

Oral & Poster Presentation Abstracts

Emerging Scholars Division

Holly Adams, Communicative Disorders

Claire Patterson, Communicative Disorders

Faculty Mentor: Rachel Saffo, Communicative Disorders

Play's Importance in the Assessment of Bilingual Children

Play is thought to be to an indicator of cognition and language skills in children (Rutherford & Rogers, 2003). It provides insight into a child's symbolic understanding and use. This study examined the play skills of four 3- to 5-year-old bilingual children with typical development whose primary language was Spanish and second language was English. The children were administered the Developmental Play Assessment (DPA; Lifter 2000). Their frequency and type of playacts were recorded according to the DPA. Cultural differences from mainstream American Culture to Hispanic culture were noted across types of playacts and genders. These differences will be discussed. Clinically assessing the play skills of children who are bilingual offers a window into their culture and cognitive abilities and informs language outcomes (Morelock et al., 2003). Thus the DPA could potentially be used as a diagnostic measure for determining a language disorder versus difference in a bilingual population.

Erin Adams, Civil, Construction and Environmental Engineering

Heather Wilson, Civil, Construction and Environmental Engineering

Faculty Mentor: Sriram Aaleti, Civil, Construction and Environmental Engineering

Material Properties of Ultra-high Performance Concrete (UHPC):

Tensile Strength During this study, Ultra-high Performance Concrete (UHPC) was mixed and tested using the Direct Tensile Testing Method. After assessing the reliability of information obtained using Direct Tensile Tests, a single size was chosen to perform future tests with direct tension as well as Cyclical Fatigue Testing and Sustained Load Testing. Direct tension tests were completed at two months plus to obtain information about the ultimate tensile strength of UHPC. In the future, tests will be completed at 3, 7, 14, and 28-day intervals after pouring to assess the strength gain characteristics of UHPC. The specimen in the Direct Tensile Testing as well as future tests of Cyclical Tension Testing and Sustained Load Testing contain steel fibers; in the future some will contain rebar to assess the effect of reinforcement on the tensile strength of UHPC. The objective of this study is to further the understanding of the tensile strength and durability behavior of UHPC compared to that of normal concrete. This information will help form requirements and understanding about the usability of UHPC in infrastructure. It is expected that the compressive strength of UHPC will decrease after tensile stress is applied, potentially affecting seismic performance of UHPC. The sustained loading tests will provide insight about the durability of UHPC under loadings, and may prove UHPC to be insufficient for necessary loading requirements.

Maya Allen, Biological Sciences

Faculty Mentor: Juan Lopez-Bautista, Biological Sciences

The Molecular Identification of Ulva Species

The algal genus *Ulva lactuca* is a green algae of a vast array of habitats, salinity preferences, and morphologies. Algal identification was once primarily conducted through morphological data. However, the specialization and affordability of genomic sequencing has opened the door for the discovery and identification of numerous algal species. The implications of this research are very significant in medical and environmental sustainability fields. The macro-project is geared to compiling the Green Algae Tree of Life (GrAToL), but Mr. Trey Melton, the graduate student who is training me, and I concentrate on the *Ulva* genus. This is because *Ulva* is a very mysterious genus composed of morphologically diverse organisms and is difficult to identify. My research uses genomic sequencing in order to identify the

various species presumed to be of the *Ulva* genus collected from various regions such as Puerto Rico and the Carolinas. Thus far, we have used the *rbcl*, *ITS*, and *tufA* genetic markers to sequence our data. In order to obtain the DNA to be sequenced, I must extract the DNA from the sample, magnify the DNA through PCR (a polymerase chain reaction), apply gel electrophoresis to ensure the DNA is magnified enough to be sequenced, and prep the final sample to be mailed to be sequenced. Currently, we are awaiting the return of the sequenced data for four specimens collected in said regions, and have also begun to extract DNA from over a dozen specimens collected in Louisiana.

Caroline Alvarez, Economics, Finance and Legal Studies

Faculty Mentor: James Cover

Economics, Finance and Legal Studies Ireland's Economic Crisis and Recovery

**International focus*

This paper provides an overview of Ireland's economic conditions the past four decades. At the end of the 20th century, Ireland went through some political and social changes that later could be attributed to the cause of the economic boom. The country joined the EU leading to increases in foreign investment, women entered the workforce in larger numbers, and the baby boomers became working age. During the turn of the 21st century, Ireland experienced an unprecedented increase in its rate of economic growth earning it the name the Celtic Tiger. There were many possible causes of Ireland's economic success at that time, including: Ireland's EU membership, low corporate taxes, and an increased investment in education. GNP increased by almost 200% during this time causing consumption to increase dramatic levels. The economy's success in the construction and property sector gave the Irish government a false sense of security allowing them to be fairly lenient with their fiscal policy. When the housing market burst, however, the government was left with little revenue and little resources to obtain more. When the Irish Economy collapsed in 2008, due to a combination of an economic slowdown and the international financial crisis, the government was forced to ask for external assistance. In November 2010 the Irish government requested financial help from the EU and IMF. They established a program to restore confidence and return the economy to sustainable growth and employment.

Jack Anderson, Psychology

Faculty Mentor: Randy Salekin, Psychology

Relations Between Reduced Cortisol Functioning and the Development of Child Psychopathy

Research on cortisol deficiency in adult psychopathy has greatly contributed to understanding the disorder's biological connections; though far less is known about those correlates in children. The present review evaluates research on inhibited cortisol functioning and the development of child psychopathy, and discusses the possibility of a hormonal origin of psychopathy. The reviewed articles focus on the effects of reduced cortisol on the emergence of psychopathic traits in children. Many of these studies found an association between cortisol deficiency and the development of psychopathy, and concluded that reduced cortisol functioning might be an important marker for the development of child psychopathy. However, many of the studies reviewed failed to determine whether the relationship was causal. Nonetheless, this review provides hints to the causal mechanisms behind psychopathy. According to the reviewed articles, this relationship is likely due to abnormalities in brain structure and function that can produce many of the hallmark symptoms of psychopathy. This review revealed that additional longitudinal research is needed to further investigate the relations between psychopathy and cortisol and the possibility of a causal link. If further research on this topic can determine that reduced cortisol functioning can lead to the development of psychopathy, the implications for effectively identifying, preventing, and treating the disorder would be invaluable.

Karl Anderson, Mechanical Engineering

Faculty Mentor: Ajay Agrawal, Mechanical Engineering

Passive Control of Thermo-Acoustic Instability in Different Length Combustors Using Metallic Porous Insert

Lean premixed combustion, while being emission free and burning cleanly, suffers from developing thermo-acoustic instabilities. Thermo-acoustic instabilities are the result of the flame propagation matching the natural acoustic mode of the combustor geometry, resulting in a large release of acoustic energy. These instabilities can result in violent vibrations, loud noises, and potential engine failure. The research I collaborated on, lead by Dr. Ajay Agrawal, strove to mitigate or completely eliminate thermo-acoustic behavior by using a metal porous insert to increase the stability of the flame. Combustion was measured inside of a quartz combustion cylinder burning a methane mixture. The experimental setup consisted of a sound probe device, a time-resolved PIV apparatus, and a seeding system to quantify the flow field of the combustion. Results of the study found that using a metal porous insert was effective in increasing flame stability, and acoustic energy was decreased. Furthermore, it was found that metal porous inserts are effective over a wide range of combustor geometries. These findings can be applied to increase the safety and reliability of gas turbine engines, which are critical in the energy and aviation industry.

Karissa Annis, English

Faculty Mentor: Patti White, English

April 27, 2011: UA Responds to the Tornado

Dr. Patti White, Professor of English, has been conducting research into the tornado that struck Tuscaloosa April 27th, 2011. My own part of the research was to compile a listing of all the efforts made by the University and those affiliated, such as faculty members, students, alumni, to distribute resources and aid the tornado victims. My method was to start on the University's website and get a base knowledge of their own efforts before expanding into local and even national newspapers to find more articles about those who gave in some way or another. So far, the research I have found tells the story of hundreds of individuals who have all given of themselves to help the city of Tuscaloosa recover from the storms. Dr. White plans to write a series of creative non-fiction essays about the tornado. Her first such essay, "The Sound," was published in Gulf Coast in 2013. This research will contribute to her work by expanding on her personal experience of the tornado, adding new information and suggesting new lines of research.

Madison Anzelc, Biological Sciences

Tori Fields, Biological Sciences

Faculty Mentor: Beverly Thorn, Psychology

The Association of Demographic and Pain Characteristics with Types of Self-Reported Pain Treatment Strategies Used Among Chronic Pain Patients Seeking Care at FQHC's

Chronic pain is a public health problem affecting over 100 million Americans. Despite its high prevalence and negative impact on individual's physical, emotional, and social functioning, chronic pain remains poorly understood and undertreated. Chronic pain is usually not cured but managed; hence, many patients have to try different types or combinations of treatment modalities to reduce their pain. Medical treatment options for chronic pain vary from over the counter (OTC) to prescription medications and surgery. While some patients find some more effective than others, what remains true is that the chronic pain is difficult to treat. Among people with chronic pain, those of lower socioeconomic status (SES) and rural residency report more chronic pain. However, little is known about the types of treatments (medical or non-medical) used among patients seeking care at a Federally

Qualified Health Center (FQHC). We sought to determine whether reported pain intensity and pain location at the time of initial assessment were associated with the types of treatments reportedly used by these patients (e.g., surgery, chiropractic, prescription medication, over-the-counter medication, alternative medicine, etc.) . For this presentation, we will analyze a subset of participants (N=134) who were enrolled in a larger randomized clinical trial comparing health literacy- adapted psychosocial interventions for chronic pain (CBT and Pain Education).

Sarah Asseff, American Studies

Faculty Mentor: Ellen Spears, American Studies

The American Chemical Industry's Transition into World War II and its Post-War Developments

World War II saw a great expansion of American markets across all lines, but especially the chemical industry as it prepared to take on a whole new level of production and development. This can be especially seen in many chemical companies print ads that feature military style planes and strong wording that plays with the themes of flight and upwards movement. Air travel and the use of airplanes in warfare was still a relatively new concept for many Americans before the war, but as industry geared up during 1939 and 1940 timeframe, sparking more research and development, air travel and traffic becomes a huge part of chemical advertisements. Additionally, the rapid expansion of the chemical industry contributed greatly to efforts of chemical companies to not only provide materials for war, but also to the American public. Research of new compounds and chemical derivatives led to the invention of many modern, domestically used products that would go on to be considered American household staples as Dr. Ellen Griffith Spears has argued. Advertisements are also prime examples of how the marketing techniques of these chemical products played into their sales success. Further research is currently being conducted into the chemical industry's full-fledged wartime transition in 1941 when the United States officially joined World War II.

Emily Barbee, Information Systems, Statistics and Management Science

Derek Carter, A&S - Economics, Finance and Legal Studies

Faculty Mentor: Emmett Lodree, Information Systems, Statistics and Management Science

The Donations Collection Problem

This research project addresses an important problem that arises within a humanitarian logistics context. In particular, this study is motivated by the process of collecting donations following large-scale disaster events such as the April 27, 2011 Tuscaloosa Tornado, and delivering these donations to a centrally located relief warehouse for processing and distribution to disaster victims. Donation collections efforts are often inhibited by the influx of exorbitant numbers of individuals to disaster areas, which introduces significant traffic congestion problems. We introduce the donations collection problem (DCP) in an effort to make the process of transporting donations to the central warehouse more efficient. Instead of individual donors traveling to the central warehouse thereby annunciating the traffic problems, the DCP proposes a network design in which donations are deposited at satellite locations and then retrieved by a few volunteers with a small fleet of large capacity vehicles. The objective of the DCP is to find a collection route that maximizes the amount of donations collected from the satellite locations and delivered to the central warehouse before a given time. We model the problem as a dynamic program and introduce heuristic policies to find efficient routes. The effectiveness of our proposed heuristic policies will be evaluated through extensive computational experiments, and validated using real-world data from the 2014 Beat Auburn Beat Hunger Food Drive.

Casey Barberio, Political Science

Faculty Mentor: Richard Fording, Political Science

Impact of Voter Identification Legislation on Alabama's Minority Voters

In 2013 the United States Supreme Court repealed Section 4 of the Voting Rights Amendment in the court case *Shelby v. Holder*. Section 4 of the Voting Rights Amendment contained the coverage formula that determines which jurisdictions are subjected to preclearance based on their histories of discrimination in voting. Jurisdictions previously covered by Section 4 of the VRA include the states of Alabama, Alaska, Arizona, Georgia, Louisiana, Mississippi, South Carolina, Texas, and Virginia. Since 2013 many of the states that were once mandated to conform to preclearance passed aggressive Voter Identification legislation. Of these states to pass Voter Identification legislation is the State of Alabama. Effective in June 2013, Act 2011-673 requires all voters to have a specific type of photo identification at the polls in order to vote. The purpose of this research project is to see if Alabama's Voter Identification legislation has had an adverse effect on African American voter turnout within the state. Using voter turnout and registration data provided by the Alabama Secretary of State's office, I will measure the change in voter turnout between the 2010 and 2014 midterm elections, for every voter precinct in the state. If the voter identification law has had a negative effect on African American turnout (compared to whites), we would assume that the 2010-2014 change in turnout for each precinct is negatively related to the percentage of the precinct that is African American.

