistry - Senior
Mentor: Dr. Michael Bizimis, Earth and Ocean Sciences
Petrographic observations in serpentinized abyssal peridotites [1] show evidence for sulfide mobilization/recrystallization during hydrothermal alteration, while thermodynamic modelling suggests that sulfide, Fe-Ni-O-S, systematics may be a useful indicator of T, fO2, fS2 for hydrothermal systems [2]. Chalcophile element concentrations (e.g. Cu, Zn, Pb) in peridotites may then reflect the processes of sulfide precipitation/desulfurization during serpentinization. We present preliminary trace element data on bulk-rock serpentinized abyssal peridotite and fresh Hawaiian peridotites with a focus on chalchophile elements, to investigate the effects of sulfide precipitation in the mantle. Our results show that Cu concentrations in abyssal peridotites are extremely variable (x10), and extend to significantly higher concentrations than the Hawaiian peridotites. Copper, and to a lesser extent Zn, are entirely decoupled from any lithophile element (Ti, Zr, REE), indicators of melt depletion and refertilization in both the serpentinized and fresh peridotites. Petrographic and EPMA investigation showed a much greater modal abundance of sulfides in the abyssal vs. Hawaiian peridotites, with abyssal sulfides being dominantly petlandites with often Cu-rich lamellae. We suggest that the high Cu contents in abyssal peridotites likely result from sulfide precipitation during serpentinization, and bulk rock Cu contents may be a proxy for the abundance of chalcopryte (CuFeS2) in peridotites.
The Effects of pH on Genetic Diversity of Daphnia
Aubrey Hughes, Biological Sciences - Junior; USC Sumter
Mentors: Dr. Jeff Steinmetz, Biology; USC Sumter
Dr. Pearl Fernandes, Biology; USC Sumter

Preventing the decline in biodiversity is a serious ecological challenge scientists face today. Though the threats to biodiversity are well known, the relationship between diversity at different levels is not well understood. Understanding the forces that maintain biodiversity at multiple levels preserves stable communities. We used genetic techniques of microsatellite markers to identify the Daphnia species. Daphnia was collected from several lakes in South Carolina and DNA was extracted and amplified using polymerase chain reaction (PCR). Three microsatellite markers (Fol Forward, Fol Reverse, and CoI) known to cross-amplify with several Daphnia species were used to identify our samples. For our ecological results, the zooplankton we found included rotifers, ostracods, copepods, and several types of cladocerans including the invasive species Daphnia lumholtzi. Our results from the genetic analysis produced PCR fragments of approximately 700 bp in the control, but no products in the samples. This could potentially be a method to distinguish our species of Daphnia from other species. However, our data is preliminary and studies with a larger population using a greater number of markers will be useful not only for studying species identification but also the genetic diversity in these populations. Sequencing of PCR products could add further information towards the population structure and genetic diversity. The work done through this research will specifically contribute to the understanding of how environmental degradation, such as lake acidification, can affect genetic diversity. It will also form a base for more detailed future studies exploring the connections between genetic and species diversity.

Buoyant Plume from Multiple Sources of Freshwater in the Presence of Cyclonic Wind Field
Grace Maze, Marine Science - Senior
Mentor: Dr. Alexander Yankovsky, Earth and Ocean Sciences

High-latitude buoyant coastal currents originating from multiple sources of freshwater, such as the Alaska Coastal Current, are affected by wind systems that are predominantly of cyclonic vorticity and downwelling-favorable near shore. An idealized model (ROMS) configured as a periodic channel was used to investigate the effects of mesoscale atmospheric cyclones, both translating and stationary, on the evolution of continuous buoyant plume forced by multiple sources of freshwater. These effects were compared for several channels of varying slope steepness. It was found that (i) translating cyclones enhance the mesoscale variability in the coastal current and these effects last longer than the time-scale of translating cyclone resulting in the offshore spreading of buoyant water. (ii) An even stronger effect is caused by stationary cyclone which produces an offshore filament of buoyant water gradually evolving into a detached anticyclone. If the wind persists long enough this process is repeated forming multiple anticyclones. These detached anticyclones move the freshwater offshore, causing the alongshore freshwater transport to be reduced by up to 50%. (iii) Substantial mixing of the buoyant discharge occurs at the mouths of individual inlets, and the efficiency of mixing is reduced when the bottom slope becomes gentler.
Mechanisms of Bacteriophage Evolution

**Andrew Moeller**, Biological Sciences - Senior  
Mentor: Dr. Robert Friedman, Biological Sciences

Over the last ten years, the field of evolutionary biology has come to accept the fact that horizontal gene transfer (HGT) has had a tremendous impact on life’s history, particularly microbial evolution. However, many characteristics of HGT among nature’s most widespread microbes, the tailed bacteriophages, are not well-understood. This is problematic because tailed phages play a significant role in a wide variety of ecological and evolutionary processes, including carbon cycling and the evolution of bacterial pathogenicity. In this study, statistical analyses of Enterobacteria phage lambda gene families are employed to examine the factors that determine the fate of horizontally transferred phage genes. Results indicate that purifying selection has been a dominant force in bacteriophage and prophage evolution, and possible mechanisms for genetic recombination among phages are proposed.

Iron Availability and Growth of Marine Diatoms

**Katherine Sandel**, Marine Science - Junior  
Mentor: Dr. Tammi Richardson, Biological Sciences

Iron is a nutrient required by all photosynthetic organisms for growth and reproduction. The supply of iron to marine phytoplankton is thought to regulate the extent of primary productivity in vast regions of the world’s oceans. In this project, I investigated the relationship between growth of a common marine diatom, Thalassiosira pseudonana, and iron availability. Diatoms are an important component of phytoplankton communities in ocean ecosystems, both in terms of their contributions to biomass and overall primary production. I used a “trace metal clean” approach to grow batch cultures of T. pseudonana in the presence and absence of iron. Cells grown with an ample supply of iron grew significantly faster than iron-limited cells. RNA from these +Fe and –Fe cultured cells was extracted, and used in a related study of the molecular mechanisms that govern iron uptake in phytoplankton.

Population Genetic Structure of D. Obtusa In Relation to Flooding Rate at Congaree National Park

**Mathew Sebastian**, Biological Sciences - Sophomore  
Mentor: Dr. Jeff Dudycha, Biological Sciences

Daphnia obtusa are planktonic crustaceans that are found in lakes and ponds. D. obtusa are commonly used in evolutionary and ecological experiments because: 1) they are the dominant herbivore in the ecosystems they inhabit; 2) they are easily maintained in a laboratory and have short generation times; 3) they are cyclical parthenogens (reproduce sexually/asexually), and can be maintained clonally for an indefinite period. D. obtuse can produce dormant eggs that winds and animals transport to other populations. This migration is assessed by using microsatellites (short repetitive DNA sequences) to measure genetic differences between populations to ascertain their population structure. To characterize the population genetic structure of D. obtusa at Congaree National Park, 12 populations of clonal lines were genotyped. The Fork Swamp region is at a relatively low elevation, in between the Congaree and Wateree Rivers, flooding often while the Visitor’s Center region is at a higher elevation, affected by flooding occasionally. First, DNA
containing microsatellites were amplified. Second, an ABI 3730 was used to determine their alleles. Then Structure 2.2 was used to analyze allele and genotype frequencies and to test the hypotheses. Results show that individuals from the same pond are more genetically similar to each other than to individuals from other ponds. Populations in one geographic region are more related to each other compared to populations in another geographic region and that the populations in the region with frequent flooding are more closely related to one another than the populations in the area with infrequent flooding.

**Gills Creek Watershed Research of Stream Contamination**

*Seth Stewart*, Marine Science - Sophomore  
*Lesley Joseph*, Civil and Environmental Engineering - Junior  
*Amanda Tatum*, International Studies - Senior  
*Hayley McLeod*, Biological Sciences  
*Nicole Prochak*, Chemical Engineering  
*Natalie Reeder*, Chemical Engineering  

Mentor: Dr. Dan Tufford, Biological Sciences  
Gills Creek is a stream that runs from Sesquicentennial Park through various small lakes and Columbia and then into the Congaree River. Some time ago, it was determined by water monitoring stations in the lower part of the creek that the fecal coliform concentration was alarmingly high in the stream. These monitoring stations are located far downstream in Gills Creek, so they provide little information about which parts of the watershed are to be associated with the contamination. The main goal behind this ongoing project is to determine which little streams that run into Gills Creek or are a part of it have such high concentrations of fecal coliform. The idea is to figure out where the contamination is mostly coming from and what is causing it. The methods being employed to complete this project are simple. Water samples are taken throughout the watershed, and then these samples are analyzed in a lab to determine the concentration of fecal coliform in each one. A high concentration indicates that contaminated runoff is reaching the stream associated with that water sample. This kind of research is important because Gills Creek is a natural freshwater stream that flows through residential areas of Columbia and empties into the Congaree. There are many people who live around Gills Creek who would prefer to enjoy it as a beautiful aspect of their community, not a body of water so polluted that swimming in it is hazardous to one’s health.