Matthew Barrett, Political Science

Faculty Mentor: Karl DeRouen, Political Science

Efficacy of United Nations Peace Keeping Operations

**International focus*

There is considerable debate on the efficacy of United Nations Peace Keeping Operations (UNPKOs) and the implementability of their mandates. Examples of the diversity of mandates include mine clearing, election administration and improving rule of law. The purpose of this study is to assess the determinants of UNPKO mandate implementation. We analyze each mandate provision and assess whether it was implemented. This will provide valuable policy guidance when designing PKO mandates. Considering the tremendous costs of PKOs, tasks that are more implementable should be given higher priority. The dependent variable in this study is provision implementation success coded dichotomously and the independent variables are mission size, level of democracy, intensity of the conflict, number of warring parties, whether there was a treaty, and GDP per capita of the host country. The nature of the dependent variable necessitates logit modeling. We hypothesize that the clearer the goal(s) of the mandate provision the more likely it will be implemented. Relatedly, provisions with a clear time line have a greater probability of being realized. We expect war intensity, smaller missions, low GDP/capita and number of insurgents to each have a negative effect on implementation.

Fatima Becerra, Anthropology

Faculty Mentor: Kathryn Oths, Anthropology

Herbal Medicine Use in the Peruvian Highlands

**International focus*

For centuries communities in the Peruvian highlands have depended upon herbal medicine to treat disease and illness. In recent years, while the use of biomedicine has increased, the use of herbal medicine persists, although to what extent has not been researched. In the Peruvian hamlet of Chugurpampa, situated in the northern highlands of the state of La Libertad, differential use of herbs as medicine will be examined through the perspective of age and gender. Any changes in use are important to document as a decrease in use could lead to the extinction of traditional healing methods as well as a loss of those healers who use medicinal herbs. This poster will illustrate the patterns in the use of herbal medicine over time through data that has been collected from residents of Chugurpampa. Data was collected through a cultural consensus survey of 29 informants that was compared to data from 1989.

Johnathan Belcher, Chemistry

Faculty Mentor: David Dixon, Chemistry

Catalysis of Ethanol Condensation Reactions

The condensation reactions of two and three ethanols on M_2O_4 ($M=Ti, Zr, Hf$) nanoclusters to generate diethyl ether were studied using electronic structure calculations with at the density functional theory and coupled cluster CCSD(T) molecular orbital theory levels. A low reaction barrier is predicted for the reaction with three alcohols, one of which is sacrificed to form a metal hydroalkoxide, a strong gas phase Brønsted acid site. The condensation reactions on the product of the hydrolysis of metal oxide clusters ($M_2O_3(OH)_2$) were studied. Different acid sites on the metal oxyhydroxide cluster give different activation energies for the condensation reaction. The ether is formed by an α carbon transfer from one ethanol to either a $-OCH_2CH_3$ group of the other ethanol or to the other ethanol depending on whether an acid site is present. The gas phase Brønsted acidities of the metal hydroalkoxides and metal oxyhydroxides were calculated. The results are compared with our previous study of ethanol condensation over cyclic $(MO)_3$ ($M = Mo, W$) nanoclusters.

Rachel Belisle, Economics, Finance and Legal Studies

Faculty Mentor: Kristen Warner Telecommunication and Film

Bias and Borders: Inequality Within the Film Industry

Objective: A host of recent studies indicate that men dominate the film and television industry. As a result, women often struggle to consistently obtain jobs in this system. This project uses several methods to explore the consequences of the disproportionate number of women working in the industry and explain the difficulty of breaking its glass ceiling. Data: Many studies have been conducted concerning this gender bias. These studies observe problems with women in the field both on and off screen. While women behind the scenes are hardly given the opportunity to showcase their skills, women on screen are often way more objectified and given less respect than their male counterparts. Data from studies that showcase these issues is scattered throughout the paper, further supporting the bias issue in the industry. Expectations: While many people are aware that women are not treated equally in the film world, most do not realize the severity of the issue. This project specifies the many struggles that women go through in order to work in the industry. I have collected data from the sources of several reliable scholars and journalists to explore this issue and present it to the public. Through research and detailed analysis, I aspire to support ongoing studies of women in film and further reveal the prejudice inflicted against them in the industry.

Emilee Benos, Journalism

Faculty Mentor: Kim Bissell, Journalism

Factors That Relate to an Individual's Self Perception as it Relates to Body Image

It's no secret that one of the main causes of unhappiness in adolescents is poor self-image, particularly poor body image, but what about adults? According to previous studies, body image issues aren't limited to just minors. People of various ages suffer from poor body image too. Of importance are factors that may contribute to this low self-esteem that people may not be aware of. The purpose of this study is to identify factors that influence people's body image as well as overall self-image and societal body standards. We are interested in the way various related and unrelated factors in a person's social and home environments, as well as their personal media preferences, contribute to a person's body-image, and at what age these different influences change. The results we get back from this study will help us understand what causes poor body image, at what age these influences on body image change, and the continuing stigma caused by not meeting societal body standards. Once we better understand these different factors that cause poor body image, we will be better equipped to prevent diseases associated with poor self-esteem including depression, eating disorders, and even death.

Haley Bevis, Communicative Disorders

Faculty Mentor: Anthony Buhr, Communicative Disorders

Perception of Stuttering

The goal of the study is to determine how different kinds of stuttering forms are perceived by college-aged students. The number of iterations of a repetition of a single word was manipulated within a brief text. Participants were asked to rate the disfluency of a computer-generated audio of that text. It is expected that participants will rate multiple iterations of a repetition as more disfluent than a single iteration of a repetition. Results will shed light on how people perceive stuttering.

Trinicia Bodden, Chemistry

Faculty Mentor: Sherwood Burns-Nader, HES - Human Development and Family Studies

SES Effects on Medical Experiences Based on the Memories of Young Adults

Socioeconomic status is a measure of the combined economic and social position of a household based on three factors: income, education and occupation. Research has found correlations between SES and the quality of healthcare experience. Because SES is so broad, it has been difficult to determine exactly how it affects a person's experience with the medical field. However, theories include low SES producing poor experiences due to an overall poor health (i.e. caused by environment, etc.), as well as discrimination within the medical field to patients with lower income. The purpose of this study is to examine adults' memories of healthcare experiences and examine the effect of SES on these memories. It was hypothesized that adults who report their childhood household income to be low will report more negative memories with healthcare. An anonymous survey discussing memories of childhood healthcare experiences was given to 346 young adults. All participants were students at the University of Alabama between ages 19 and 41 enrolled in a Human Development and Family Studies course. The survey was composed of 48 questions including assessment of adults' memories of healthcare. Surveys were collected and analyzed. Findings supported the hypothesis, finding relationship between SES and feelings about the medical staff. In addition, a significant relationship was found between SES and the use of caregivers as support during medical visits.

Theresa Borcky, Chemical and Biological Engineering

Christopher Bankston, Chemical and Biological Engineering

Kendall Smith, Information Systems, Statistics and Management Science

Faculty Mentor: Margaret Liu, Chemical and Biological Engineering

Targeted Anticancer Biopharmaceutical Production Platform Development Using CHO Cells

Chinese Hamster Ovary (CHO) cells are the predominant hosts to express recombinant bio-therapeutic proteins in the biopharmaceutical industry. The effective CHO platform for anticancer therapeutic protein production is critical to both the biopharmaceutical companies and the growing requirement of anticancer biomedicine. In this study, CHO K1 cells, one of the most popular CHO hosts, were used to establish a novel platform for the targeted anticancer biopharmaceutical production via cell line development. A double-gene vector with optimized codons was successfully constructed for simultaneously expressing the light chain and the heavy chain of IgG antibodies. After transfection and selection, the genes encoding IgG were amplified using methionine sulphoximine (MSX) to obtain the stable and high yielding CHO cell pool. The top 6 clones with the highest protein productions, between 347 mg/L and 780 mg/L, were subsequently selected through single cell cloning. In addition, the reverse phase high performance liquid chromatography (RP-HPLC) analysis method was developed to quantitate the IgG protein titer efficiently and economically. In the future, the cell line will be engineered using the emerging omics technologies and the various cell-engineering strategies to acquire both high productivity and high quality in anticancer biopharmaceutical productions.

Matt Bowen, Computer Science

Faculty Mentor: Jeff Gray, Computer Science

Speed Estimation Using Computer Vision

With recent advancements in digital camera technology, the opportunity to integrate computer vision into our daily activities has become possible. A popular example of computer vision is ESPN's use of K-Zone during Major League Baseball broadcasts, which uses a combination of four cameras along with four computers running a sophisticated algorithm that is capable of tracking a pitch to within 2/5ths of an inch. K-Zone calculates pitch speed, identifies pitch type, and graphically displays pitch location. This poster presentation describes the design and experimental test results for the Mobile Video Velocity Estimation (MoVVE) project, which investigated the application of computer vision to support a speed-tracking app on a smartphone. MoVVE estimates the speed and tracks the location of a thrown baseball using video obtained from a typical mobile digital camera in conjunction with OpenCV computer vision library functions that identify the baseball within the video images. Hundreds of videos obtained under a wide variety of lighting and background conditions have been utilized during the development and testing of MoVVE.

Andrea Bright, Human Nutrition and Hospitality Management

Faculty Mentor: Linda Knol, Human Nutrition and Hospitality Management

Home Food Environments among College Students

The foods available at home may be linked to obesity during early childhood and teen years. The transition to college can impact young adult's eating patterns and weight status. However, there is a limited amount of research focusing on the home food environment of students living on and off campus. The purpose of this literature review was to examine the association between home food environments and food intake among college students. A search was conducted in PubMed using the following key terms: "Home food environment" and "college students". Eleven studies were identified initially, but only six discussed home food environments among students. When parents provide a healthy home food environment, their children are more likely to consume fruits, vegetables and whole grains during their college years. Those who live off campus are less likely to have a healthy home food environment than those who live on campus. More research is needed to determine the factors that relate to the home food environment in students who live off campus.

Joseph Butler, Chemistry

Faculty Mentor: Daniel Goebbert, Chemistry

Radical Emission Spectroscopy

Organic radicals are highly reactive transient species that are challenging to observe using standard experimental techniques. They are interesting intermediates in a wide range of chemical reactions, from combustion and energy to astrochemistry. Highly excited radicals were generated by a high voltage discharge of an organic compound in helium gas undergoing supersonic expansion. Helium was used to cool the molecules and prevent unwanted reactions. The excited molecules relaxed by photon emission, and spectra were recorded by using a lens and fiber optic cable connected to a CCD spectrometer. This project focused on the properties of the 2,5-lutidyl radical, and aromatic radical containing a nitrogen atom in the aromatic ring. The replacement of a carbon atom with nitrogen decreased the electronic excitation energy of the radical relative to the similar benzyl and xylyl radicals. A series of peaks close to the origin band in the spectrum corresponded to different vibrational energies, and these were used to identify the structure of the radical. The results of this study provide important information about the electronic structure of 2,5-lutidyl radical and the effect of heteroatom substitution. The spectrum provides a fingerprint that can be used to identify the presence of this molecule in remote or inaccessible environments, such as the interstellar medium or combustion chambers.

Kip Callahan, Chemistry

Faculty Mentor: Silas Blackstock, Chemistry

Donor-Acceptor Cocrystallization of Neutral and Cationic Azobenzenes

This semester I researched in the Blackstock group, working in the lab under Savannah Reach. Initially, we studied the impact of protonating methyl yellow with trifluoroacetic acid (TFA), which is an electron-rich molecule. The introduction of protons into an organic compound affects the structure and reactivity. We utilized laboratory instruments such as a Nuclear Magnetic Resonance (NMR) spectrometer to track and understand how the molecule was affected after protonation. Using 2D NMR, we were able to assign the most basic site of the molecule and understand where protonation occurred. There was also a dramatic color change upon protonation and crystallization occurred immediately. In further work, we have been attempting to cocrystallize the neutral and protonated forms of methyl yellow, which are hypothesized to associate with each other. Any cocrystals isolated will be studied by x-ray diffraction to deduce their atomic structure and evaluate the geometry of any neutral-cation complex. UV-Vis spectra of both neutral (yellow) and protonated (violet) forms have been measured to characterize the optical absorptions of these species. The photoisomerization of these azo species is also under investigation.

Davis Campassi, Mechanical Engineering

Faculty Mentor: Paulinas Puzinauskas, Mechanical Engineering

Diagnostic and Emissions Analysis of a Hybrid-Electric Vehicle

In my research I am analyzing the performance of a Hybrid-Electric Vehicle (HEV). The way we are monitoring the behavior comes in two forms. The first is diagnostic software with which we can plug directly into the car with a connector, and read data from the car's computer such as fuel flow, spark timing, and engine temperature (much like a mechanic would use to diagnose your engine trouble light). The second is through emissions analysis. The engine lab in the SERC has a state of the art emissions analysis system which can be hooked up while the car is on the dynamometer (basically a treadmill for cars). By doing this we can get extremely accurate concentration levels of relevant emissions such as carbon dioxide, carbon monoxide, and NOx. Then by using the fuel flow rates taken from the diagnostic software and a little bit of chemistry, we can create a "carbon balance" to get the actual mass of the emissions. By doing this process for different conditions such as aggressive city driving, conservative city driving, and highway driving and comparing the results to those of non-hybrids, we can get a better understanding of the efficiency differences of hybrid vehicles.

Miranda Casey, School of Social Work

Faculty Mentor: Debra Nelson-Gardell, School of Social Work

Preventing Delinquency Among Maltreated and Trauma-Exposed Children and Adolescents: Mentoring Natural and Trusting Relationships [MNTR]

Abstract Abram, Teplin, Charles, Longworth, McClelland, and Dulcan (2004) found that 92% of the youth in the juvenile justice system have experienced at least one traumatic event in their lifetime, with many youth experiencing more than one traumatic event. It is evident that there is a link between childhood maltreatment and levels of juvenile delinquency. Research indicates that youth with a history of maltreatment are indeed at a higher risk of delinquency than their peers who have not been abused in some way. Though it is apparent that delinquency and childhood maltreatment are correlated, most current juvenile delinquency interventions do not include addressing the issues involved with being a survivor of a childhood trauma. In order to adequately address this issue, this project aims to showcase the benefits of trauma sensitivity training for mentors dealing with traumatized youth, as well as demonstrate the added benefits of allowing the mentee to choose an already trusted adult as their mentor. To do this, the mixed methods study will randomly assign youth and their matched mentors to

one of four groups: Mentoring as Usual -MAU, Youth Identified Mentoring - YIM, Trauma Sensitive Mentoring - TSM, or Youth Identified Trauma Sensitive Mentoring - YITSM. Researchers will conduct qualitative interviews to provide a better understanding of mentees' and mentors' views of the mentoring process associated with the respective conditions to which they were randomly assigned.