**Analysis and Fate of Single-Walled Carbon Nanotubes and their Manufacturing Byproducts in Estuarine Sediments and Benthic Organisms**

*Brianna Tracy*, Marine Science - Senior  

Mentor: Dr. Thomas Chandler, Public Health  
Carbon nanotubes (CNTs) are nanomolecular-scale tubes of carbon that characteristically exhibit unique electrical properties, extraordinary durability, and can be efficiently used as thermal and electrical conductors. Due to these properties, CNTs are used in a wide array of commercial products. Although CNTs have many extensive applications the potential impacts of their usage have not been closely studied thus making the toxicity of CNTs one of the most pressing questions in nanotechnology. As part of the Magellan Scholar program, I had the opportunity to take part in research currently being conducted by Dr. G. Thomas.
Chandler examining the biological uptake of single-walled nanotubes (SWNTs) and their manufacturing byproducts in estuarine meiofaunal sediment microcosms collected from USC’s North Inlet pristine salt-marsh estuary under laboratory conditions. For this portion of the project, I examined sediment samples contaminated with CNT using epifluorescent stereomicroscopy and recovered benthic foraminifera of species Ammonia beccarii and Elphidium sp. The ultimate goal of the project is the determination of SWNT-derived nanocarbon bioavailability, fate, and effects on estuarine sediment communities at both the biological and environmental level.
Effect of the Anxiolytic SB-205384 on Recombinant GABA(A) Receptors

Laura Heidelberg, Biological Sciences - Senior

Mentor: Dr. Janet Fisher, Pharmacology, Physiology and Neuroscience

Many drugs used to treat anxiety act as positive modulators of GABA(A) receptors, which mediate fast inhibitory neurotransmission. The GABA(A) receptors can be assembled from a combination of at least 16 different subunits. The receptor’s subunit composition determines its pharmacological and functional properties and subunit expression varies regionally throughout the brain. A major goal for treatments targeting GABA(A) receptors is the production of drugs that are more subunit-selective and can therefore modulate a discrete population of receptors.

The anxiolytic SB-205384 is widely considered to act selectively at α3-containing GABA(A) receptors. However, activity at recombinant receptors has been compared only among α1-, α2- and α3-containing receptors. The goal of this work was to examine the activity of SB-205384 at recombinant receptors containing each of the six different α subunits. We found that receptors containing the α3, α5 and α6 subunits were all potentiated by SB-205384, and that the α6 subunit conferred the greatest sensitivity to this modulator. Chimeric α1/α6 subunits showed that multiple regions of the subunit influence sensitivity to SB-205384. Point mutations at sites of heterogeneity within the extracellular N-terminal domain identified leu119 in the α6 subunit as an important contributor to the subunit selectivity of its modulatory effects. Our results indicate that SB-205384 is not an α3-selective modulator, and instead acts on a variety of GABA(A) receptor isoforms. These findings have implications for the side-effect profile of this anxiolytic as well as for its use in neuronal and animal studies as a marker for contribution from α3-containing receptors.

Orexin Neuron Populations in Young and Aged Rats: A Stereological Analysis

Brice Kessler, Biological Sciences - Senior

Mentor: Dr. Jim Fadel, Pharmacology, Physiology and Neuroscience

Alzheimer’s disease (AD) is the most common form of age-related cognitive impairment, and a grave public health problem. In addition to attention and memory deficits, AD is associated with changes in sleep patterns, food intake and metabolism that may precede the diagnosis of dementia by several years. Orexin neurons in the hypothalamus influence all of these phenomena, and there is evidence for altered orexin signaling in aging. Orexin neurons show dichotomous functions, with those cells lateral to the fornix influencing reward/feeding behavior, and those medial to the fornix influencing arousal. To date, there have been no anatomical assessments of the orexin system to determine if there is an age-related reduction in these neurons. This project employed the use of immunohistochemistry and subsequent stereological counts in both young (4 mo) and aged (28 mo) rats to determine if there is a significant and specific age-related loss in orexin neurons. In addition to investigating a specific loss of lateral/medial orexin neuron subpopulations, global neuron loss was examined by counts of hypothalamic melanin-concentrating hormone (MCH) cells. The counts revealed a strongly significant deficit in orexin neurons in aged rats, with both lateral and medial subpopulations displaying fewer cells. Additionally, the aged rats showed a significant loss in MCH cells. Thus, it appears that orexin neurons show an age-
dependent loss. Yet, whether it is a specific dysregulation of the orexin system, or global cell loss in the hypothalamus responsible for the aforementioned symptoms of aging and AD will require further investigation.

**Investigating the Role of Peripheral A2A Receptors in Neuropathic Pain Using Recombinant Herpes Simplex Virus Type 1 to Over-Express the Adrenergic A2A Receptor**

**Iisiaha Mark,** Biological Sciences - Senior

Mentor: Dr. Sarah Sweitzer, Pharmacology, Physiology and Neuroscience

Agonists for the $\alpha_{2A}$–adrenoceptor reduce pain in both animals and humans. Current $\alpha_{2A}$ analgesics produce sedation and cardiovascular depression after systematic or intrathecal injection. The compound ST91, a peripherally active $\alpha_{2A}$ agonist, produces analgesia without hypotension and sedation. The present study used recombinant herpes simplex virus type 1 (HSV-1) containing cDNA sequences for the adrenergic $\alpha_{2A}$ receptor (HSV- $\alpha_{2A}$) and, as a control, the *E. coli lac Z* gene marker (HSV-lacZ) to investigate the role of peripheral $\alpha_{2A}$ receptors in neuropathic pain-associated behaviors and $\alpha_{2A}$–medicated analgesia. Mice were infected on day 7 post-L5 spinal nerve transection, or in the absence of nerve injury, with HSV- $\alpha_{2A}$ or HSV-lacZ. HSV-$\alpha_{2A}$ increased expression of $\alpha_{2A}$ in the DRG and spinal cord, but not the skin at day 15 post-infection as compared to HSV-lacZ control. In uninjured mice, HSV-$\alpha_{2A}$ increased ST-91 analgesia, capsaicin (0.15%) induced de-sensitization and capsaicin (0.015%) induced thermal hyperalgesia as compared to HSV-lacZ. In nerve injured mice, HSV-$\alpha_{2A}$ had no effect on thermal paw withdrawal latency or basal paw withdrawal responses on days 14 and 15 post-infection as compared to HSV-lacZ. In nerve injured mice HSV-$\alpha_{2A}$ had no effect on ST-91 analgesia compared to HSV-lacZ. In summary, HSV-1 mediated expression of $\alpha_{2A}$ in primary afferent neurons, increased capsaicin-induced nociception and ST91 analgesia in uninjured mice but was unable to modify nerve injury-induced alldynia and hyperalgesia. This work was funded by a United States National Institutes of Neurological Disease and Stroke grant (NS26363).

**Optimizing Lentiviral Vector-Mediated Transgene Delivery to Rat Hippocampal Neurons**

**Katherine McClellan,** Biological Sciences - Junior

Mentor: Dr. David Mott, Pharmacology, Physiology and Neuroscience

Epilepsy affects approximately three-million Americans. Kainate receptors, a subtype of glutamate receptors, contribute to development of epilepsy. To study the role of kainate receptors in epilepsy, we would like to manipulate the expression of specific kainate receptor subunits. To do this we use a form of gene therapy in which lentiviral vectors are used to introduce kainate receptor subunit genes into neurons in the hippocampus. Our ultimate goal is to study the effects of kainate receptors in epilepsy. The first step towards achieving this goal is to optimize delivery of the lentiviral vector. Twelve male Sprague-Dawley rats, three per group, received hippocampal injections of a lentiviral vector containing either CaMKII, Synapsin, or PGK promoters driving expression of green fluorescent protein (GFP). To compare vector spread the lentiviral vector was injected into either a single or multiple sites in the hippocampus. The animals were allowed to recover for four weeks while the virus transduced hippocampal neurons. Then, the rats were perfused and their hippocampi were examined for GFP expression. We
found that lentiviral vectors with the PGK promoter produced the most robust GFP expression, followed by Synapsin and CaMKII. Vectors containing the PGK promoter caused GFP expression in most neuron types in the hippocampus. Comparison of the two injection strategies revealed different patterns of GFP expression. In future studies we will insert kainate receptor subunit genes into this vector to evaluate the role of kainate receptors in epilepsy. Supported by an SCHC Undergraduate Research Fellowship (KSM) and NIH grant NS065869 (DDM).

Neonatal Exposure to Alcohol Alters Spinal Cord Innervation

**Eric Robinson**, Biological Sciences - Senior

Mentor: Dr. Sarah Sweitzer, Pharmacology, Physiology and Neuroscience

Alcohol exposure in utero causes physiological and cognitive defects which are termed Fetal Alcohol Spectrum Disorders (FASD) and occurs in 1-10 out of 1000 births. The clinical literature has described somatosensory processing disorders characterized by under-responsiveness to sensory stimulation with increased seeking of sensory stimulation in children with FASD. The purpose of this study is to uncover the neurophysiological changes which underlie this somatosensory processing disorder. A FASD rodent model results in decreased sensitivity to non-noxious mechanical stimuli (Aβ-fiber mediated) and increased sensitivity to noxious thermal stimuli (C-fiber mediated). The innervation of the dorsal horn of the spinal cord occurs by activity dependent competition between A- and C-fibers. Examination of A-fiber and C-fiber innervations of the dorsal horn of the spinal cord were assessed by immunohistochemistry. In the spinal cord, a decrease in the area and density of immunoreactivity of Neurofilament 200 (a marker of Aβ-fiber terminals) illustrates one part of the dynamics of this competitive relationship. In contrast, an increase in area and density of calcitonin gene related peptide (a marker for C-fiber terminals) immunoreactivity in Lamina II of the spinal cord corresponds with the activity dependent competition for innervation. In conclusion, this study demonstrated that fetal alcohol exposure results in changes in spinal innervation. This understanding gives a physiological context to place the clinical evidence of somatosensory processing defects in the FASD population, as cortical wiring is also activity dependent and consequentially somatosensory messages from the spinal cord can lead to abnormal cortical circuits.

Physical and Molecular Characterization of the Peromyscus Epilepsy Model

**Kevin Ryan**, History - Senior

Mentor: Dr. Gabor Szalai, Biological Sciences

Epilepsy is one of the most common human neurological disorders and can arise from any number of causes, including inherited brain lesions and genetically modified cell function. Auditory induction in rodents has proven to be an effective way to analyze epilepsy. Audiogenic seizures (AGS) are initiated through the inferior colliculus and require activation of brainstem auditory pathways. Among the Peromyscus species of deer mice maintained at the University of South Carolina, the subspecies maniculatus artemisiae displays AGS through a spontaneous genetic mutation. For this mutation, it is known that there is a single gene locus. It is hypothesized that alteration in gene expression accounts for the predisposition to AGS. Molecular characterization involves the amplification of purified DNA quantities from the inferior colliculus. Gene expression is carried out
using transcription primers for proteins known to be upregulated and downregulated in the inferior colliculus. Physical characterization of the Peromyscus model is carried out using a Bruker 7 Tesla MRI machine. Both wild type and epileptic Peromyscus deer mice are treated subcutaneously with a manganese contrast agent (0.4% MnCl2 within a 4.2% glucose solution). Manganese is known to be taken up semi-permanently in voltage-gated calcium channels during neuron activation. Therefore, tissue analysis of the inferior colliculus and surrounding structures of both wild type and epileptic mice will reveal the paths of activation of a seizure in these mice compared with normal brain function. Characterization of Peromyscus deer mice will lead to a better understanding of epilepsy both in these mice and in general.

**Alterations in Behavior and Amygdalar Activation in a Model of Pilocarpine-Induced Spontaneous Recurrent Seizures**

*Melissa Smith*, Biological Sciences - Senior  
Mentors: Dr. Marlene Wilson, Pharmacology, Physiology and Neuroscience  
Dr. David Mott, Pharmacology, Physiology and Neuroscience  

Temporal lobe epilepsy (TLE) is a brain disorder characterized by episodic abnormal electrical activity originating from the temporal lobes. TLE is typically associated with additional cognitive symptoms, including memory impairment and increased anxiety. Within the medial temporal lobes are the hippocampus, which is involved in maintaining short-term and contextual memory, and the amygdala, which is implicated in anxiety plus emotional learning and memory. This project uses the pilocarpine animal model of TLE to examine the behavioral and neurological effects of spontaneous recurrent seizures (SRS) on basic memory using an object recognition test, emotional memory using contextual fear conditioning, and amygdalar activation associated with fear learning. Rats with pilocarpine-induced SRS (n,13) and vehicle-treated control rats (n,11) were compared in these tests. In the object recognition task, there were no significant differences between SRS and control groups in exploration of a novel versus familiar object. As expected in the fear conditioning task, SRS rats tend to show less freezing behavior than control rats during acquisition of fear memory and upon re-exposure to the context, reflecting impaired function in this model of emotional learning. In contrast, SRS rats also showed more unconditioned freezing than control rats. An immunohistochemical analysis of cFos expression in the amygdala after fear conditioning showed no difference in neuronal activation between groups, suggesting normal amygdalar activation in SRS rats. These results suggest SRS rats may be impaired in specific types of memory processes, such as contextual fear learning. This might be related to hippocampal changes seen in this rat model of TLE.

**Chronic Ethanol Exposure During Pregnancy: GABAergic Interneurons in the Reward Pathway**

*Daniel Wynn*, Psychology - Senior  
Mentor: Dr. Robert Lawrence, Psychology  

Developmental ethanol exposure is currently the leading cause of preventable mental retardation, affecting an estimated 1% of live births. In fact, a Center for Disease Control survey showed that 10% of pregnant women consumed alcohol while pregnant. FASD, the wide range of physiological and behavioral changes in
the off spring have been well characterized but the physiological impact on the mother is not fully understood though effects on maternal behavior and parenting have been shown in rat models. For example, the dam is less protective of her pups and there is a higher rate of death while nursing. Using immunohistochemistry to stain glutamic acid decarboxylase, an enzyme involved in the synthesis of GABA, it’s possible to identify cells that use GABA. The mothers’ brains were stained after 21 days of ethanol exposure at 4.5 grams of ethanol per kilogram of bodyweight administrated via intragastric intubation followed by 21 days of abstinence, allowing the changes in the number of GABAergic interneurons originating the amygdala and terminating the VTA. Two control groups were used: one receiving an intubation with an analogous dosage of maltose and another receiving no intubation at all. These results should provide insight into the impact of ethanol on neural circuitry associated with addiction and reward and the structural changes in this system that facilitate GABA’s mediation of its activity and their role in long-term changes in behavior as a result of chronic ethanol exposure like an increased likelihood of continued consumption, addiction, and relapse.
Psychology & Public Health

Understanding the Impact of Parental Beliefs on Preschool Aged Children’s Lunchtime Options

Sarah Ali, Public Health - Junior

Mentor: Dr. Christine Blake, Health Promotion Education and Behavior

The United States Department of Agriculture and Centers for Disease Control and Prevention outlines specific nutrition guidelines for preschool aged children to promote optimal health. Food consumption patterns in the population vary because of many social and ecological factors. One important contributing factor is how parents’ beliefs about their children’s preferences influence what they provide as lunchtime options. The goal of this study was to compare the correspondence between children’s preferences and parent beliefs. I worked with a local preschool serving children aged 2½ to 6 years of age to observe children during lunch and ask them questions about their lunch food preferences (N,39). I also surveyed parents through the email listserv (N,17), and discussed observations with teachers. Child meal observations were coded by food group and results suggest that specific food groups, most commonly vegetables, are consistently lacking in the children’s diets. When children were asked about their lunch preferences, they favored anything their parents provided. Parents were receptive to nutritional guidance about their children’s needs as a way of instilling a more balanced diet and believed their children would eat what was put in their lunches though their children were generally unwilling to try new foods. To respond to parental request, an instructional pamphlet was assembled, presenting results from child observations, and outlining current MyPyramid guidelines for preschool aged children and other helpful resources. Future studies of child food preferences should assess perspectives of both parents and their children to develop meaningful intervention messages and approaches.

African American Women’s Perception of the Relationship between Cultural Eating Habits and the Increased Occurrence of Type 2 Diabetes Complications

Kayla Butler, Nursing – Senior; USC Aiken

Mentor: Dr. Lou Gramling, Nursing; USC Aiken

American healthcare studies show that a growing population of African Americans suffers from the effects of Type 2 diabetes mellitus, especially African American women. As the Senior leading cause of death among African American women, diabetes has been termed an “epidemic” among this group. One of the biggest risk factors for acquiring Type 2 diabetes mellitus is obesity, associated primarily with dietary management. The purpose of my research project is to describe African American women’s perception of the relationship between cultural eating habits, prescribed diabetic diets, and health complications in Type 2 diabetes. I will present data that I have collected through one-on-one interviews with African American women diagnosed with Type 2 diabetes. Their responses have been transcribed and analyzed in order to gain insight into whether these women recognize the importance of diet in the management of their diabetes and how culturally influenced meals may pose a risk for developing complications if not adjusted to meet the standards of a recommended diabetic diet. The information from this qualitative, ethnographic study will provide health care professionals
insight into how to address more effectively the needs of diabetics as they cope with the lifestyle changes that accompany Type 2 diabetes.

**Healthcare Disparities in Ghana: The Inaccessibility of Healthcare Resources in Rural Ghana**

*Cara Fertitta*, Biological Sciences - Senior  
Mentor: Dr. David Simmons, Anthropology & Health Promotion, Education and Behavior

The objective of this project is to uncover the barriers faced by Ghana’s rural poor in accessing healthcare and how to identify possible solutions to these access issues. While cost, resource availability, living conditions, educational disparities, explanatory models for illness/disease, and cultural perspectives emerged as salient factors, the single most significant factor that emerged throughout my fieldwork in the Ashanti region of Ghana and my research revolves around geographic obstacles. In addition to participant observation, my research encompassed a wide range of factors including policies, finances, surveys, culture, resource availability, and both government and nongovernment organization initiatives. While in Ghana, I worked first half of each week in a hospital and spent the remainder of the time traveling throughout the country to remote rural areas. My time there was heavily focused on observation and cultural awareness but was also utilized to conduct a series of informal interviews with healthcare professionals and Ghanaians. Based on my findings, I believe that the most effective way to bring greater equality of healthcare to Ghana would involve a series of mobilized care unit initiatives. These initiatives would best serve the current inherent health problems in rural Ghana by introducing health and prevention education, regular immunizations, and midwifery.