Carissa Clay, Biological Sciences

Faculty Mentor: Ryan Earley, Biological Sciences

Personality and Fitness in Mangrove Rivulus Fish

The influence of behavior on survival and reproduction can vary as a function of the environments that animals inhabit. Mangrove rivulus fish live in highly variable environments, mangrove ecosystems, characterized by temporal variation in water levels and refuge (crab burrow) availability. These characteristics can exert strong selection on behavioral performance, and perhaps favored the evolution of unique behaviors in rivulus such as the ability to jump out of the water and move on land. We designed an experiment to examine how behavioral variation among individuals predicts fitness in environments that present different challenges. We will quantify aggression, emersion (jettisoning from water) in response to aggression by conspecifics, and terrestrial locomotion. Behavior will be quantified twice for each individual, a prerequisite for determining within-individual consistency and among-individual variation in behavior (i.e., personality). We will then place the fish into mesocosms for one year to explore personality-related variation in survival and reproduction in environments that favor different behavioral traits. Control mesocosms will contain crab burrows that are constantly submerged. Treatment mesocosms will expose rivulus to tides, leaving crab burrows submerged for 12 hours daily, and will challenge rivulus to interact within crab burrows and locomote on land. This experiment will provide insights into the evolution of behavior in variable environments.

Cassie Clifton, Mechanical Engineering

Faculty Mentor: Vinu Unnikrishnan

Aerospace Engineering and Mechanics Computational and Experimental Modeling of Female Pelvic Floor Muscles for Obstetric and Pelvic Organ Prolapse (POP) Surgical Planning

Trauma due to childbirth and post pregnancy health issues such as Pelvic Organ Prolapse (POP) affect millions of women in the U.S. and across the globe. To date, lack of understanding on the complex mechanisms of childbirth among obstetrics and gynecological surgeons prevents the development of effective surgical planning. A computational model combined with a biofidelic experimental model of the pelvic floor muscle would be indispensable for surgical planning and devising mitigation strategies for traumatic childbirth and POP. In the current research effort, the pelvic floor muscle is modeled from human pelvic MRI data and subsequently converted into a 3D geometric model using advanced image segmentation techniques, and computational analysis involving various loading conditions simulating human pelvis would be carried out. A 3D model would be printed and surgical and suture of the pelvic floor would also be experimentally investigated for improvements in pelvic floor surgeries.

Elizabeth Conrad, Computer Science

Faculty Mentor: Jeff Gray, Computer Science

A Block-Based Programming Environment for Young African American Girls

There is a growing effort to encourage young children to start learning the basics of coding and computer science. Additionally, it is especially important to focus these efforts toward children that are underrepresented in the field (e.g., young women and ethnic minority students). The aim of this project is to develop a new programming environment using Google's "Blockly" that will be contextualized in a way that encourages young African American girls to become excited about computer programming. Blockly is an interactive programming language that is very easy to understand and has been used in

many other educational outreach efforts to help children delve into computer programming for the very first time. Blockly uses pre-coded "blocks" that represent different pieces of code that can be assembled and snapped together. The new environment will display three fingers of a hand and will walk the children through coding in order to paint the nails. Three main programming control structures will be available: sequential, repetition, and decision. Putting blocks in order will help students understand the intuitive, sequential aspect of coding. A series of programming puzzles will introduce the children to the idea of repetition and decision making in code, which are fundamental concepts of programming. The environment will aim to be very simple to understand, but also very effective in its instruction.

Bethany Corne, Advertising and Public Relations

Faculty Mentor: Christopher Vargo, Advertising and Public Relations

Understanding Brands on Social Media with a Tweet Typology

Brands create content on Twitter every day. They follow a content schedule. They use hash tags. These are just a few of the countless tips and tricks that today's "social media experts" have created to boost the presence of brands on social media. Yet the real question is, does any of this really work? How can a brand know that its tweets are truly reaching its target audience? Dr. Vargo's research has set out to do just that. This study aims to create a typology under which tweets by brands can be categorized. Once a working typology is created, it will allow insight into the subject matter and content that is most likely to earn interaction from a brand's publics. The first typology was created by reading one hundred tweets from each of several retail brands, insurance providers, banks, and television providers. This typology was tested through a survey where each survey taker was asked to categorize tweets based on the typology. The survey was first tested by University of Alabama students and then by Amazon Mechanical Turk workers. Overall, the typology went through six iterations. After each test, the typology was revised to boost agreement on its categories. The next step in this study will be to perform an analysis of how much interaction each type of tweet receives. This analysis will be based on each tweet's number of re-tweets and favorites. We will be looking for significant differences in each category to determine which types of tweets are most effective for a br

Ellis Crabtree, Chemical and Biological Engineering

Andrew Hanebuth, Chemical and Biological Engineering

Jared Morgan, Chemical and Biological Engineering

Faculty Mentor: Heath Turner, Chemical and Biological Engineering

Physical Representations of Simulation Data

Communication of information proves to be a common challenge of theoretical research in the field of chemical engineering. Theoretical research often and understandably yields very little tangible results, and this obstacle impedes a researcher's ability to explain their findings and important elements of their research. The goal of our research is to create tangible representations of data resulting from simulations as well as develop easier methods to create these representations. The primary method of representation generation that we seek to utilize is the method of 3D printing, particularly pertaining to molecular simulations. We seek to produce 3D structures from computerized files of data generated from simulations as well as other theoretical data. Our goal is to create structures that accurately demonstrate molecular behavior and allow for easier explanations, and improve our approach to 3D printing in the process.

Megan Craig, Political Science

Faculty Mentor: Dana Patton, Political Science

Could Medicaid Expansion Help Lower Male Suicide Rates in Alabama?

Many people lack the resources and support they need to deal with their mental health issues and turn to suicide for relief. In Alabama, every county is required to provide an overview of their health records, including data on the number and rate of suicides. Through examining this data, particularly the data on the comparative suicide rates of whites and blacks and males and females, it is evident that, in Alabama, white, male citizens are more likely to commit suicide than any other group. Alabama chose not to expand its Medicaid program when such an expansion was offered under the Affordable Care Act of 2010. Accordingly, many males across the state potentially lack proper health care resources, including access to mental health services. Many most likely do not qualify for Medicaid, or for subsidies for purchasing health insurance plans on the marketplace established by the ACA, or "Obamacare". As such, they lack access to mental health resources.

Candace Cravey, Management and Marketing

Faculty Mentor: Juliet Davis, Management and Marketing

What Characteristics Affect the Quality of Long-Term Care?

Thanks to today's social media, news has the power to reach people faster than ever. In the past few years, stories of long-term care facilities have frequented our headlines with pictures of neglected patients and facilities that were not up to standard. In a survey conducted by the Department of Health and Human Services, 44% of the participants reported that they had abused themselves while 95% reported they had been neglected or witnessed the neglect of a fellow patient. According to the U.S. General Accountability Office state surveys understated the problems found with licensed facilities. Of all the state's surveys of various facilities, 70% of the surveys missed at least one deficiency while another 15% missed a major issue that could have, or did, lead to actual harm or jeopardized a resident. Under the direction of Dr. Juliet Davis, we will look at the overall standing of nursing homes and long-term care facilities in the state of New York to find out what characteristics make certain facilities better than others by analyzing trends over a wide variety of variables. By isolating characteristics that associated with higher scoring facilities, we hope to study these facilities and see how their practices reach such high standards. We hope to use our findings to lower-ranking facilities with guidance on how to implement procedures that will help them improve their quality of care. Our hope is that this research can ultimately be used to improve the quality of long-ter

Vidya Sree Dandu, Biological Sciences

Faculty Mentor: Asma Hatoum-Aslan, Biological Sciences

Isolating Bacterial Viruses that Combat Drug-Resistant Staphylococci

The rise of drug resistant bacterial infections is inciting a global public health crisis. The Staphylococcus genus of bacteria has developed resistance to all known antibiotics and is emerging in both hospital and community settings. This reality underscores the need for alternative therapies. Bacterial viruses, or phages, have been proposed as one such alternative because of their ability to invade and destroy bacteria. These organisms are ubiquitous in nature, and have been isolated from a variety of environmental sources. The goal of this study is to identify and characterize novel phages that attack Staphylococcus epidermidis, the most common cause of infections associated with medical implants. We collected samples of human wastewater and enriched for phages that combat S. epidermidis by cultivating the bacteria with the samples over the course of a week. Using a plating assay, we found clear evidence of the existence of phage in the form of plaques, or clear zones that interrupt the growth of bacteria. The plaques have different morphologies, suggesting multiple types of phages may be present. We isolated phages from distinct plaques and visualized them using transmission electron microscopy, which definitively confirmed at least three distinct phage morphologies. Future work will characterize the phage genomes using restriction mapping and whole genome sequencing. At its conclusion, this work is expected to provide valuable tools to fight Staphylococcus infections.

Ellery Day, Biological Sciences

Alison Beiser, Biological Sciences

Faculty Mentor: Sarah Morrow

Anthropology Analyzing Stress Levels in High Risk, Preschool/Kindergarten-age Children (Research in progress)

This project is measuring various, high-risk preschool/kindergarten-age children's reactions to age-appropriate stimuli that could evoke physiological responses to mild social, cognitive, and emotional stressors. This is done through use of an electrocardiogram (ECG), and is used to measure skin conductance level (SCL) and respiratory sinus arrhythmia (RSA) by three disposable spot electrodes and fingertip electrodes. University students working in the field take saliva samples of these children, and return them to the lab to test cortisol reactivity: this hormone is indicative of stress levels and shows activity in the hypothalamic-pituitary-adrenal axis. A saliva sample is used as a pre-stress baseline to maintain consistency in the child's stress levels before, during, and after the testing is complete. The stimuli used during the ECG testing are a baseline story read before exposure to stressors, social interview, number recall, lemon juice taste test, a neutral, non-stressful emotion video, a mild-reaction evoking video, and then repeating the baseline story. Two more saliva samples are taken after to create a "complete cortisol response profile."

Alexandra DeKinder, Chemical and Biological Engineering

Faculty Mentor: Jason Parton Information Systems, Statistics and Management Science

Survival Likelihood of Trauma Patients: An examination of transport to trauma centers compatible with the pre-hospital assessment of the patient

The care of patients with traumatic injuries is an area of primary concern in the pre-hospital setting. These conditions account for the majority of deaths in the United States for children and adults between 1 and 44 years of age (1). At the scene of an accident, Emergency Medical Service (EMS) personnel need to be able to effectively identify the type and severity of an injury as well as make the decision for the appropriate transport destination that may offer the best and most adequate care for the patient. Minimal response and transport times, severity and classification of injury, and pre-existing conditions are certainly all critical aspects with regard to trauma patient outcomes. Additional consideration should also be given to the transport destination that most appropriately matches the injuries of the patient. Our study aims to investigate how these considerations may impact trauma patient mortality. Specifically the interest of this study are to: · Identify Alabama Trauma Center locations and approximate distance via road networks · Examine how well the transport destination matches the specified level of trauma for the patient · Compare the likelihood of survival for level 1 trauma patients being transported to a level 2 or 3 trauma facility to that of a level 1 patients transferred to a level 1 facility

Sean Devey, Mechanical Engineering

Faculty Mentor: Paul Hubner, Aerospace Engineering and Mechanics

Development of a Fixed Membrane-Wing MAV Test Platform

Rationale: Aerodynamic characteristics for fixed-wing Micro Air Vehicles (MAVs) are not well understood and documented at low Reynolds numbers. Objectives: To determine the feasibility of, and gain insight for creating a fixed membrane-wing MAV platform for low Reynolds number flight testing. Methods: By modeling lift and drag characteristics from previous research and published literature, the predicted performance at varying angles of attack of a theoretical fixed membrane-wing MAV were calculated and graphed to assist design. Research is being conducted into commercially available motors and components for the craft. A preliminary design for wing tunnel testing will be constructed using the predicted performance data. Results/Conclusions: This project is still in progress and as yet no platform

has been constructed. One of the challenges faced in the modeling and design of the MAV is the shortage of accurate lift and drag data at low Reynolds numbers and aspect ratios. Weight is also a critical issue, and appropriately sized components including motors, batteries, receivers, and servos are important, requiring trade-off studies. The initial prototype will be tested in the wind tunnel by the end of April to generate experimental performance data which can be used as a basis for optimization of the design for flight testing and to corroborate the accuracy of the analytical model.

Evan Dittmar, Biological Sciences

Faculty Mentor: Jeff Lozier, Biological Sciences

Effects of latitude and altitude on Bombus vosnesenskii morphology

Bumble bees (*Bombus*) are important native pollinators of which many species have large ranges and experience diverse environmental conditions. Regulating body temperature and flying efficiently are major factors for bumble bee survival. Bees thermoregulate both before and during flight as their flight muscles require a specific temperature range to best function, and decreased external temperatures present an obstacle for optimal flight. As latitude increases, temperature decreases, and as altitude increases, both temperature and air density decrease. Because of this, we expect the bees in areas of increased latitude and altitude to adapt, through increased body and wing size, to the conditions in order to more efficiently fly and regulate body temperature. However, due to the difference in air density as well as the increase in body size, we expect wing size to increase at a greater rate in comparison to increases in body size. In order to evaluate this hypothesis, bees were collected from California, Oregon, and Washington at different elevations and measured. Bee bodies and wings were photographed using a microscope, and the body size and wing area and shape were measured using digital software. Our analysis suggests that bees in different environments have morphological differences that could represent possible adaptations due to changes in environmental conditions associated with latitude and altitude changes.