The extant problems with Ghana’s healthcare system hold true for a number of other developing nations. If we truly want to help reduce these disparities, we must not only offer assistance, but offer it in a way that can effectively address the issues at hand.

**Culturally Appropriate Interventions and Recruitment Strategies to Promote Mammography in African American Women**

*Cristal Humbert*, Nursing – Senior; USC Upstate  
Mentor: Dr. Lynette Gibson, Nursing; USC Upstate

“Save Our Breasts” is a new more culturally appropriate intervention being introduced to provide information on breast cancer screening among women 35 and older in the African American community. There is a great need for new interventions based on the current statistics on breast cancer in African American women. Breast cancer is the most common cancer in African American (AA) women (American Cancer Society (ACS), 2009). The breast cancer mortality rate is higher in AA women than that of all U.S. ethnic groups and AA women are more likely to die from breast cancer at every age (ACS, 2008). A quasi-experimental pre and post-test longitudinal design was used. Using convenience sampling, AA women over 35 from churches and community organizations were invited to complete surveys that measure knowledge, beliefs, fear, fatalism, mammography self-efficacy, and mammography screening intention prior to, immediately, and 3 months after the “Save Our Breasts” Health Forum. The study will also evaluate
recruitment techniques for African American women in research. It is anticipated that after the “Save Our Breasts” intervention the women will respond having more breast health knowledge and a change in beliefs. And that using spiritual institutions and community organizations as facilitators of recruitment into research are effective. This research has enlightened me to the many health disparities and barriers in minority groups and I firmly believe that these problems must be addressed and new ways of reaching these groups must be found.

The Effects of Physical Activity on Obstructive Sleep Apnea Severity: Conducting Overnight Sleep Assessments
DeAnna Milton, Exercise Science - Junior
Colin Kane, Biomedical Engineering - Junior
Mentors: Dr. Shawn Youngstedt, Exercise Science
        Mr. Christopher Kline, Exercise Science
Obstructive Sleep Apnea (OSA) is a disorder which affects 10% of adults and often accompanies other serious health concerns, such as cardiovascular disease, hypertension, diabetes, and neurophysiologic impairment. OSA occurs when there is partial to complete collapse and blockage of the upper airways, leading to repeated drops in blood oxygen saturation and arousals from sleep. In severe cases of OSA, these arousals can come at a rate of over 100 times per hour, preventing the patient from sleeping properly. The most common treatment for OSA, Continuous Positive Airway Pressure (CPAP), has a low patient compliance rate because of the discomfort of sleeping with a breathing mask. As a result, other options for OSA treatment are needed, thus, we are investigating the possible effects of two physical activity programs, as prior research has documented up to 50% reduction in OSA following exercise training. We initially administer a full polysomnography sleep study to subjects in order to determine the severity of OSA they are suffering from. Following that is a 12-week intervention consisting of either a whole-body flexibility training program or an aerobic and resistance training exercise program. After completion of the intervention, subjects are re-screened to assess any changes to their OSA symptoms. The study is currently ongoing with only baseline data to report, but the results could have a considerable effect on the way OSA is understood and treated, giving patients possible additional options for improving sleep quality and overall health.

Comparing the Practitioner-Patient Relationship in Biomedicine and Acupuncture
Samir Panvelker, Anthropology - Senior
Mentor: Dr. David Simmons, Anthropology & Health Promotion, Education and Behavior
The objective of this project was to understand the health-seeking behavior of patients using acupuncture in the Western world, specifically with respect to the practitioner-patient relationship in both biomedical and acupuncture treatments. Through interviews, questions looked at patients’ perceived differences in their relationships with each practitioner as well as differences in patients’ expectations of each relationship. Research was conducted in Australia and the United States, countries where biomedicine dominates but complementary and alternative medicine like acupuncture is increasing in popularity. Interviews were qualitative
and semi-structured, with questions touching on specific aspects of practitioner relationships like the amount of time spent talking with patients, the interest in patients’ non-health issues, the level of patient involvement in treatment decisions, and how much health issues were explained to patients. While the variation in patients’ interactions with practitioners requires some restraint when making broad conclusions about acupuncturists and biomedical physicians, the general trend among patients interviewed has been more favorable relationships with their acupuncturists. However, their expectations for each relationship have been different and patients have noted areas of preference in the practitioners’ approaches for both treatments. The results provide some insight into the larger picture of patients’ motivations for seeking complementary and alternative medicine.

**Vitamin D Status among African-American and European-American Women Diagnosed with Breast Cancer in South Carolina**

*Rebecca Rosling*, Biological Sciences - Senior

*Mentor*: Dr. Susan Steck, Epidemiology and Biostatistics

*Background and Significance*: Except for lung cancer, breast cancer claims the lives of more women than any other cancer. Vitamin D is of interest in breast cancer prevention and prognosis because it has been shown to inhibit cell proliferation and induce apoptosis and differentiation in both normal and malignant breast cells. Levels of vitamin D in humans are mainly due to sun exposure and vary based on skin tone, age, body mass index \([\text{BMI, weight (kg)/height (m)}^2]\) and other factors. This study examines racial differences in vitamin D status and whether vitamin D levels vary by clinical parameters among women diagnosed with breast cancer in South Carolina.  

*Methods*: A total of 107 women between 33 and 84 years of age and diagnosed with breast cancer in the previous five years were enrolled in the study \([n, 60 \text{ African American (AA), n, 47 European American (EA)}]\). Each participant donated a blood sample, and serum 25(OH)D was measured by enzyme immunoassay. Age, BMI, clinical characteristics, and treatment were abstracted from medical records.

*Results*: The mean \((\pm SD)\) concentration of serum 25(OH)D in EA women was 29.8 ± 12.1 ng/ml while the mean concentration in AA women was 19.3 ± 10.0 ng/ml. Vitamin D deficiency (defined as 20ng/ml) was much more common among AAs (60%) compared with EAs (15%). Vitamin D concentrations decreased with increasing stage of disease.

*Conclusions*: This study corroborates other studies showing racial differences in vitamin D status and provides further support for a protective role of vitamin D in breast cancer. The prevalence of vitamin D deficiency and insufficiency was high, suggesting the need for monitoring of vitamin D levels among breast cancer patients.

**“The P.A.N. of Latino Children” (Physical Activity and Nutrition)**

*Kellie Sharpe*, International Studies - Senior

*Mentor*: Dr. Myriam Torres, Epidemiology and Biostatistics

*Obesity has reached epidemic proportions in the United States. If current trends continue, by 2015 approximately 75% of adults in the United States will be obese. Obesity is also known to disproportionately affect minority groups including Latinos. Meanwhile, research has shown levels of physical activity and nutrition to be recognized risk factors for obesity. I am in the process of interviewing Latina...*
mothers in the West Columbia area about their children’s levels of nutrition and physical activity. I hope to gain a better understanding of these two risk factors for obesity among this at-risk population. My objectives are to assess the frequency and setting of current physical activity and inactivity, to quantify potential obstacles to physical activity, and to measure the nutritional intake and dietary habits of these Latino children. After conducting the interviews, I will compile and analyze the data using EpiData and SAS. With the resulting findings, I hope to increase our knowledge of the presence of these two risk factors for obesity Latino children in South Carolina of which there is currently very little in existence and which will be an important contribution to fighting the current public health epidemic.

Promotores: Accessing Latino Health  
**Kellie Sharpe**, International Studies - Senior

Mentor: Dr. Myriam Torres, Epidemiology and Biostatistics

This service-learning course (funded by a grant through the South Carolina Honors College) explores the explosive growth in South Carolina’s Latino population through the lens of public health. The course will delve into the immigration experience, the cultural practices and beliefs, the health needs, the implicit and explicit barriers to services, and potential areas for advocacy for South Carolina’s Latino population. By combining classroom knowledge with hands-on learning experiences, this course gives students the opportunity to gain a holistic perspective on the otherwise invisible population of Latinos living so close to the University’s campus by working with the PASOs (Perinatal Awareness for Successful Outcomes) Program. Course objectives include learning about the culture and characteristics of the particular Latino community in South Carolina including what makes this population different than other Latino groups around the nation, being able to understand and assess the their health needs, looking into what resources and programs that are available to them and the barriers that come in between them and the assistance, and becoming equipped to work with the Latino population as a health care advocate. Outside of the classroom, students will work directly with PASOs Program clients by conducting needs assessments and evaluations and facilitating access to legal, material, and spiritual resources by acting as liaisons between the Latino clients and local Columbia health care providers.

Nutritional Education and Prevention: Oaxaca, Mexico and South Carolina  
**Jessica Steele**, Baccalaureus Artium et Scientiae - Senior

Mentor: Dr. Myriam Torres, Epidemiology and Biostatistics

The project was a three phase pilot study designed to investigate diabetes and nutritional education multilaterally in order to enhance the educational offerings in Latina communities in South Carolina. The first phase consisted of in-depth interviews with health care professionals in Oaxaca, Mexico to determine what type of nutritional education is distributed on a general population and individual level. It also included clinical observation and participation in a monthly rural diabetes information session. The second phase incorporated a 4-week observation and practicum with diabetes health care professionals in a free medical clinic in Hilton Head, South Carolina, which has an extensive nutrition and diabetes clinic. The goal of this phase was to grasp some strategies already being
utilized in diabetes education and also to recognize areas that may be improved upon. The final phase explored the diet changes Latina women made upon arrival in the US and whether or not length of stay has a negative effect on nutritional status. The research highlights components of the nutritional education system in Mexico (national system, registries, school-based education) that would be beneficial to include in preventive programs in immigrant communities in South Carolina. It also suggests the need for a two-tier approach to nutritional education, one targeted at prevention (within communities and schools), and another targeted at treatment (within the free medical clinic). Most importantly, length of time in the United States is likely to increase poor nutrition outcomes. For this reason, prevention efforts should be targeted at immigrant populations who have recently moved to the United States.

**Bioavailable Iron Sources in the South African Diet**

*Tara Tae,* Exercise Science - Junior  
Mentor: Dr. Erin Connolly, Biological Sciences

The prevalence of iron deficiency anemia (IDA) in African women is 47.5%, the highest in the world. Pre-menopausal women in South Africa who subsist on a diet that consists mainly of maize staples are at an increased risk for developing IDA. This risk arises from the fact that plant based diets are not only low in total iron content, but also typically provide low levels of bioavailable iron. The primary goal of this study was to reach an understanding of the main cause(s) of iron deficiency in the diet of South African women. Using a 24-hour recall and food frequency survey, 40 pre-menopausal women from the Khayelitsha township in Cape Town were interviewed about their diet and food preferences. The objectives of the survey included: to determine the major dietary sources of heme and non-heme iron, to understand access to dietary sources of iron, and to understand how cooking methods and dietary components that enhance/block iron absorption contribute to IDA in South Africa. The interviews revealed that the diet consisted primarily of maize, bread, beans, root vegetables, and some poultry. It was determined that the women had adequate access to iron sources, but their monotonous diet put them at risk for other micronutrient deficiencies. I held a nutrition clinic in the township to teach the women about vitamins and minerals as well as cooking methods and how to choose nutrient rich foods. One suggested solution to the problem in this area is the development of personal compost gardens.

**Understanding the Experiences of Diet and Physical Activity in Adolescents**

*Sangeeta Vijayagopalan,* Exercise Science - Senior  
Mentors: Dr. Christine Blake, Health Promotion Education and Behavior  
Dr. Cheryl Armstead, Psychology

Adolescence is a time where diet and physical activity (PA) patterns change dramatically. Some changes have long-term positive and negative health impacts. Cultural and psychosocial factors and aspects of physical and social environment including: access to fast food, green space, and fear of crime are associated with PA and diet in adolescents. Most research in this area has been ‘adult centric’ with minimal work that delineates the adolescents’ views. The goal of this project is to explore adolescents’ perspectives on what contribute to healthy and unhealthy diet and PA behaviors with emphasis on their social and physical environments.
Participants were recruited from a photovoice project run through their career preparatory program in partnership with the Columbia Writer’s Alliance. This project centered on increasing awareness of how their behaviors, family influences, and social and physical environments relate to body weight, size and image to foster enhanced self-confidence and interest in improving their health. Qualitative in-depth interviews were conducted with 10 students to gain insight into their perspectives. Analysis revealed important aspects of cultural, social, and physical environments identified by participants. These findings have the potential to raise awareness of the adolescent perspective on what influences their diet and PA behavior. Conducting this research on diet and PA in adolescents gave me a better understanding of what I want to focus on in the field of health psychology. These findings may also encourage other people to get involved in promoting healthy lifestyles among adolescents in more effective and compassionate ways.
Coding Eyewitness Identifications: Do Accurate and Inaccurate Eyewitness Exhibit Different Behavioral Cues?

Kayla Anthony, Psychology – Senior; USC Beaufort
Mentor: Dr. Jennifer Beaudry, Psychology; USC Beaufort

DNA evidence has unequivocally demonstrated that at least 250 people have been wrongfully convicted of crimes they did not commit; the majority of these cases involved inaccurate accounts by eyewitnesses (Innocence Project, 2010). Laboratory research echoes these real-world cases—eyewitnesses can make mistakes. Once a false identification has occurred, the problem is exacerbated if people believe that the eyewitness is accurate. Traditionally, jurors use the eyewitness’s testimony to evaluate the eyewitness identification evidence. Unfortunately, based on testimony alone, jurors cannot effectively determine the accuracy of an identification (e.g., Wells, Lindsay, & Ferguson, 1979). That is, their belief of the evidence is not tied to the eyewitness’s accuracy. Following recent recommendations (Kassin, 1998; Cory, 2001), police are beginning to video record eyewitness identification procedures (Beaudry & Lindsay, 2006). Unfortunately, Beaudry and colleagues (2010) found that, compared to the eyewitness’s testimony, exposure to the identification procedure video did not result in more accurate decisions. One explanation for this indiscrimination between correct and false identifications is that mock-jurors are using the wrong cues to determine the accuracy of eyewitness identifications. Using Observer XT 9.0 software, we coded accurate and inaccurate eyewitnesses (N = 56) who made their identifications under a variety of presentation and administration conditions (e.g., Simultaneous or Sequential lineups; Double-blind administration or Feedback conditions). Our poster will identify the various verbal and non-verbal behaviors that may help distinguish between accurate and inaccurate eyewitnesses. In later research, this information may used to train mock-jurors to better discriminate between correct and false identifications.

Effect of Accent on Reference Resolution in Descriptive Discourse

Autumn Boyd, Psychology - Junior
Mentor: Dr. Amit Almor, Psychology

Reference resolution is the process of identifying which entity is referred to by a referential expression. In the case of spoken discourse, one factor that affects this process is the prosody of the sentence. The present study examined the effect of prosody on reference interpretation using eye tracking. Participants were placed in front of a computer and shown four pictures placed in each corner of a 3x3 grid. One of the pictures was the referent noun and another was a competitor noun sharing the same initial syllables as the referent noun. The other two pictures were unrelated distractors. While looking at the screen the participants heard two sentences. The first sentence introduced the referent, while the second sentence used either the same reference or a pronominal reference (“it”), both of which being either accented or unaccented. The participants eye movements were tracked using an eye tracker with special attention placed on the movements after the target referent in the second sentence was heard. It was predicted that there would be a bias towards the initial referent when referent was unaccented in the second sentence, regardless of whether the repeated referent or the pronominal
reference was used. This would be shown by more looks to the picture of the
target referent than to the other pictures when the reference in the second
sentence was unaccented.

Higher Education: Understanding Undergraduate Prescription Stimulant Abuse
Elyse Coolidge, Chemistry - Senior
Mentor: Dr. Patrick Nolan, Sociology
In recent years the rate of non-medical prescription stimulant (NPS) use among professionals and pre-professionals has been on the rise. Drugs normally prescribed to manage Attention Deficit Hyperactivity Disorder (ADHD) and Attention Deficit Disorder (ADD) are being used by college students and professionals to increase mental alertness and attentiveness while studying or working overtime. Recent nationwide studies of undergraduates have demonstrated usage rates from 0% to 30% with the highest rates of use at competitive colleges and universities in the Northeastern United States. This project aims to assess the rates and trends of NPS use at the University of South Carolina and within the more competitive South Carolina Honors College through an online survey distributed to undergraduate students. In addition, the researcher seeks to understand the ethical and moral attitudes of students in regards to NPS use. Most substance abuse programs on campus are aimed towards alcohol abuse and smoking cessation; however there is a lack of programs targeted towards other drugs of abuse. This project will assess whether programs targeted towards stimulant abuse are warranted on campus, and give an initial assessment of the motivations behind undergraduate NPS use. The research is still in progress; however the researcher expects to find elevated rates of NPS use among SCHC students, Greek students, and students who report using other illicit drugs. In addition, it is expected that most students will cite staying up and studying longer as primary motivations for prescription stimulant use.

Gender and Greek Affiliation as Moderators between Positive Alcohol Expectancies and Substance Use
Samantha Davis, Psychology - Senior
Angela Malo, Psychology - Senior
Mentors: Dr. Kate Flory, Psychology
Ms. Kerrie Glass, Psychology
The main goal of this study was to determine if the relation between positive alcohol expectancies and alcohol use among college students differs by gender or Greek membership. Examining these factors may assist in gaining a better understanding of particular populations at-risk for greater alcohol use. This can be applied to improve intervention/prevention programs that aim to decrease substance abuse on college campuses.