Katie Doggett, Mechanical Engineering

Samantha Nofsinger, Kinesiology

Samantha Darr, Biological Sciences

Faculty Mentor: Jonathan Wingo, Kinesiology

Effect of Ice Slurry Ingestion on Cardiovascular Drift and Maximal Oxygen Uptake During Heat Stress

Abstract Ice slurry ingestion prior to initiation of exercise has been shown to improve exercise capacity and tolerance of core temperature elevation. Few studies have examined the effect of ice slurry ingestion during exercise, its effect on cardiovascular (CV) drift, and maximal oxygen uptake ($\dot{V}O_{2max}$) remain unknown. This study's purpose was to determine whether ingesting ice slurry beverages during exercise attenuates CV drift and the associated decrease in $\dot{V}O_{2max}$. Six healthy males completed a control $\dot{V}O_{2max}$ on a cycle ergometer followed by three experimental trials involving cycling at 60% $\dot{V}O_{2max}$ in a hot environment for either 15 min, 45 min with no beverage (45NB) or 45 min with ice slurry ingestion (45ICE). $\dot{V}O_{2max}$ was assessed immediately at the end of each trial. During these trials, we measured heart rate and stroke volume. There was a greater increase in heart rate from 15 to 45 minutes of exercise in the NB trials. There was a decrease in stroke volume from 15 to 45 minutes of exercise in the NB trials whereas there was an increase in stroke volume from 15 to 45 minutes of exercise in the ICE trials. There was a decrease in $\dot{V}O_{2max}$ from 15 to 45 minutes of exercise in both the NB and ICE trials. However, $\dot{V}O_{2max}$ after 45 minutes of exercise do not appear to be different between treatments. This observation is similar to the findings of previous research.

Marlow Durbin, Chemical and Biological Engineering

Faculty Mentor: Jason Bara, Chemical and Biological Engineering

Synthesis and Physical Testing of Tetramethylimidazolium-based Ionic Liquids

Ionic liquids (ILs) created from substituted imidazole rings are of great interest in the field of CO₂ capture and structured materials. These compounds are ideal in a practical setting because of their low viscosity and minimal volatility. Developing structure-property relationships among the many variations of imidazole-based IL to test their density and viscosity is one of the first steps in researching viability for industrial applications. The compounds being synthesized in this experiment are 1-R-2,3,4,5-tetramethylimidazolium cations with various R groups substituted in the '1' position. Preliminary observations from the synthesis of the alkyl and benzyl-substituted imidazolium compounds indicate that the hexyl, octyl and benzyl groups are liquid at room temperature, while the butyl chain is solid at room temperature. The current stage of the project is the purity confirmation of the alkyl and benzyl-substituted imidazolium compounds by ¹H NMR analysis, as well as the synthesis of ILs with oxyethylene and fluorocarbon groups. After all six substitutions for the imidazolium have been successfully synthesized, density and viscosity testing will be undergone to confirm computer models of the compounds' physical properties.

Jenna Dworak, Communicative Disorders

Faculty Mentor: Anthony Buhr, Communicative Disorders

Stuttering Frequency And Its Dependency On Conversation Topic

Through the Communication Disorders department, research was conducted involving two patients who attend appointments regularly at the University of Alabama Speech and Hearing Center who stutter. The basis for this research is the idea that a person's ability to stutter can either be enhanced or diminished by them talking about stuttering versus talking about something completely unrelated. In order to set up the experiment, two sets of questions were created; one including questions about stuttering and the other including questions ranging from cooking to travelling. An interview scenario was set up and the people being interviewed, who had a stuttering speech impediment, were unaware of the purpose of the study to avoid bias. There were two interviews conducted and recorded on a video camera in order to save and replay the data so that every word was clearly logged. For the first interview the questions that were unrelated to stuttering were asked first and for the second interview, the questions involving studying were asked first in order to add another variable to the experiment. After the interviews were complete, they were uploaded onto InqScribe software so that the entire video could be transcribed. After each video was transcribed into the computer, the data was analyzed in order to accurately place the communication deficiencies spoken into the already transcribed videos. The transcriptions were compared in order to understand the data that was collected.

Jordan Elizaga, Electrical and Computer Engineering

Faculty Mentor: Jaber Abu Qahouq, Electrical and Computer Engineering

Experimental Study on the Effect of Aging and Health of Batteries on its Parameters

The main objective of this experiment is to measure battery parameters such as voltage, current, and impedance under different conditions while the battery ages in order to correlate these parameters to the aging of the battery. The research hypothesis is that the age and health of the battery can be determined from the voltage, current and impedance measurements. The real-time impedance is measured by using a developed concept at the UA's Energy and Power Electronics Systems and Devices Laboratory which uses power converter control for real-time impedance measurement in addition to voltage regulation, charging, and discharging. The aging and health of battery is critical in many applications for reasons such as safety, cost, and convenience.

Madison Elmore, Kinesiology

Faculty Mentor: Phillip Bishop, Kinesiology

A Combined Intervention Improves Recovery from Weight Training

Recovery from training is a key issue in training elite athletes. The effects of ibuprofen, vitamins C & E, and protein on muscle pain, endurance and recovery was studied in a double blind placebo controlled experiment in trained weight lifters. Participants were instructed to perform a whole-body workout consisting of 3 sets to failure of each of these exercises using an 8-12 rep max of: shoulder press, lat pulls, chest press, leg extensions, hamstring curls, and leg press. Treatment consisted of: protein shake (270 kcal, 20 g protein, 45 g carbohydrate), 100mg of ibuprofen, 1000 mg of vitamin C and 400 I.U. of vitamin E were consumed immediately after the first workout, and a second dose of vitamin C and Ibuprofen were consumed 1 hour or 30 minutes, respectively, before the second workout. Participants were given a treatment or placebo (flavored water, gummy candies, and a sugar pill) before and after the workout. After a 24-hour rest, the participants performed the same workout. A 0-10 scale and a 100mm visual analog scale (VAS) scale were used to measure muscle pain/fatigue after each set of each exercise. There was a significant difference in lower muscle pain/fatigue following treatment compared to placebo conditions. Follow-up is needed to evaluate the efficacy of each component of the treatment and long-term effects on performance.

Kaitlin Ervin, Biological Sciences

Austin Martindale, Biological Sciences

Troy Smigielski, Biological Sciences

Faculty Mentor: Jonathan Wingo, Kinesiology

Effect of Exercise Mode on Cardiovascular Drift and Maximal Oxygen Uptake During Heat Stress

Cardiovascular drift-the progressive rise in heart rate and decline in stroke volume over time during constant, moderate-intensity exercise-is related to reduced maximal oxygen uptake ($\dot{V}O_{2max}$) during heat stress. Exercise mode impacts the magnitude of cardiovascular drift under thermoneutral conditions, but the extent to which exercise mode impacts cardiovascular drift and a decrement in $\dot{V}O_{2max}$ in hot conditions remains unknown. Purpose: to test the hypothesis that a greater magnitude of cardiovascular drift will be accompanied by a greater decrement in $\dot{V}O_{2max}$ during cycling compared to running in the heat. Methods: Four men completed 2 graded exercise tests (in 22 °C) to determine $\dot{V}O_{2max}$ on the cycle ergometer (BIKE) and treadmill (TM), respectively, followed by 4 experimental trials (in 35 °C) performed at 60% $\dot{V}O_{2max}$ in counterbalanced order-cycling for 15 and 45 min and running for 15 and 45 min, each immediately followed by measurement of $\dot{V}O_{2max}$. Results: The magnitude of cardiovascular drift and decrease in $\dot{V}O_{2max}$ between 15 and 45 min were similar between cycling and running. Conclusion: These preliminary data support 2 main conclusions; 1) the magnitude of cardiovascular drift during running is not different from that during cycling at a comparable intensity during heat stress, and 2) the relationship between cardiovascular drift and a reduction in $\dot{V}O_{2max}$ during heat stress appears to hold regardless of whether the exercise is cycling or running.

Allison Estep, Biological Sciences

Faculty Mentor: Julie Olson, Biological Sciences

Cultivation and Characterization of Urea Utilizing Bacteria from Weeks Bay, AL

Cultivation and Characterization of Urea Utilizing Bacteria from Weeks Bay, AL Claire Estep, Philip O. Lee, and Dr. Julie Olson Wetland soils maintain a vast diversity of microorganisms that can help to alleviate the nutrient pollution that has been steadily increasing worldwide due to human actions around and in waterways. Relatively few bacteria have been cultured and identified from wetland ecosystems due to difficulties associated with culturing environmental bacteria. In order to assess the presence and

diversity of urea-utilizing wetland bacteria, we collected sediment samples from six environmental zones of Weeks Bay, AL, and, using selective media to mimic the soil conditions of the studied areas, cultured bacteria possessing genes for the utilization of urea, a common component of wetland pollution. Currently, twelve organisms have been isolated and verified to have urease genes through chemical and molecular methods. Microscopy allowed for general morphological characterizations of each isolate, providing information about the composition of the cell walls. In the future, sequencing of the 16S rRNA gene from these isolates will allow us to identify the cultured organisms and determine if they have previously been characterized and described. Evaluating the ability of wetland microorganisms to utilize urea as a nitrogen source will help to determine the capability for these ecosystems to alleviate urea pollution.

Taylor Fancher, Biological Sciences

Faculty Mentor: Natasha Dimova, Geological Sciences

Dating Corals from Coral Reef Terraces in Papua-New Guinea

The end goal of this project is to use information recorded in growth bands in corals to reconstruct ocean water chemistry in past geological time and climate. As corals grow, they use nutrients from seawater that are specific for that time. Because of coral's long life-span, we will be able to use these growth bands to determine the changes in the ocean over thousands of years. The age of coral material is determined by using naturally occurring isotopes that have been stored in these bands. Since most of the material is carbonate, the Carbon-14 dating technique is usually used. For this project we are planning to use another method based on U/Th-decay. We will use corals that were collected by Dr. Paul Aharon in Papua New Guinea and have either already been dated or will be dated by C-14 methods. Dr. Aharon will be supervising the initial steps in dating the corals using our technique. We will make a powder of the coral material and get an XRD scan to verify that it is pristine aragonite or aragonite-calcite conversions, saw a thin slab and get X-Ray radiography in order to unravel the bands that can be used for dating. Dr. Natasha Dimova will be supervising as we clean the samples to remove any impurities, dissolve them, spike them with tracers, and analyze them using alpha spectrometry.

Kayla Frederick, Political Science

Faculty Mentor: Diana Dolliver, Criminal Justice

Drug Trafficking on Silk Road 2 through the Tor Network

**International focus*

BACKGROUND Criminal activity through the Internet has been made easier with the advent of Tor marketplaces. These anonymous, online settings not only permit the trade of illicit goods and services, but they are fairly accessible to a wide range of people. This research project seeks to determine the extent to which Tor marketplaces facilitate such trades. **METHODS** To better understand the scope of criminal activity through Tor marketplaces, web crawling software was used on Silk Road 2 and Evolution to pull data on drugs and their distribution from the sites. The data gathered from the pulls was then coded to give the different drug-types quantitative representations. In addition to the information on what drugs were being sold, there were also data collected regarding the geographic sources and destinations, as well as frequencies that these goods were sold on these Tor market-places. **RESULTS** It was found that the United States both bought and sold the most drugs out of the nineteen countries that made up the supply and demand of Silk Road 2. Additionally, the countries traditionally known for the drug trade were not necessarily top sellers on Silk Road 2, probably to do with the need for more technology to participate. **CONCLUSION** This study was the first to look at Silk Road 2, and it was found to be smaller than its original counterpart, Silk Road.

Alexander Fries, Geography

Faculty Mentor: Steven Ericson Geography

Assessment of Bikeability on The University of Alabama Campus

One of the notable features of The University of Alabama's extensive transportation infrastructure is its network of bicycle paths and lanes interspersed throughout campus to accommodate bicycling commuters. The existence of these bicycle lanes alone says very little about their actual effectiveness as means of transportation, nor does it provide a clear understanding of the overall feasibility of on-campus bicycling. This study assesses the quality and safety of select bicycle lanes throughout campus by assigning scores to the bicycle lanes by means of a modified, qualitatively-based bikeability audit. As a follow-up, a survey of the previously-assessed bicycle lanes was conducted, in which total bicycle traffic was tallied over the course of several weeks under thirty-minute intervals taken at various times throughout the day; included in the tabulations was information concerning bicyclists' preferred commuting facility (bicycle lane, sidewalk, roadway, etc.) and the gender of bicyclists on certain commuting facilities. The ultimate aim of this study is to examine if a correlation exists between a bicycle lane's assigned score and the actual usage patterns of commuters observed during the study period.

Francesca Fuger, Biological Sciences

Faculty Mentor: Ryan Earley, Biological Sciences

Can Variation in Fecundity Be Influenced by a Predecessor's Experience? Transgenerational Epigenetic Inheritance of Life History Traits

The phenotypes that organisms possess are the product of their genotype and environment. Environments experienced by a predecessor also affect the phenotypes of future generations via transgenerational epigenetic inheritance-the process whereby the phenotype is altered by factors other than its DNA sequence. If such modifications occur in germinal tissue they can be passed on for several generations. Because sexually reproducing individuals have unique genotypes, it is difficult to identify the precise contribution of the environment to the phenotype. However, mangrove rivulus, a self-fertilizing hermaphroditic fish, produces isogenic lineages with offspring that are effectively clones of the parent. In two populations, the majority of animals are genetically, but not phenotypically, identical; fecundity varies considerably among individuals. We hypothesize that epigenetic factors underlie variation in fecundity of wild caught, genetically identical individuals. If epigenetic modification occurred in germinal tissue, we predict similar phenotypic variation across many generations of offspring derived from the same individual. Multiple strains of two genetically distinct lineages from each population will be reared under laboratory conditions for three generations and eggs will be collected, counted, and measured weekly. If our hypothesis is supported, we can conclude that individual experiences can have lasting effects on offspring for many generations.