An online survey was administered to 425 students (sophomores through seniors) at the University of South Carolina, as a part of a larger study on substance use. Questionnaires assessed alcohol use (Molina & Pelham, 2003), positive alcohol expectancies (Fromme, Stroot, & Kaplan, 1993), and demographics. In the sample, 99 of the participants were male and 324 were female.
We used hierarchical regression analyses to examine the possible moderating effects of gender and Greek status on the relation between alcohol expectancies and use. Whereas the main effects of gender and alcohol expectancies were significant, the interaction term between gender and alcohol expectancies was not found to be significant ($\beta=-.099$, ns). Similar results were found when examining Greek affiliation ($\beta=-.042$, ns). Contrary to our expectations, neither gender nor Greek affiliation significantly moderated the relation between positive alcohol expectancies and use. One explanation for this result is that the total sample was not evenly distributed between males and females. In addition, a significantly larger portion of the females in the sample were Greek which could have affected results. Nonetheless, results have implications for better understanding alcohol use among college students.

**Meta-Analysis of Social Cognition**

*Lue Fang,* Psychology - Senior  
Mentor: Dr. Svetlana Shinkareva, Psychology  

The study of social cognition is the foundation for understanding social intelligence, decision making and personality traits. Functional neuroimaging studies have approached social cognition in various perspectives ranging from visual cues (i.e., human face), biological motion (i.e., eye gaze), emotional arousal (i.e., guilt and shame), to mental attributes (i.e., theory of mind (ToM)). The goal of this work is to present a quantitative summary of neuroimaging literature and to discuss the neural representations underlying social cognition tasks. We conducted a quantitative meta-analysis to identify brain regions associated with social and nonsocial stimuli across 31 neuroimaging studies. Studies comparing brain activation for social and nonsocial stimuli at a whole-brain level in healthy adults were included. The social nonsocial processing engaged the medial prefrontal cortex (mPFC) and the temporo-parietal junction (TPJ), whereas the nonsocial social processing engaged the secondary somatosensory cortex. The results suggest consistent differences in brain activation in processing social- and nonsocial-related stimuli across social cognition tasks.

**An Exploration of Dating and Sexual Violence on College Campuses: A Pilot Study**

*Kimberly Howard,* Psychology - Sophomore  
Mentor: Dr. Suzanne Swan, Psychology  

This presentation will: 1) provide results from a survey designed to assess base rates of dating violence and sexual violence among undergraduates at the USC campus, and 2) describe a new violence prevention intervention, entitled Green Dots, that will be implemented at USC beginning fall 2010. The survey will be conducted with N,450 18-24 year old full-time undergraduates (half female and half male) and will be representative of the campus with respect to racial composition. The survey is a pilot for a larger survey to be implemented in April with N,4000 undergraduates. Green Dots is a bystander prevention intervention that teaches students that 1) everyone has a role to play in preventing violence; and 2) we can all work to change social norms that tolerate violence by engaging in bystander intervention behaviors that challenge these norms. For example, bystander behaviors include speaking up when someone makes a joke about rape or violence; making sure a drunk friend makes it home from a party safely, and
supporting someone who is a victim of violence. The survey will provide baseline rates of dating and sexual violence, as well as bystander intervention behaviors. After the Green Dots intervention has been implemented, a follow up survey will be administered in spring 2011. We hope to see that bystander behaviors have increased, and dating and sexual violence decreases, as a result of the intervention.

The Effects of Response Prevention on the Development of Activity-based Anorexia in Rats

**Krista Lange**, Psychology - Senior; USC Aiken
Mentor: Dr. Edward Callen, Psychology; USC Aiken

The phenomenon of activity-based anorexia (ABA) was first documented by Hall and Hanford (1954) and further defined as self-starvation by Routtenberg and Kuznesof (1967). These studies revealed that as rats were subjected to a restricted feeding schedule, wheel running increased while food consumption decreased, despite the continued presence of hunger. Investigators have examined the effects of ABA in rats, but have yet to determine the mechanisms by which this behavior is reinforced. Therefore, utilizing the known paradigms of learning and motivation that have been established by behaviorists, the aim of the present investigation was to identify the mechanisms by which these behaviors become reinforced. More specifically, this project is designed to investigate the effects of response prevention on the maintenance of food restriction-based running behavior. Though previous research has investigated behavioral aspects of activity-based anorexia in rats, no study has examined the effects of response prevention on the reinstatement and severity of ABA. Using the established animal model to produce ABA, the effects of response prevention and response interference upon weight loss and wheel running was investigated in the current study. Findings support the concept that some form of response prevention may attenuate the amount of subsequent wheel running activity usually observed in the ABA effect. Total response prevention resulted in lower levels of responding than no response prevention, and response interference produced an intermediate level of responding.

Modeling People’s Choice Behavior

**Elliot Litteral**, Psychology - Senior
Mentor: Dr. Douglas Wedell, Psychology

This research was conducted with the understanding that it is unlikely that there is one correct choice model. Instead, people may approach a choice task with different goals and motivation so that different individuals may apply different choice strategies. If this is true, then it is misleading to aggregate choices across individuals, as this would obscure the strategies they are using. In our previous research we found that having participants make choices on simulated grocery shopping trips allowed us to gather the necessary number of repeated choices in order to model individual choice behavior. In that study, we found evidence for several different strategies participants were using. However, because the same price-quality trade-off was used in the stimulus materials for everyone, that study was not sensitive to everyone’s strategy as some individuals simply always picked the higher quality alternative or always picked the cheaper alternative. Thus, in a new experiment we include a preliminary phase that tries to capture the price-quality tradeoff that best characterizes each individual before gathering the critical
data. In this experiment the participants looked at multiple grocery items and determined which grocery item they preferred best. The grocery items occurred in sets of two or three in random order. Our goal was to successfully determine the best strategy characterizing each participant’s choice behavior.

**The Meaning of Sets: Information from a Single Glance**

*Zach Morris*, Psychology - Sophomore

*Holley Pitts*, Psychology - Senior

Mentor: Dr. Melanie Palomores, Psychology

What information about our surroundings do we extract from only a brief glimpse? Previous research has shown that when we view sets, or groups of similar items, we remember the mean of the group, rather than individual characteristics of each member. In the current study, a target array of 1 to 9 squares of various sizes was briefly displayed (133 ms) on a computer screen. Two choice squares were then presented. Participants were asked to judge (1) which square was part of the set or (2) which square represented the mean size of the set. The trials (n=50) were blocked by task. In Experiment 1, we replicated prior findings in that participants were significantly more accurate at identifying the mean size of the set than identifying an individual object from that set (Ariely, 2001). More recent studies suggest that participants use only a subset of the set to determine the mean size (e.g. Myczek and Simons, 2008). In Experiment 2, we evaluated the possibility that participants were only using the largest and smallest square to compute the mean, rather than the entire set. We varied the skew of the sets distribution by systematically changing the proportion of larger squares to smaller squares, and vice versa. If participants were using the entire set to find the mean, the results will be congruent with Experiment 1. However, if participants are only using the largest and smallest square in their computation, they will be significantly less accurate at identifying the mean. These results have implications in how we perceive our natural environment.

**Blame as a Reflection of Just World Attitudes and Counterfactual Reasoning**

*Thomas Smith*, Psychology - Senior

Mentor: Dr. Douglas Wedell, Psychology

Research on causal reasoning and on blame has produced two very different views of the intimately related concepts. Perceived causes for events have been linked to counterfactual reasoning, which generates alternate outcomes expressible in “If not X, then not Y” statements. Assignment of blame has been linked to a subconscious rationalization process that rests on attitudes concerning belief in a just world. The tendency of blaming the victim of a crime can be understood as related to a belief in universal justice so that one gets what one deserves. Our research attempted to understand and explore blame assignment from the perspective of these two explanatory frameworks. The experiment consisted of a series of descriptions of crimes, with two focal individuals, the presumed victim and presumed perpetrator. Each scenario included framing information, which was designed to provide material for the generation of counterfactuals related to one or more of the focal individuals. The type and variety of framing information was manipulated, as was the severity of the crimes being described. The subjects were then asked to provide their opinions on the relative blameworthiness of each involved individual, to generate counterfactual statements about the situation, and
to complete a 20-item inventory about their belief in a just world. Extensive statistical analyses will be performed on the resulting data, and results will be discussed. Results indicate a role for both counterfactual reasoning and just world belief in blame assignment.

**Facial Perception Across Development: Do Children Process Faces Holistically?**

*Ashley Stevens*, Psychology - Junior  
*Ashley Mazzanna*, Psychology - Senior  
*Sanguetta Banks*, Psychology - Senior

Mentor: Dr. Melanie Palomares, Psychology

We can tell a lot about a person by their face. It shows whether or not a person is happy, angry or having a bad day. Faces are used in social interactions in order to identify others, gain social knowledge and pick up on nonverbal cues. Previous studies suggest that children and adults process faces differently. It is thought that children process faces more analytically, focusing on specific features or aspects of the face, while adults process faces more holistically (Tanaka, Kay, Grinnell, Stansfield, Szehcter, 1998). We tested this hypothesis directly, by evaluating the inversion effect across development. The face inversion effect is the disruption of holistic processing when the face is upside down. Our study examined the presence of the inversion effect in three age groups, 2-4 year olds, 5-10 year olds, and adults. They were asked to identify upright or inverted faces that varied in expression (happy, sad, surprised and disgusted) on a computer screen, and we measured contrast threshold (i.e., the dimmest contrast a face can be presented in order to identify it at 75% correct). We found that children were worse than adults in identifying faces. We also found that inverted faces were harder to identify than upright faces across all age groups – the degree of the inversion effect in 2 year olds is similar to that of adults. These results are inconsistent with previous studies that demonstrated that children are less holistic in their facial processing than adults.
How Foreign Countries Effectively Shape the Development of Institutional Integration Across Countries

Jimena Escamilla, International Business - Junior
Mentor: Dr. Gerald McDermott, International Business

This project addresses the larger issues on integration and development by analyzing which types of transnational integration mechanisms help or hinder the diffusion of international food safety standards and the upgrading of domestic regulatory institutions. I have begun to examine the contrasting impact of trade incentives, local politics, and transnational assistance programs on the renovation of Mexico’s food safety system. It has been interestingly difficult to find concise cross-temporal and cross-sectoral data on Food Safety Regulation particularly in Mexico, due to the lack of institutional organization on the federal level in Food Safety issues. As a result, interviewing Mexican representatives was not possible early on in the process, though we have been able to discuss issues with researchers based in Mexico that are willing to collaborate with our efforts. However, I have been able to access a myriad of information (mostly qualitative rather than quantitative data) regarding what initiatives have begun in Mexico, not only by federal parties, but by private institutions as well: both national to Mexico and from abroad. It has been very interesting to find the essential barriers that are ironically formed when trade barriers are eliminated via trade agreements like NAFTA. This project has given me personal insight into the “realities” of cross-national trade, more specifically, the difficulties that accompany the integration of very different national systems.

Average Per Capita Income earned in Townships of Cape Town, South Africa

Emily Hartley, International Business - Senior
Mentor: Dr. Robert Rolfe, International Business

I travelled to Cape Town in May to volunteer and conduct my research. I decided to volunteer to gain a better understanding and connection with the people I would be surveying. I went through a volunteer organization, Greenheart Travel, who set me up with the Indlovu Project in Cape Town. The project was located in the Khayelitsha Township, a large shanty town community with over 2 million people. I spent my first week working and getting to know the local people. Surprisingly, they were not fazed to have us there and embraced us in their culture immediately. Over the next 3 weeks, I conducted 60 surveys of local men and women. The survey asked for basic demographic information, occupation, monthly income and allocation of income. Since there is a 75% unemployment rate in the township, I was trying to determine the typical jobs held by the employed and where the unemployed received their income. I found an 84% unemployment rate for women and a 50% unemployment rate for men. Those who were unemployed typically received money from some form of government stipend or family remittances. Initially I planned on trying to determine whether implementing a basic income grant would help stimulate economic development. Once there, however, I learned about the dangers of depending on the government to support a society. The project I volunteered with had a mission to create jobs by making the township more environmentally sustainable. I decided to focus my energy in developing financial analysis for the project.
Communications as a Tool to Increase Knowledge and Visibility of a Local Area Non-Profit

Misty Kelley, Public Relations - Senior; USC Aiken  
Mentor: Dr. Deidre Martin, Communications; USC Aiken  

STAR Riding, Inc. is an equine-assisted program that aids Aiken County's disabled community. Pre- and post-research surveys were conducted on STAR volunteers and families, and a target group of USC Aiken students, in order to aid STAR in its information distribution efforts to those currently and potentially involved with the program. Both pre- and post-surveys asked questions about the importance of serving the disabled community, involvement, and helpfulness of public relations materials. These materials included a brochure, newsletters, flyer, media kits, and car decals. Technical problems prevented the website from being included, but a list of changes was included in the post-surveys for future use. A scale of 1 to 5 was created to develop an average for answers to survey questions. For all parties, the average across all categories was within one point of another with the newsletter being perceived as the most helpful material. Results proved the same in the post-research surveys, but USC Aiken students reported lower volunteerism each month. This project was important to me and USC Aiken because both myself and the University focus strongly on serving the community. If I am able to aid a non-profit in reaching out and making a connection with USC Aiken students, then this project has served its purpose. Furthermore, this project brought to light the hardships faced by non-profits because of lack of financial support and the importance that public relations can have in making a community more aware of the resources and volunteer opportunities available to them.

Who Holds the Power: The Role of Women in the Tourism Market in the Andean Countries

Julie Lanier, International Business - Sophomore  
Mentor: Dr. Lee Walker, Political Science  

My research focuses on evaluating the role of women in the tourism industry in the Andean countries of Peru, Bolivia, and Ecuador. By establishing businesses that provide both lodging and personal services, women have found a niche in the new tourism industry that has emerged in the aftermath of democratic and economic transition. I argue that opportunities for women have increased since the democratic opening of the governments in the Andean countries. To support this argument, I gather data from several sources: 1) government statistics on income and tourism; 2) interview data from governmental officials; 3) survey data from business owners and cross-national survey organizations; 4) data on each country's level of democratic development. The information compiled supports my contention that opportunities for women have increased since the democratic opening of the governments in the Andean countries.

The Effect of War on the U.S. Federal Courts of Appeals: An Analysis of U.S. Appeals Court Treatment of War Related Cases

Molly McDonald, Political Science - Sophomore  
Rebekkah Boxt, Religious Studies - Senior  
Mentor: Dr. Donald Songer, Political Science  

How is judicial decision making in the United States affected by the presence of war? To contribute to this question we analyzed changes in U.S. Courts of Appeals
decisions during times of war and peace, bridging current analyses by assessing the influence of war on the outcome of civil rights cases and criminal rights cases and on war related cases only. I personally was involved in coding the court cases, rather than the analysis of the data. Using LexisNexis online database, I documented the main facts of cases regarding Veterans from 1921 until present day, in total over 600 cases. Going beyond the sample database to identify cases related to the wars in question and using a measure that captures the intensity of war, we show that the courts are not immune to the changed circumstances during times of war and that judges on the U.S. Courts of Appeals tend to vote more conservatively in times of war and with increased intensity of war. These influences are even more pronounced in cases related to war and while war appears to produce changes in judicial behavior in non-trivial ways.

**Stadium and Arena Funding: Current Trends and Future Issues**  
*Matthew Meehan*, Sport and Entertainment Management - Senior  
Mentor: Dr. Matt Brown, Sport and Entertainment Management

The purpose of this study was to analyze how stadiums and arenas are currently funded, to determine the issues that affect the availability of public funds for these venues, and to determine how these facilities will be funded in the future. Three research questions were proposed: first, what trends have been observed regarding the construction and funding of sports venues in the past? Second, how is the current economic recession affecting the construction and funding of these facilities? Third, based on the trends that have been observed in the past and the current issues affecting construction and funding of sports venues, what trends are likely to be observed in the future? To discover how these trends and issues were impacting today’s venue industry and how they might affect the future of stadium and arena construction, financial data was gathered from past sports venue construction projects and projects that have recently been proposed, completed, or are currently under construction. Findings indicate that professional sports teams will need to include other income generating projects such as office, retail, and residential spaces in their venue master plans to offset the loss of public revenue from cities and states under financial duress resulting from the Great Recession. This will appease detractors who oppose the use of public money for private gain. The results of this study should be helpful to those interested in and involved in the development of future stadium and arena construction projects.

**State Failure: Recovery and Recurrence**  
*Alexander Severson*, Political Science - Sophomore  
Mentor: Dr. Harvey Starr, Political Science

The aim of this project is to consider and statistically evaluate which factors give rise to recurrent state failure as well as to elucidate the determinants of the duration of state failure. This project is an extension on former projects which considered the variables that cause the collapse of central authority and their geospatial diffusion effects. Building on this, this project looks to the phenomenon of state failure as a unified variable to predict future failure, state failure here seen as both consequence and cause. This project investigates the role of the concepts of positive reinforcement and recidivism as potential explanations for failure recurrence and longevity and employs a similar-systems design to evaluate and match countries which have failed once to countries which have failed multiple
times (using multivariate data from multiple datasets). The results of the analysis seem to suggest that the extent to which a country is motivated to pursue democratic policies post-initial collapse is a factor determining recurrence of state failure as well as the extent of internal conflict and the degree of international intervention in the form of IGO activity. Interestingly, the research indicates that the duration of state failure seems not to be convincingly correlated with any of its expected covariates save economic growth; the presence of domestic political turmoil, violent conflict, the degree of trade openness, the amount of national wealth, and the institutional memory of democracy have relatively marginal, if any, predictive value for collapse duration. The problem of recurrent state failure is important to study because by understanding the complex amalgamation of variables that go into interregnum and recovery, one can better understand how to craft appropriate policy responses and effectively engage with such states.