Annalee Fuller, Psychology

Faculty Mentor: Andrea Glenn, Psychology

Development of a Naturalistic Facial Expression Image Dataset

Psychological researchers often employ facial expression images as stimuli in their studies from a few databases which contain unrealistic portrayals of human emotions. In their research, participants' reactions may not be accurate due to the nature of the stimuli, reducing the validity of the research. Upon its completion, this project will bring forth a new set of facial expression images which will be distributed to researchers. First, previously used databases were examined and a list of target emotions was compiled. Secondly, using various internet video sources, ideas for accurately extracting certain responses were accrued. Video clips were spliced together using video-editing software; the product will be shown to participants as stimuli. Thirdly, colleagues watched the videos as participating researchers

evaluated the effectiveness of each segment; necessary revisions to the stimuli were made. Soon, participants will be recruited and trials will begin. The participants' reactions to the stimuli will be recorded discreetly via webcam. Later, screenshots will be taken from the recording. The effectiveness of those screenshots as facial expression stimuli will be judged by separate recruits in the project's second phase. Due to the pending status, no conclusions have yet been reached, but it is anticipated that the contribution of this realistic image-set to the scientific community will improve the validity of psychological research results.

Keaton Galloway, Curriculum and Instruction

Faculty Mentor: Michael Picone, Modern Languages and Classics

Literary Dialect and Its Use in Linguistic Reconstruction

19th-century authors depicting the South often used literary dialect to represent speech restricted by geographic location and socioeconomic status of its speakers. Knowing this, it is then possible to glean knowledge of the spoken dialects from the literary dialects. However, the literary dialects used only represent the spoken dialects, and so are questionable in their usefulness. Authors would often use literary dialect, authentic or not, to sell books. My task then was to locate first and subsequent editions of these books which used literary dialect and then review these texts to search for changes made to the dialect in subsequent editions. When reviewing one book, *The Granddissimes*, I found no changes from the original 1880 edition to subsequent editions from 1957 and 1968, which appear to have been reprints rather than new editions. However in an edition from 1899, small changes began to appear in the dialect. Initially they were minor, such as a letter added or subtracted to a word. Soon, whole words were replaced. Eventually entire passages were rewritten in Standard English, only retaining an introductory sentence of dialect to signal to the reader that the entire passage should be read with dialect. My research then underscores the fact that in addition to negotiating the other potential pitfalls associated with attempts to use literary dialect to reconstruct earlier speech, a careful researcher must be sure to examine the original addition before proceeding.

John-Cole Garwick, Economics, Finance and Legal Studies

Faculty Mentor: Paul Drenevich, Information Systems, Statistics and Management Science

Measuring Value Creation vs. Value Capture in Mergers and Acquisitions

Long-term value creation from Merger and Acquisition (M&A) activity is extremely difficult to forecast. Despite this inability to forecast, M&A activity continues to be prevalent, with most transactions using Investment banks as (assumed) essential intermediaries. This role raises further questions as to whether bank involvement positively contributes to M&A value creation, and if banks contribute more value than they appropriate in fees. We examine these issues by first measuring value creation from M&A activity, and then determining the net effects of bank involvement. There are two major variables to examine, costs incurred and value created. We categorize deals as lower cost vs. higher cost, and categorize value as loss in value vs. low value vs. high value created. These categories result in a matrix of outcomes. We measure costs as premium paid over stock price, with under 5% as low and over 15% as high. We measure value captured as increased cash flow over two years, with 3% considered high, 0-2.9%, considered low. As a goodwill write down is indicative of overpaying (costs in excess of value created), if a write down occurs, we consider the deal to have destroyed, or lost value. We will test relationships between deal cost and value created, predicting that: 1) as deal cost increases, value returns will diminish or be negative and 2) bank involvement will be positively related to higher costs and lower value creation.

Katie Gatti, Advertising and Public Relations

Faculty Mentor: Meg Lamme, Advertising and Public Relations

The "Mouse-General" and the Grey Lady: Joseph Goebbels in The New York Times, 1933

*International focus

In the decade following the end of World War I, American public relations professionals, the press, and academics struggled with the implications and ramifications of the pervasive success of wartime propaganda, systems of communication designed to hinder independent thought and cultivate crowd mentality. Meanwhile, the rise of the Nazi Party in Germany was proving unstoppable, culminating in the 1933 Machtergreifung [seizure of power], which included the appointment of Dr. Paul Joseph Goebbels as Hitler's Reich minister of popular enlightenment and propaganda. This study, then, examines the ways in which The New York Times—the paper of record for the city and the U.S. at this point—covered Goebbels during that year, a time of much national conversation concerning the roles and risks of propaganda. It was found that the two months with the most Goebbels-related Times coverage, April and November, not only offer insight into the way American perceptions of Goebbels changed during his first year as Minister of Propaganda but also reveal a contrast between Goebbels' portrayals three weeks into his appointment and then seven months later. Initial coverage conveyed careful concern and mild restraint as Goebbels' efforts were found to have strongly permeated German business and culture as well as the foreign press in Berlin. The coverage of his policies and methodology later, though, conveyed a sense of foreboding.

Rainey Gerald, Human Nutrition and Hospitality Management

Faculty Mentor: Amy Ellis, Human Nutrition and Hospitality Management

How well does skinfold thickness predict percent body fat in healthy older adults?

Background: Dual energy X-ray absorptiometry (DXA) is considered the gold standard for measuring lean soft tissue mass, fat-free mass, fat mass, and bone mineral content. On the other hand, a skinfold test is a quick and easy way to estimate percent body fat by measuring subscapular, suprailiac, biceps, and triceps skinfold thicknesses. The primary aim of this cross-sectional study is to determine how well an estimation of percent body fat by skinfold thicknesses compares to the gold standard of DXA. Methods: Thirty-four community-dwelling men and women, ages 66-81 had their body composition assessed by a skinfold test and DXA. The skinfold variables used to predict percent body fat are the averages of three measurements of the biceps, triceps, subscapular, and suprailiac skinfolds on the right side of the body. Reference tables for the sum of the four skinfolds were used to predict percent fat. The data from the skinfold tests and DXA were compared by paired t-tests and Pearson correlations. Results: Skinfold estimates and DXA data were correlated with each other ($r = 0.869$; $p < 0.001$). Also paired t-test revealed no significant difference between the two measures. Discussion: In this small group of healthy older adults, skinfold thicknesses provided estimates of percent body fat comparable to the gold standard measure of DXA. Further studies are needed to determine if the similarities are true for other age groups besides the older adult.

Madeline Gibson, Chemical and Biological Engineering

Faculty Mentor: Kristi Crowe-White, Human Nutrition and Hospitality Management

Effects of Processing on the Phytochemical Profile and Antioxidant Capacity of Four Honey Varietals

Commercial honey processing involves heating and filtering of the raw product, possibly influencing phytochemicals abundant in honey. This study aimed to determine the influence of processing on phytochemical content and antioxidant capacity of raw and processed clover, orange blossom, eucalyptus, and buckwheat honey. Two batch samples per varietal were purchased from national retailers. Samples were extracted to remove compounds interfering with the Folin-Ciocalteu assay which measures phenolic content using gallic acid standard. Quercetin content was measured using

UPLC-PDA. Antioxidant capacity was measured using the ORAC assay with Trolox standard. Results from all four varieties suggest that processing significantly lowers ($p < 0.05$) antioxidant capacity as well as phenolic and quercetin content with extent of change more pronounced in lighter colored honey. Processed clover honey (lightest) resulted in phenolic and antioxidant losses of 60-65% while buckwheat honey (darkest) exhibited losses of 15-30%. Eucalyptus and orange blossom honey showed similar losses within the range of clover and buckwheat. Among varieties tested, processed honey of darker coloring appeared more heat-tolerant than lighter colored varieties; however, raw honey varieties contained the greatest phenolic content and antioxidant capacity. Although processing lengthens commercial shelf-life, results suggest that non-thermal processing methods should be investigated in order to retain bioactive compounds in processed honey.

Todd Gilliam II, Chemical and Biological Engineering

Faculty Mentor: Nitin Chopra, Metallurgical and Materials Engineering

Carbon nanotube network composited with graphene-encapsulated gold nanoparticles

Integrating highly conductive noble metal nanoparticles and carbon nanostructures such as graphene, carbon nanotubes (CNTs) has found being of great interest for advanced heat dissipation in developing small size electric devices and integrated micro/nano-electromechanical systems. The major challenge lies in eliminating the inevitable thermal barriers at the interfaces or boundaries of the combined nanostructures. Thus controlled fabrication of thermally conductive architectures composed of noble metal nanoparticles and carbon nanostructure and further understanding the thermal transport behaviors with advanced characterization techniques will be of great interest. Here we report the fabrication of a single-walled CNTs based composite network filled with uniformly dispersed graphene encapsulated gold nanoparticles (GNPs). The GNPs were prepared through a xylene-based chemical vapor deposition approach. The combination of the CNTs and GNPs was achieved through the typical biotin-streptavidin binding with further assistance of EDC/NHS chemistry. Morphology and structure of the architecture was observed using SEM and TEM. The binding chemistry was characterized by FTIR and fluorescence microscopy. The influence of GNP incorporation in the CNT network and the introduction of biotin-streptavidin, EDC/NHS chemistry on the thermal conductivity of CNT network was demonstrated in detail. This study provides interesting view for understanding the fundamental chemistry of the CNT-GNPs

Samantha Glukhova, Biological Sciences

Siyuan Zhang, Biological Sciences

Faculty Mentor: Dr. Kimberlee Caldwell, Dr. Guy Caldwell, Biological Sciences

Role of neutral cholesterol ester hydrolase gene in lifespan and neuroprotection in a C. elegans model of Parkinson's Disease

Parkinson's disease (PD) is the second most common neurodegenerative disease. The loss of dopaminergic neurons leads primarily to muscle tremors. Aging is one of the contributing factors for PD, with age correlated with an increase in PD occurrence. PD is characterized by the accumulation of the α -synuclein (α -syn) protein as aggregates in and around the neurons. We have developed an experimental model of PD in the roundworm *Caenorhabditis elegans* by expressing human α -syn in the dopaminergic neurons, which then causes these cells to degenerate. We are using this model to identify genetic components that act together with aging to contribute to PD. One such gene is *daf-2*, which, when mutated in *C. elegans*, extends lifespan and protects dopamine neurons from α -syn. A screen for genes involved with *daf-2* identified *nche-1*. Loss of *nche-1* enhanced neurodegeneration, while overexpression was neuroprotective. NCEH-1 is a conserved enzyme that converts esterified cholesterol to free cholesterol. Lower cholesterol levels in the *C. elegans* growth media was also neuroprotective.

Since this gene was identified by its relationship to the longevity gene daf-2, we are determining if nceh-1 also alters the lifespan of *C. elegans* and if cholesterol modulates this effect.

Nathan Golden, Management and Marketing

Faculty Mentor: Craig Armstrong, Management and Marketing

Minimizing Entrepreneurial Risk in Start-Up Businesses

A start-up is defined as a company that is in the first stages of operations. These start-ups are often unsuccessful due to the abundance of untested assumptions that decisions are based on in the beginning stages of a business. Using the lean start-up method in hands on research, the goal is to determine the best way to minimize risk and create a successful business. The lean start-up method covers all of the key parts of a start-up in its early stages. The first step was to take the lean launch pad approach to create a business model hypothesis that helped conceptualize an operating plan for my very own service oriented business. The next step was to take those hypotheses, put them to the test, and acquire customer feedback. Using Birmingham, the closest major city to Tuscaloosa, as testing grounds for my business, I received ample customer feedback. The service-oriented business was successful in its first season, but my research is far from complete.

Sommer Hallquist, Anthropology

Madeline Anscombe, Anthropology

Faculty Mentor: Ian Brown, Anthropology

Dealing with Death: A Study of Children's Changing Grave Themes and What They Reveal about American Society

This study explores the changing perspective of children posthumously through the gravestones in Evergreen cemetery in Tuscaloosa, Alabama. Within the time frame spanning from 1840 to 1950, there are noticeable differences in the portrayal of children- dependent on the time period and the age of the child upon death. By locating such trends of change, we are able to show how the relationship between parent and child has changed over time. Through this, we reveal larger societal changes that took place in the time period. Since children's stones and epitaphs are nearly always chosen by their parents, children's gravestones serve as a reliable control group for showing past societal change. Any changes in the adult generation's thought or behavior should have surfaced in the way they treated their children in death. Events such as WWI, the Spanish Flu Pandemic, and the vast modernization of the Second Industrial Revolution influenced American society in a multitude of ways. Communication was increasing and the world was getting smaller. We expect to see evidence of such societal changes reflected within the text and symbols chosen for children's graves. A transition from more religious epitaphs and symbolism to those more secularized is predicted within the early twentieth century. We hypothesize that images such as lambs and angels will most commonly accompany religious epitaphs, and that such stones will appear earlier in time, before the modern era of industrialization.

Sarah Harden, School of Social Work

Faculty Mentor: Shadi Martin, School of Social Work

Learning from the Survivors: How to increase breast cancer screening and early detection among Emirati women

**International focus*

This research project focuses on the reasons for the high percentage of breast cancer mortalities concerning Emirati women. The purpose of this study was to explore the influence of culture on breast cancer screening and treatment compliance among Emirati women. In this study qualitative methodology was used in order to gain a deeper understanding of cultural beliefs and practices. In depth interviews were conducted with a small number of Emirati women who had been diagnosed with

breast cancer. Following themes emerged from data analysis: mis-information, lack of awareness, an overabundance of trust in doctors, and the influence of friends and family members. These themes provide some perspective on some of the cultural practices that influence care seeking behaviors of Emirati women. These factors should be considered in the development of culturally appropriate interventions that can encourage breast cancer screening and in turn decrease breast cancer mortality. The findings of this study has implications for breast cancer patients and health care professional in UAE and other countries.

Mary Harris, Biological Sciences

Rachel Anderson, Biological Sciences

Faculty Mentor: Margaret Johnson, Biological Sciences

Isolated Region of MIPS promoter involved in epigenetic regulation of inositol phosphate biosynthesis via PCR

The foundation for this study is the finding that both curly-tail and straight-tail mutant mice display alterations in control of inositol phosphate biosynthesis. Glucose 6-phosphate is synthesized into inositol phosphate by a reaction that is catalyzed by myo-inositol 1 phosphate synthase (MIPS). In mice, abnormal expression of MIPS is associated with the curly tail, spina bifida, mutant phenotype. Curly tail mutant mice have the same genotype but differ in phenotypes (some have straight tails), disease susceptibility, and inositol phosphate metabolism. This generates the question of how the expression of MIPS can differ so greatly between mutants of the exact same genotype. Because abnormal methyl groups have been detected on the MIPS promoter of diseased mice, we questioned whether or not transcription factors can bind to this site in wild-type, mutant straight tail, and mutant curly tail mice. Our goal this semester was to isolate the region of the MIPS promoter known to be differentially methylated. To do this, we performed a polymerase chain reaction (PCR) using mouse genomic DNA, cloned the PCR product via a ligation reaction, and transformed bacteria with the clones. Thus far, we have selected and grown transformed colonies in ampicillin media to kill bacteria not carrying a plasmid. We do not have results yet, but when we complete our procedure, we hope to use our knowledge of differentiated methylation of the MIPS promoter to model spina bifida.

Stephanie Harris, Metallurgical and Materials Engineering

Faculty Mentor: Glenn Tootle, Civil, Construction and Environmental Engineering

Tree-Ring Research

Stephanie Olivia Harris Dr. Tootle March 2014 Dendrochronology is the science of dating events by studying the growth of tree rings and any variations that may exist in the wood. This is done by first coring the tree to obtain a sample. That sample is then taken, mounted, and sanded down in order to be analyzed underneath a microscope. A skeleton plot is created to better access the information when comparing multiple rings. More specifically, narrow rings and abnormal patterns are looked for. All of the rings are ultimately measured in width to acquire the desired data. This data can be applied to various objectives, but for the purpose of this lab it is used for Dendrohydrology, the science of reconstructing hydrologic processes. The data obtained from measurement essentially correlates with the water patterns of the area in which the tree was obtained. These studies are ultimately used in this particular lab for the purpose of understanding past and present water patterns, and predicting the future patterns, specifically with the concern that water will be present in adequate amounts for our society's prosperity. In this lab, I have been able to look at various tree core samples to create plots of different ring variations, and to furthermore measure them. Due to my present learning of the processes involved in this lab I am presenting this as a work in progress as I continue to learn more of Dendrochronology, Dendrohydrology, and the overall study of tree rings.

Trevor Hearing, Biological Sciences

Faculty Mentor: Laura Reed

Biological Sciences The effects triglyceride levels have on the health of Drosophila melanogaster

Trevor Hearing Reed lab 3/13/15 The effects the triglyceride levels have on the health of Drosophila melanogaster Triglycerides in high concentrations in the blood result in an elevated risk of stroke and many other medical issues. Drosophila melanogaster is an excellent model to see the effects of high and low triglyceride diets on the body. This can be related to health issues in humans such as diabetes. By finding the difference in triglyceride levels, we can see how the different levels affect their health. Therefore would impact the health of a human with an analogous diet. I found the triglycerides of the flies by sorting them by genetic line and then crushing them into forty tubes and then pipette said crushed flies into forty more tubes. Then I move them into a rectangular box with small cylinders that I place five milliliters of the crushed flies into. Then I place them into a triglyceride-reading machine, which gives me their amount of average triglycerides for each genetic line. This is all done in the hopes that I see a pattern that the health of the fly is negatively proportional to the amount of triglycerides the fly has. By finding out the long-term affect of triglycerides on the body of the flies we may also discover the affects that such a diet will have on a human. This knowledge will help further support and encourage research about chronic illnesses.

Dylan Hood, History

Faculty Mentor: John Beeler, History

The Devolution of Close Friends to Bitter Enemies

**International focus*

My research is currently ongoing, but I have found some results that, after a broad examination of historical evidence as well as contemporary research, have supported as well as expanded on what I had hypothesized prior to investigation. I started with an interest in researching Japanese military history at the end of last semester. That narrowed down as I got into the subject deeper; from military history down to the interwar period. As I narrowed down the time frame that I found interesting, I realized a major theme that I wanted to explore more thoroughly: what caused the relationship between Great Britain and Japan to be destroyed prior to the outbreak of conflict in WWII? Initially, I hypothesized that the issue arose from the combination of Japan's imperialism in the 20s and 30s and Britain's relations with the U.S., and those are factors that I've found to be in part responsible, but not sufficient. Japan's economically motivated expansion and their hostility toward America, particularly U.S. naval superiority in the Pacific, as well as the role Britain took in the naval conferences during the period. The flashpoint that ignited the tension, I believe, was the report of the Lytton Commission; the commission was organized by Britain on behalf of the League of Nations. Shortly after the release of the report, Japan withdrew from the League, severing friendly ties with Britain. I would like to continue research further on public opinion at the time in both nations.

Sarah Howard, Chemistry

Faculty Mentor: Timothy Snowden, Chemistry

Progress Toward the First Enantioselective Synthesis of Chiral Diarylmethanamines

Chiral amines are common targets in the pharmaceutical industry, in part, because they form strong binding interactions with enzymes or cell receptors associated with a variety of diseases. Importantly, enantiomers of chiral amines exhibit vastly different binding affinities toward biological targets. One enantiomer may show high potency and selectivity while the other may induce side effects. Many drugs are sold as racemic mixtures of chiral compounds, because the racemates are expensive to separate or to synthesize as single pure enantiomers. Therefore, it is valuable to find new methods either to improve the large-scale separation of racemic mixtures of chiral amines or to synthesize the desired

products as single enantiomers. In association with Professor Debra Dolliver at Southeastern Louisiana University, we are developing a new method to synthesize enantiopure diaryl methanamines, found in Levocetirizine® and other drugs, by reducing oxime ethers using a chiral borane catalyst. We have discovered that the catalyst selectively affords either the (R)- or (S)-enantiomer depending upon the type of diphenyl oxime ether employed. I will present progress toward an optimized synthesis of the oxime ethers used in the asymmetric reduction step. Through this route, single enantiomers of chiral diaryl methanamines will be readily accessible from commercially available materials. This is expected to facilitate future drug discovery and drug development efforts.

Amanda Ivy, Chemistry

Blake Fairchild, Biological Sciences

Serenity Pace, Biological Sciences

Faculty Mentor: Margaret Johnson, Biological Sciences

DNA Chromatography of Myo-inositol Phosphate

MIPS, myo-inositol-1 phosphate synthase, is an enzyme known to regulate inositol in mice. MIPS converts glucose-6-phosphate into inositol phosphate, and little is known of the controls that regulate this process. Our hypothesis states that a methyl group on the promoter region of the gene interferes with the ability to regulate inositol. To test this hypothesis, we amplified the 224 base pair promoter region of the MIPS gene by polymerase chain reaction, cloning, and sequencing. Our work will lead to discovering if there are transcription factors that bind to promoter region of DNA by DNA chromatography. We used PCR, gel electrophoresis, cloning methods, and restriction digest to amplify and isolate the promoter region of the MIPS gene. After being sequenced, our results did not include the 224 reverse primer, so the process was repeated. In conclusion, our research extensively purified and validated the DNA. The results of our research will be used in the future for DNA affinity chromatography.

Baylor Jeffries, Psychology

Faculty Mentor: Theodore Tomeny, Psychology

What can social media tell us about opinions of vaccination practices?: A literature review

In light of the recent measles outbreaks in Disneyland, the United Kingdom, and other parts of the world, conversations about vaccination practices have re-emerged. Autism spectrum disorder (ASD) is another syndrome often involved in vaccination debates. Despite many studies disputing the link between ASD and vaccines (e.g., DeStefano et al., 2013; Gupta, 2010; Madsen et al., 2003), parents continue to cite fear of their child contracting ASD from vaccines as a reason for choosing not to vaccinate their children (Bazzano, 2012; Berreth, 2011). These fears appear to be maintained by a variety of factors, including misinformation in the media (Berreth, 2011; Lewandowsky et al., 2012), cautious language in scientific publications (Parikh, 2008), and poor communication between doctors and parents (Gupta, 2010), among others. Given the variability in views about vaccines, it follows that these opinions may differ according to a variety of demographic variables (e.g., ethnicity, political affiliation, education levels, access to healthcare providers, composition of local school districts). UA faculty from the Departments of Psychology and Advertising and Public Relations will attempt to identify demographic correlates of opinions about vaccine practices posted on social media nationwide via statistical modeling techniques. This poster will summarize the ongoing literature review being conducted to develop hypotheses for the larger project being conducted by the faculty members.

Eric Johns, Biological Sciences

Faculty Mentor: Kim Caldwell, Biological Sciences

Identification of Mutations Involved in Epilepsy using a C. elegans Convulsion Model

Epilepsy is characterized by erratic and uncontrollable neuronal impulses that lead to seizures. Whereas some forms of epilepsy have a clearly defined genetic origin, such as Miller-Dieker lissencephaly, other forms are not associated with causative genes. We have developed a model for neuronal convulsions using the roundworm *Caenorhabditis elegans*. Exposure of normal, wild-type, *C. elegans* to the convulsion-inducing drug pentylenetetrazole (PTZ) has no effect. However, animals with mutations for known epilepsy genes, such as *lis-1* (the cause of lissencephaly), exposed to PTZ result in a seizure-like convulsions. These animals repetitively and characteristically move their heads back and forth in a pattern termed "head-bobbing". Currently we are using the *C. elegans* model to identify additional genes that cause convulsions that are associated with both intellectual disability and epilepsy in humans. Recent whole genome sequencing efforts of patients and their families where these disorders are prevalent have now amassed large datasets of variants of unknown significances (VUS). Many of these human genes have conserved equivalents in *C. elegans*. Our experiments will be to test identified genes for convulsions, in combination with PTZ, in our *C. elegans* model. Establishing a functional impact for some of these mutations versus the wildtype (or normal versions) of the genes will support a case for these candidate genes as having a role in causing neuronal convulsions.

Mitchell Johnson, Mechanical Engineering

Faculty Mentor: Ajay Agrawal, Mechanical Engineering

Effects of Geometry on Combustion Performance of Flow-Blurring Fuel Injectors

Flow-blurring fuel injectors are a type of effervescent atomization injector, which operate by injecting high-pressure air into flowing liquid fuel before it can exit through a discharge orifice. The air injection creates bubbles in the fuel, which expand rapidly upon exiting the orifice, creating droplets which combust more cleanly, due to a greater specific surface area. However, only about 1-2% of air that passes through the injector actually atomizes the fuel. Theoretically, this can be improved upon dramatically, and we set out to find how changing the injector orifice geometries would improve the efficiency of atomization. Three different injector orifices with diameter of 2.5 mm, 3.0 mm, and 4.0 mm, and three injector different spacers, with height of 0.625 mm, 0.75 mm, and 1.00 mm, were made for this study. Experiments were conducted with injectors of different orifice diameter and a spacer height of 1.0mm. Tests covered a range of air-liquid mass ratios from 2.0 to 3.0. A gas analyzer was used to measure the amount of oxygen, carbon dioxide, carbon monoxide, and nitric oxides present in the exhaust. Visual images of the flame and infrared image of the combustor liner were also acquired. Results show that changing the orifice diameter had a substantial impact on combustion performance and emissions.

Hilary Jones, Political Science

Faculty Mentor: Joseph Smith, Political Science

Party like it's 2014: An Evaluation of issue stances for the Democrats, Republicans, and Tea Partiers in the 2014 Election Cycle

This research examines the campaign rhetoric of each United State Congressional candidate in the 2014 election cycle. The goal of this project is to evaluate the different attention candidates give certain issues based on their partisan affiliation. Specifically, this project takes into consideration whether a candidate is Democrat or Republican, and whether or not they are considered a Tea Party Republican. The project first involved compiling all of the issue stances from each individual candidate's campaign website into one document. This document was then put through a computer generated content

analysis to determine the frequency of certain language. For this research, key words pertaining to the categories of constitutional limits, fiscal responsibility, free market, gun rights, immigration, and unemployment were used. The result of this analysis is a computer generated number for each candidate within each category, displaying how often that candidate focused on that specific issue. This evidence will then be used to evaluate the overarching theme of the focuses of candidates within the Democratic, Republican, and Tea Party on a national level.

Olympia Karageorgiou, Political Science

Faculty Mentor: Dana Patton, Political Science

Ebola: Media Coverage and Public Opinion

This research project examines news coverage of the Ebola Outbreak of 2014 and public opinion in the United States regarding Ebola. First, I provide a brief overview of the history of Ebola in Africa prior to the 2014 Outbreak. Then, I present a timeline of Ebola deaths by country for each month in 2014. The countries most affected by the Outbreak were Sierra Leone, Guinea, and Liberia. I also include deaths that occurred in the United States. I conduct a content analysis of all New York Times stories regarding Ebola from January 1, 2014 to December 31, 2014. I code the stories based on country(ies) mentioned, if the stories are opinion pieces, and if the slant of the stories are positive, neutral, or negative. I then provide information regarding changing public opinion in the United States regarding Ebola. Finally, I examine if there appears to be a connection between the content of the news stories, number of deaths, and public opinion regarding Ebola.