**Developing a Strategic Communications Plan For Promoting Community-Based Orphan Care in Malawi, Africa**

*Amanda Tatum*, International Studies - Senior

Mentor: Prof. Van Kornegay, Journalism and Mass Communications

A service-learning project to create a strategic communications plan for Ministry of Hope, a non-governmental organization based in Malawi, Africa that provides physical, educational and spiritual support to children who have been orphaned by AIDS.
Social Science & Education

Development and Implementation of a Preschool Curriculum Unit in Ocean Biology

Ashley Chase, Marine Science - Senior  
Mentors: Dr. Tammi Richardson, Biological Sciences  
Dr. Nancy Freeman, Educational Studies
In a nine-week period, I developed nine lessons plans on the ocean food chain to be carried out for one hour each week to the 4K class at the Children's Center at USC. The first and last weeks were a pre and post assessment while the middle weeks were the levels of the food chain beginning with sharks, then seals and sea lions, squid, big fish, little fish, zooplankton, and phytoplankton. I expected the children to have some idea in the beginning of what organisms eat in the ocean, but by the end of the nine weeks, I wanted to see a definitive increase of their understanding of the ocean food chain. I based the lessons off the key science and technology skills in the South Carolina Early Learning Standards for Four-Year Olds and High/Scope Key Developmental Indicators. This included “predicting possible outcomes based on prior experience and knowledge”, “recognizing objects by sight, sound, touch, taste and smell”, “exploring and describing similarities, differences, and the attributes of things” and “anticipating, remembering, and describing sequences of events” (Hohmann & Weikart, 1995; SC Department of Education, 2005).

Academic Intrinsic Motivation

Lue Fang, Psychology - Senior  
Mentor: Dr. Scott Huebner, Psychology
Intrinsic and extrinsic types of motivation have been widely studied in the past 30 years and have been applied to the realm of education. Some researches on intrinsic motivation of academic contexts approached from the Self-determination theory (Deci, 1971) and the goal framing theory (Lens & Deci, 2006). Empirical cross-sectional and longitudinal studies by Gottfried (1985) have found that academic intrinsic motivation positively correlated with school achievement, self-efficacy and perception of competence. The continuity of academic intrinsic motivation tends to be stable during childhood through adolescence and becomes more stable over time but slightly declines during school transitions. Further, academic intrinsic motivation is differentiated into subject areas (Gottfried, 2001), and applicable cross culture (Deci & Ryan 2008).

Single Photon Interference

James Gambrell, Physics - Junior  
Mentor: Dr. Timir Datta, Physics and Astronomy
The dark adjusted eye can detect a single photon, a laser shone through a slit or two can lend us insight into the wavelike nature of light, and TeachSpin’s Two-Slit Interference, One Photon at a Time’ demonstration can demonstrate mathematically the curious behavior of one photon when presented to those same slits. This presentation details research centered around the teachspin device’s demonstration capabilities. The experiments follow a natural progression from the visually comprehensible into experiments that raise many questions about the activity of the single photon. We have laid out the operation of this device for our audience, but the greatest value of our research has gone into the preparation of a
lab so that many students can reproduce this work in their classes to gain greater understanding into the nature of light.

**A Cookbook for Children Promoting Nutrition**

*Halley Gibson*, Mathematics - Senior
Mentor: Dr. Kara Montgomery, Health Promotion Education and Behavior
In the United States, one out of three children are overweight or obese. Children these days are eating more calories from foods that have little or no nutritional value, which can harm their health and well-being. Studies have shown when children are involved in the preparation of their food they are more likely to try new foods. Also, the eating habits they have as children are likely to continue when they are adults. This cookbook is designed to be a resource for the entire family while specifically targeting children between the ages of 8 and 11. The book will teach children the importance of eating a balanced diet while showing the importance of the food groups set by the USDA. The book will also help parents understand the importance of healthy eating habits and provide information for resources to help them get their family eating healthy. By raising awareness of what children should be eating and empowering the children to help make the decision for what they are eating, hopefully, children and their families will start to make healthier decisions in their life.

**Graduate Students Views of the Relationship Between Teaching and Research Across the Disciplines**

*Pawel Glab*, Accounting - Senior
Mentor: Ms. Joanna Gilmore, Educational Studies
The purpose of the current study is to explore graduate students’ conceptualizations of the research-teaching relationship. There have been few studies that investigate the connection between graduate students’ teaching and research and their perceptions of the connection between the two activities (but see Deen & Lucas, 2006; Maher, et al., 2009; Robertson & Blackler, 2006). This study will also examine the extent to which graduate students’ conceptualizations differ across academic disciplines as researchers have noted that disciplinary contexts impact graduate students’ socialization (Austin, 2002). This study explored graduate students’ views of the teaching-research relationship through surveying 308 graduate students who attended a two-day training opportunity at the University of South Carolina for new teaching assistants. Most participants reported a significant positive relationship between teaching and research. When asked to describe the relationship in their own words, many graduate students characterized the relationship as unidirectional with more participants reporting that research improves teaching (as compared with teaching improving research). Participants in the engineering and formal science fields held the most antagonistic views of the relationship between teaching and research. This information may be useful for improving graduate students’ experiences.

**Understanding and Implementing Language Immersion Policy in South Carolina**

*Sarahi Paz*, Early Childhood Education - Senior
Mentor: Dr. Kara Brown, Educational Studies
This research looks at the piloted Spanish language immersion program in
Lexington County School District One in South Carolina. The motivation behind the research was to gain a better understanding of why and how this program was implemented and in use in South Carolina and see the results from implementing such a program. This was done by observing, teaching, and working in a second-grade Spanish immersion classroom at Red Bank Elementary in Lexington District 1 for a period of one school semester. It was immediately clear that the immersion program had developed a strong control of the language for these non-native speaking students; at the end of the semester, it was evident that the children were fluent in the language and could use it to converse and in academic settings. This research shows that implementing such programs in South Carolina schools has proven extremely effective to the language development of the immersion student.

**Pharmacy Residents Ability to Evaluate Medical Literature and Biostatistics**

**Danielle Tice,** Pharmacy - Senior  
Mentor: Dr. Brandon Bookstaver, Pharmacy

Objectives: This study will evaluate pharmacy residents understanding of medical literature and biostatistics through an assessment of post-graduate year one (PGY1) accredited residency programs. The secondary objective is to assess the Residency Program Directors’ (RPDs) attitude and confidence in their residents' ability in utilizing biostatistics/EBM training. Methods: This is a two-part, survey-based study that involved two surveys: one designated for 2008-2009 PGY1 residents and one designated for RPDs of ASHP-accredited programs. PGY2 residents and PGY1 residents scheduled to begin in the summer of 2009 were excluded. The Dillman method was used in survey development and dissemination. Surveys were scored on a 5-point Likert scale (strongly agree to strongly disagree), and distributed through the web-based survey program, SurveyMonkey, for anonymity. Survey responses were recorded to evaluate attitude, confidence, and knowledge based questions. Missing demographic, attitude, and confidence values will not be utilized in the results and missing knowledge values will be scored as incorrect. Correlation and bivariate analyses will be conducted to relate PGY1 responses to knowledge scores. Results: 214 PGY1 residents and 157 RPDs participated in this study. The overall mean knowledge score of the residents was 49%. Only 17 out of 214 passed the knowledge test (≥70%). 67% of RPDs were confident in their residents ability to appropriately critique medical literature by analyzing statistical methods used in a study while only 48% of PGY1 residents were confident in their ability to critique medical literature. Residents who were confident had a mean knowledge score of 41%. Conclusion: The results of our study show there is poor knowledge in biostatistics and interpretation of EBM from PGY1 pharmacy residents. This reflects the need for further evaluation of biostatistics and EBM training requirements in PGY1 residency programs.

**The Effects of Mentoring on Emotional Intelligence and School Connectedness of Mentors**

**Mary Wampler,** Psychology - Senior  
Mentor: Dr. Brad Smith, Psychology

Mentoring research over the past two decades has suggested that the development of close and enduring relationships between adults and youth can be beneficial in youth development. However, less research has investigated the benefits of
mentoring on mentors. My study examined how being a mentor in the Transitional Mentoring Program had effects on emotional intelligence and school connectedness of mentors. The Transitional Mentoring Program engages first-year USC students enrolled in University 101 service-learning sections in mentoring sixth graders who are making the transition to middle school. Prior to mentoring, mentors participate in one period of training in class and watch an on-line training video. Then they meet with their protégé six to eight times and had weekly discussions in their University 101 class about mentoring. I collected pre and post data from the 60 mentors from three University 101 service-learning sections and 60 controls from University 101 classes that did not do the Transitional Mentoring Program. Analysis of this quasi-experimental dataset began with comparing differences between the University 101 classes, and controlling for these differences in subsequent analyses. Key outcomes were perceptions of the specific service learning experience, emotional intelligence, and higher education. The Transitional Mentoring Program is complete, all data has been collected and is currently being analyzed. Complete results be ready to present for Discovery Day. The preliminary results suggest participation in service learning experiences may contribute to emotional and professional development among participants.
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