Kirklan Kathe, Biological Sciences

Adam Lazarus, Biological Sciences

Faculty Mentor: Janis O'Donnell, Biological Sciences

Investigating the role of dopamine synthesis in the social interaction paradigm of autism spectrum disorders

Autism Spectrum Disorders (ASDs) encompass a wide range of communication deficits, restrictive/repetitive behavior, and social abnormalities. Our lab has previously demonstrated that disruptions in dopamine regulation have been shown to affect molecular and behavioral ASD phenotypes. Recently our collaborators have found that altering dopamine biosynthesis and homeostasis results in aberrant social interaction in the conserved *Drosophila melanogaster* model. To this end, we evaluated two genes involved in dopamine biosynthesis, *pale* (*ple*), a positive regulator of dopamine biosynthesis and *Catecholamines-up* (*Catsup*), an inhibitor of this pathway. The effects of these two genes on *Drosophila* social interaction were assessed by calculating a social space index within a customized assay chamber as previously published by our collaborators. We tested flies expressing heterozygous mutations for *ple* or *Catsup* and found that *catsup* mutants, which have increased dopamine production level, exhibited decreased sociability. With this research, we aim to elucidate the potential link between dopamine regulation and social defects associated with ASDs.

Julia Katz, Psychology

Faculty Mentor: Jeffrey Parker, Psychology

Relationship Between Self-Esteem, Contingency, and Parental Psychological Control in Adolescent Friendship Jealousy

People often expect self-esteem and jealousy to be inversely related, but little research has been done to study this relationship. Past studies conceptualize self-esteem as being high or low, and its relationship with jealousy has had weak or mixed findings. For this study, we hypothesized that parental psychological control influences adolescent jealousy in friendships, and we expected that the adolescent's self-esteem, the contingency of as opposed to the level of, could explain this association. We collected data from 72 mother-child dyads (39 mother-daughter; 33 mother-son), with the children's ages ranging from 10 to 15 years with a mean of 12.3 and a standard deviation of 1.30. We collected data by having the participants complete questionnaires and analyzed the data using several regressions and Baron & Kenny 1986 steps to test the mediation hypothesis. Our results supported the hypothesis that parental psychological control influences jealousy, however the idea that self-esteem contingency could explain the relationship was not supported. The level of psychological control could predict the contingency of self-esteem, which could then predict susceptibility to jealousy, but the mediation test shows that contingency can not be credited as a mediator between them. This study is important because the findings can help create intervention programs for children more likely to experience jealousy, and help educate parents of the harms of using psychological control.

Kassandra Keith, Chemical and Biological Engineering

Faculty Mentor: Nitin Chopra, Metallurgical and Materials Engineering

Fabrication and Characterization of Platinum Nanoparticles Decorated Metal Oxide Nanowire Heterostructures

One dimensional nanowire heterostructures were prepared by decorating the cobalt oxide (Co₃O₄) or copper oxide (CuO) nanowires with platinum (Pt) nanoparticles. The fabrication was achieved via a multistep process involves thermal oxidation, chemical nucleation and post-annealing. The direct thermal oxidation of cobalt or copper foil resulted in the growth of free-standing nanowire structures on the metal substrate. This was followed by a wet-chemical heterogeneous nucleation process leading to the formation of Pt nanoparticles on the nanowires. Post-annealing was further carried out on these Pt nanoparticle-decorated Co₃O₄ or CuO nanowires at various conditions including annealing duration, temperature and environment. This annealing process leads to critical optimization on the morphology, distribution and crystallization of the Pt nanoparticles on the metal oxide nanowires. The crystal structures, morphologies, dimensions, and phases at various growth stages of nanowire heterostructures were studied using high resolution electron microscopy, energy dispersive spectroscopy, and X-ray diffraction methods. Cobalt oxide nanowires were observed to survive multiple processing steps and resulted in stable heterostructure configurations. The investigation showed for the first time the dry processing route for the fabrication of such novel nanowire heterostructures.

Madeline Khuri, Biological Sciences

Faculty Mentor: Jennifer Howeth, Biological Sciences

The Role of Habitat Age in Structuring Fish Communities in a Successional pond Metacommunity

Metacommunity theory invokes both local and regional processes to explain community assembly, but the role of habitat age in influencing metacommunity dynamics has been ignored to date. To address the importance of succession in structuring species diversity at local and regional spatial scales, we evaluated the influence of habitat age and the associated environment on fish species richness and composition in a network of beaver-formed forest ponds. Analyses testing for effects of pond age on the environment suggest that habitat age influences key environmental variables established to influence fish richness and community composition. Older ponds were generally deeper and warmer relative to younger ponds, possibly selecting for a lentic (pond-like) fish assemblage as opposed to a stream fish assemblage. A preliminary analysis of species diversity suggests that deeper ponds support fewer fish species. These findings indicate a strong potential for age-dependent environments that may structure resident fish communities.

Ryan Lamm, Economics, Finance and Legal Studies

Faculty Mentor: Bartow Elmore, History

The History of Triphosphate Detergents in America

This research investigates the history of triphosphate detergents and their role in environmental damages such as eutrophication. We examine the companies involved in the production and sale of triphosphates, and their reactions to growing controversy surrounding their product, as well as the role of Congress in regulating the production of triphosphate detergent. Using historical newspapers from 1950-1972, annual reports from 1940-1975, congressional records from 1968-1973, and scientific reports from 1960-modern day, this research has created a timeline detailing the evolution of detergent in America, the rise of triphosphate detergent, and the eventual legislation following the discovery of the environmental damage caused by the triphosphate detergents. Furthermore, using the timeline we are able to analyze the aftermath of the legal limits placed on triphosphates.

Johnathan Laurich, Biological Sciences

Faculty Mentor: Ryan Earley, Biological Sciences

Climate Variation and Reproductive Seasonality in Mangrove Rivulus Fish

Climate Variation and Reproductive Seasonality in Mangrove Rivulus Fish, Johnathan Laurich, Kristy Marson & Ryan Earley. Life history traits, like reproductive timing, have important fitness consequences and populations residing in different climates may experience unique selection pressures that favor certain patterns of reproductive seasonality. This study will develop a method to determine reproductive status of wild rivulus using geometric morphometrics, which accounts for multiple dimensions of shape variation. By regressing body shape variation against measures of reproductive investment, we will create a model to assess reproductive status in wild rivulus using only photographs. Fish collected seasonally from three populations per region (East, West, South Florida) will be photographed for geometric morphometrics and gonads will be dissected to quantify presence of vitellogenic eggs and abundance of all egg stages. We hypothesize that reproductive investment will vary by season, and that these patterns will vary among populations occupying different climate zones. We predict that populations in more seasonally variable regions will show more annual variation in body shape and reproductive investment. This information is valuable because rivulus is a species of

conservation concern, and data gathered in this study will identify their most and least successful reproductive seasons.

Michael Leffler, Chemical and Biological Engineering

Faculty Mentor: Margaret Liu, Chemical and Biological Engineering

Process Engineering of Clostridium tyrobutyricum to improve Butyric Acid Production

Butyric acid production through the bacterium, *Clostridium tyrobutyricum*, has drawn an increasing amount of attention because of its wide use in the food and pharmaceutical industries. The genetically modified *Clostridium tyrobutyricum* mutant, PAK-EM, which has an inactivated encoding acetate kinase (ack) gene, was used in fermentations to produce butyric acid from glucose. A fibrous-bed bioreactor (FBB) was used to immobilize and adapt PAK-EM cells, which boosted the butyric acid yield to 0.38 and .42 g/g at a pH of 5.5 and 6.5, respectively. PAK-EM produced much more butyric acid (23.2 g/L vs. 17.2 g/L at pH 5.5 and 63.0 g/L vs. 15.7 g/L at pH 6.5) than the wild type, but had a lower specific growth rate (0.08 h⁻¹ vs. 0.11 h⁻¹ at pH 5.5 and 0.09h⁻¹ vs. 0.10 h⁻¹ at pH 6.5) in the FBB. These results demonstrate the possibility of significantly increasing butyric acid production through the integration of metabolic engineering and process parameter optimization.

Jordan Levy, Economics, Finance and Legal Studies

Faculty Mentor: Liana Pennington

Criminal Justice Juror trust in a Southeastern courthouse

Research on juror trust in legal authorities leads researchers to believe that trust in the legal system affects individual choices in jury trials. However, there is need for additional empirical study on this issue. Although some studies have looked at juror trust in police on trial outcome, these studies tend to be based on hypothetical scenarios. Some such studies (Hepburn 1980), found that jurors who view police favorably have a higher chance of rendering a guilty verdict. Yet most of these studies do not look at juror behavior in actual trials (Farrell 2013). There is a definitive need for research to be done on individuals' views of the legal process before and after their experience as jurors, and how this affects their ultimate choice in judging defendants. There has been a lot of work done over the past twenty years on the legitimacy of the law system, and how it is perceived by individuals, not jurors. It has been found that there is a correlation between individuals finding legitimacy in the legal system, generally having a higher trust in the police system than the judicial system (Tyler 1990). This higher trust in police can be accredited to the average citizen coming into contact with police on a more common basis than courts (Walker 1980). Other research has looked into the importance of race in trial deliberation. It has been found that, as expected, race is a huge factor in the outcome of the trial. Both ju

Kaitlin Little, Capstone College of Nursing

Faculty Mentor: Cassandra Ford, Capstone College of Nursing

Rural Women and the Rate of Cardiovascular Disease

The number one cause of death for women in the United States is heart disease, with rural women being even more susceptible to an early death via heart disease than the average woman living in a more metropolitan area. This study focuses on the connection between the level of healthcare access

and utilization by rural women and the rate of cardiovascular disease. A wide range of studies that related to rural women and cardiovascular disease (CVD) were reviewed. It was found that rural women, particularly minority women, are less likely than other women to have regular access to healthcare and less likely to utilize healthcare services if they are available. A number of factors explained these findings including the nearest healthcare center requiring significant travel, the opportunity cost of receiving health care which tends to be higher in rural women, the unique values among rural populations such as self-sufficiency, and lack of education as to the importance of continuous healthcare utilization. The lack of preventative care and education has shown to be detrimental to rural women, who have higher rates of CVD which are not improving at the same level as CVD rates among men. Findings indicate that the isolating nature of rural areas and lack of education pertaining to CVD rates in women and their symptoms all contribute to the higher rate of CVD among rural women.

Briana Lucas, Psychology

Faculty Mentor: Sheila Black, Psychology

Effects of Semantic Satiation on Metaphor Interpretation

Semantic satiation refers to words becoming less meaningful as a function of repetition. The current study examined the possibility that semantically satiating one meaning of a metaphor (i.e., the literal) might affect the accessibility of the alternative meaning (i.e., figural). On a given trial, undergraduate participants were presented with a prime for 2, 12, or 22 repetitions. Afterwards, participants received metaphorical sentences. At this point, they were instructed to determine if the metaphorical sentences made sense or not. Half of the sentences were sensible and half of the sentences were not. On one-third of the trials, the prime preceding the metaphorical sentence activated the figurative meaning of the metaphorical sentence, and on another third of the trials the prime activated the literal meaning of the sentence. Finally, on one-third of the trials (the neutral baseline condition), the prime was not related to any of the meanings of the sentence. As in previous studies, activating the literal meaning of a metaphorical sentence resulted in inhibition relative to the neutral baseline condition and activating the figurative meaning of the sentence resulted in facilitation relative to the baseline. However, in addition, this study indicates that repetition attenuates the facilitatory and inhibitory effects of the prime.

Lindsay Macher, Chemical and Biological Engineering

Faculty Mentor: Yuping Bao, Chemical and Biological Engineering

Synthesis of PEI-coated nanowhiskers for use as MRI contrast agents

My project focuses on creating effective T1 contrast agents for MRI testing using nanowhiskers. The nanowhiskers are initially formed from an iron oleate precursor using a modified heat up method. The synthesized whiskers are cleaned of free ligands and dispersed into chloroform. 1200 MW PEI was chosen as the most effective ligand from the group of ligands tested. The whiskers dispersed in chloroform undergo a ligand exchange with the PEI, allowing the whiskers to be transferred from the organic phase to the aqueous phase. This process of exchange controls the regions of the wires and their selective reactivity in solution. After effectively transferring the wires into solution, the PEI chosen prevents aggregation within the solution. Using analytical techniques, the whiskers were shown to have a strong T1 signal and have the potential to become an effective contrast agent.

Kara MacIntyre, Biological Sciences

Faculty Mentor: Laura Reed, Biological Sciences

Influence of humans' land use on Drosophila species and genetic diversity

Influence of humans' land use on Drosophila species and genetic diversity Kara MacIntyre, Nelson Brown, Laura Reed, and Andrey Bombin Abstract The main goal of this project is to identify the effect of humans' land use on genetic and species diversity of Drosophila. In addition, we will identify native and endemic Drosophila species, the range of their habitat, and possible hybrid zones in the state of Alabama. This study will establish the basis for asking questions about ecological speciation and variations in biological and genetic diversities due to anthropogenic factors. The University of Alabama is a nearly perfect base for this study. According to historic records, twenty Drosophila species, including at least nine endemic species, should be found in the state of Alabama. Here we will report the initial findings of Drosophila biodiversity data focusing on identified species from our recent collections and how land use influences that diversity.

Rachel Madey, Chemistry

Faculty Mentor: Kathryn Oths, Anthropology

Understanding Demographic Changes in Peruvian Andes

**International focus*

The farming communities of the Peruvian Andes are a small but significant population, highly sensitive to demographic change. One such example of these changes can be seen in the rapid and unprecedented demographic shift that has occurred in the highland campesino village of Chugurpampa in the La Libertad region over the last 25 years. This shift, characterized by a dramatic outmigration of the economically active, is the result of a number of complex sociopolitical, economic, and environmental factors. It is necessary to understand the probable causes of this shift in order to better anticipate its long-term effects on population health and development. This poster will illustrate graphically the population shift that has occurred through the use of demographic data gathered from 1988 and 2014 censuses carried out in Chugurpampa, and through examination of research in key areas such as public policy, environment, and climate, posit the probable causes of this shift

Joseph Matthews, Biological Sciences

Noah Connor, Biological Sciences

Faculty Mentor: Matthew Jenny, Biological Sciences

The Effects of Age and Sex on Zebrafish Cognitive Function

Alzheimer's is an incurable disease that affects millions of Americans every year and is projected to cost the United States an additional \$20 trillion dollars by the year 2050. While there are no known causes for Alzheimer's disease, a genetic variant of the ApoE gene has been identified as a genetic risk factor. Furthermore, the ApoE gene has been linked to other risk factors associated with oxidative stress and cognitive dysfunction. The long-term goal of this research is to create a 'humanized' transgenic zebrafish to assess the interaction between the ApoE gene and environmental or lifestyle factors as causative agents for Alzheimer's disease. Herpes simplex virus type 1 will serve as the environmental factor and a high fat diet will serve as the lifestyle factor. In addition to investigating brain pathologies associated with Alzheimer's disease in this transgenic line, we hope to correlate the pathology with alterations in

the cognitive function of the zebrafish. Our current efforts utilize associative learning techniques to assess age and sex-specific differences in learning and memory in healthy zebrafish. This data will serve as the baseline for the future assessment of the zebrafish that display brain pathologies consistent with those found in patients of Alzheimer's disease. Here we present the current data highlighting differences in cognitive function between male and female zebrafish between 8 and 12 months of age.

Cole Mattingly, Biological Sciences

Faculty Mentor: Ryan Earley, Biological Sciences

*Thermal Acclimation to increased temperature in *Kryptolebias marmoratus**

Thermal acclimation is the physiological adjustment to temperatures that deviate from the normal temperature of an ectothermic organism. Acclimation can be measured by comparing standard metabolic rate (SMR) and maximum metabolic rate (MMR) before, during, and after a change in temperature. After prolonged periods spent in warmer or cooler temperature regimes, some animals manually adjust their metabolic rates. Global climate change has made thermal acclimation a fundamentally important process to understand; insights into these metabolic processes may help conserve species under warming climate regimes. The mangrove rivulus (*Kryptolebias marmoratus*), a fish that lives in extremely variable habitats and across a broad geographical range encompassing tropical and temperate zones, is an ideal organism in which to measure the potential for acclimation abilities. The goal of this study is to determine whether rivulus thermally acclimate by examining differences in SMR and MMR between fish exposed to prolonged temperature elevations and fish exposed to control conditions. We hypothesize that rivulus will thermally acclimate to increased temperatures over a two-month period, and that metabolic rates at the conclusion of the study will be similar to baseline metabolic rates before exposure to warming. We hypothesize that this will occur due to rivulus' capacity for extreme physiological flexibility in response to the notoriously variable ecology of mangrove ecosystems.

Alex McAlister, Mechanical Engineering

Faculty Mentor: Paul Allison, Mechanical Engineering

Nanoindentation of Multilayer Composites to Probe the Nanomechanical Properties of the Interfacial Regions

A. McAlister, O. Rivera, P.G. Allison, J. Wang Department of Mechanical Engineering, University of Alabama, Tuscaloosa, AL Department of Civil Engineering, University of Alabama, Tuscaloosa, AL

Abstract: An aging and deteriorating concrete infrastructure in the United States requires new methodologies to strengthen and rehabilitate the current concrete structures such as dams and bridges. One technique that is showing potential promise in the scientific community is the use of carbon fiber reinforced polymer (CFRP). The CFRP may be used as a retrofit by bonding to the concrete with an epoxy adhesive. However, one of the critical mechanisms for the CFRP/epoxy/concrete retrofit to function properly is the bond between the different layers. In this study, nanoindentation has been used to probe the nanomechanical properties of the interfacial transition zone (ITZ) between the various material layers (CFRP/epoxy/concrete). Additionally, to further elucidate the bonding mechanisms at the ITZ, the nanoindentation measurements are spatially correlated with images through scanning electron microscopy and chemical composition using energy dispersive X-ray microanalysis. The spatially

correlated nanoindentation to chemical composition provides unique local structure-property relationships to develop optimal CFRP retrofits bonded to concrete structures.

Lance McCaskey, Economics, Finance and Legal Studies

Faculty Mentor: James Cover, Economics, Finance and Legal Studies

Alternative Energy and the Texas State Government: A study on increasing energy demand and the political fight to increase supply

In 2009, the state of Texas consumed more energy than it produced for the first time in its history. A state known for its vast production of oil and for being the home of the world's largest energy company suddenly found itself in an unfamiliar situation, an energy crisis. Texas had always relied on its high oil production to serve its own energy needs, and had never fully explored alternative energy options, despite increasing domestic demand, both in state and out of state, due to rising oil prices in the Middle East and elsewhere abroad. The market was unable to correct its own failure, lack of supply, due to an overcrowding in energy suppliers in Texas, which has the highest energy provider per capita in the United States. This overcrowding in the market created a natural market shortage, as companies were forced to lower their prices to match those of their competitors in order to keep customers from switching to one of the many other energy supply options. The state government was forced to step in and find alternative ways for the state's energy needs to be met, and found just that in the form of wind power. While not enough energy is currently produced to close the gap of the natural shortage in energy completely, there has been enough production for a noticeable shortening in the shortage gap, as well as a return to the days of production of energy surpassing the states consumption.

Brandon McChristian, Mechanical Engineering

Faculty Mentor: Steve Shepard, Mechanical Engineering

Determining Helmet Impact Energy Using Spectral Analysis of Sound

Determining the impact force involved in helmet-to-helmet collisions has become increasingly demanded but often comes at costs unrealistic to most athletic departments. Expensive instruments like accelerometers may no longer be a necessity in order to obtain a live data stream of impact data. Instead, spectral analysis of sound waves produced during the collision may lead to the same conclusions drawn from these less obtainable instruments that ultimately help in accurately determining concussion risk. To prove that there exists a direct correlation between energy in the impact and energy in the sound waves produced, a pendulum was constructed to ensure repeatability of total energy involved in each impact. Since the relation between potential and kinetic energy is independent of mass it may have been assumed that helmets of different weights would still produce the same amount of sound energy. However, to ensure that the greater change in momentum, which is dependent of mass, did not affect the sound energy produced, some drops were performed with weighted helmets. By dropping one helmet from different heights and allowing the other to remain free hanging, a set of data was compiled which revealed a definitive relation between sound energy and impact energy.

Ethan McVay, Mechanical Engineering

Faculty Mentor: Joshua Bittle, Mechanical Engineering

Commissioning of rainbow stiller system for imaging vaporizing liquid fuel sprays

Understanding fuel injection in a diesel engine allows for better control of the combustion process which controls engine efficiency and emissions. Current methods using laser diagnostics are limited when studying areas of fuel sprays containing both liquid and vapor. The quantitative rainbow schlieren technique has been used to analyze gaseous fuel jets and will be used here to study fuel spray near the injector. An optically accessible constant pressure spray chamber equipped with diesel injector will be used to acquire high speed images (25-50 kHz) of the vaporizing fuel sprays at high temperatures and pressures (up to 1380 kPa, 200°C). Two cameras will be used to simultaneously take Mie-scatter liquid phase data and rainbow schlieren vapor phase data. This poster will present the effects of changing the lens position and the schlieren filter size on the imaging results of the fuel sprays. As the position of the lens varies in relation to the camera, the spatial resolution and maximum frame rate vary accordingly, creating a zoom effect on the image. As the lens and camera are moved parallel to the spray chamber, different portions of the spray can be imaged, which allows for the analysis of both the liquid and vapor portions of the spray. Large schlieren filters show density gradients of dense liquid regions but are not sensitive to smaller gradients in vapor regions, while the reverse is true for small filters.

Brice Morpeth, Chemistry

Faculty Mentor: Stephen Woski, Chemistry

Single Molecule Rectifiers

Single molecule rectifiers are being investigated to try to replace the current silicon based rectifiers. Theory suggests that single molecule rectifiers may be more efficient than the silicon based rectifiers. The hemibiquinone core includes an electron rich dimethoxybenzene and electron poor quinone, which allows current to flow through the molecule in one preferred direction. This poster outlines the synthesis of a single molecule rectifier with a hemibiquinone core and two nitrile substituents. The focus of this poster is 4'-bromo-2',5-dimethoxy-2,5-dioxo-2,5-dihydro-[1,1'-biphenyl]-3,4-dicarbonitrile (Br, (CN,CN)-HBQ). Synthesis of this molecule was not trivial. The hydroquinone precursor was made by reacting potassium cyanide with dibromohemibiquinone. The hydroquinone was oxidized by reacting it with FeCl₃ in benzene and water. Purification of the Br, (CN,CN)-HBQ was also nontrivial. Several purification methods were tested, but the purified dicyanoquinone was triturated from warm benzene with hexane, which precipitates purified product. Upon vacuum filtration and drying a blue-black amorphous solid remained. We also report the crystal structure. The molecule was given to Metzger Lab where the molecule was self-assembled as a monolayer and the conductance was tested. Currently, optimization studies are ongoing, looking at the oxidation of the hydroquinone into the dicyanoquinone.

Mary Muffly, Chemistry

Rainey Gerald, HES - Health Science

Faculty Mentor: Kristi Crowe-White, HES - Health Science

The Acid-Base Hypothesis: Dietary Protein and Bone Health among Older Adults

M. Muffly, KM Crowe-White, R. Gerald, A. Ellis Background: Protein intake is important for older adults as this macronutrient helps maintain muscle mass. However, protein once metabolized promotes systemic acidity in the body. One of the ways of restoring pH homeostasis is to draw calcium from bone. It has been hypothesized that dietary protein may increase the potential renal acid load (PRAL) and negatively affect bone mineral density (BMD). If protein negatively influences bone health, then

increasing dietary protein might be detrimental. Purpose: To determine the relationship between protein intake and BMD among older adults. Methods: PRAL was calculated from dietary data of 32 healthy men and women ages 65-87y obtained from the Nutrition Data System for Research 24-hour recall multi-pass method. Additional measures included urinary pH and BMD assessed by dual-energy X-ray absorptiometry. Relationships were examined by partial correlations adjusted for total kilocalories, ANCOVA, and multiple linear regression. Results: Men have significantly higher ($p < 0.001$) BMD than women. Upon controlling for total kilocalories and sex, BMD was not significantly associated with PRAL, total protein intake or urine pH. Conclusions: Sex was the main predictor of BMD. Those with higher protein intake had higher PRAL; however, no association was found between PRAL and BMD. A lack of relationship between protein intake and BMD implies that older adults can consume the recommended daily allowance (RDA) of protein without adversely affecting bone health.

Molly Neill, Biological Sciences

Faculty Mentor: Rebecca Allen, Psychology

Future Care Preparedness of Urban and Rural CNAs

The purpose of this research is to measure and compare the future care awareness and preparation of rural and urban certified nursing assistants (CNAs) who are currently employed in nursing homes (NHs). Because of the intimate care roles played by CNAs in NHs they may be exposed to a higher rate of exposure to death and decline. This exposure may impact their own future care decisions. Self-report data, including information on demographics, duration of employment as a CNA, religious beliefs, and responses on the My Aging Preparation Scale (MAPS), was collected. The MAPS measures awareness, avoidance, information gathered, developed preferences, and concrete planning related to future care needs. We hypothesize that CNAs employed longer will have more awareness and developed preferences of their own future care needs than those who have been employed for a shorter duration. We hypothesize that there will be no difference between rural and urban CNAs. Implications include better understanding the role of CNAs and how this role may impact their own future care decisions.

Andrew Nelson, Computer Science

Faculty Mentor: John Lusth, Computer Science

Computer-Generated Trumpet Music

My research is largely unfinished and in-progress. It involves using a software made by Dr. Lusth called "Songlib" that takes recorded sound files and allows you to create music from those. I recorded samples of trumpet notes myself and have been working to make them work with the program like they should. There were many obstacles along the way, including me having to learn the programming language "C" that Songlib is written in. I then had to dissect Songlib in order to discover how exactly it worked and to create a file that used my trumpet notes and made them into a song. As of right now I am still working on getting those notes to sound in tune in the program and attempting to find a solution to include the common way of articulating notes in music so that the song sounds more realistic. This may involve me recording my notes several more times, for which I am grateful to have the Samford Media Center here on campus as it lets me record in the high quality fashion that I need, because if the notes are not of good quality then the project is just not of good use to anyone. While I am not able to present a demonstration of the program with my laptop, I will have examples of code on my poster board.

Jocelyn Newman, Chemistry

Faculty Mentor: Martin Bakker, Chemistry

Reduction of 4- Nitrophenol with Sodium Borohydride using Nickel on Porous Carbon Supports

Nickel is a relatively cheap metal that is known to catalyze a number of reactions, particularly addition of hydrogen across double bonds. The activity of the catalyst is determined by surface area. Preliminary syntheses of such nickel nanoparticles on porous carbon have been carried out and the materials characterized by electron microscopy, BET, and XRD. The ability of these materials to catalyze the reduction of 4-nitrophenol to 4-aminophenol with sodium borohydride has been assessed using UV-visible spectroscopy to compare the rates at which these reactions occur with and without the presence of nickel catalyst. SEM data yielded a spiky tree-like morphology of the nickel particles of catalytic size.

David Nicholson, Theatre and Dance

Faculty Mentor: Seth Panitch, Theatre and Dance

Artistic Grants from Various Foundations

This project is designed to meet an end goal of \$100,000 in grant donations. The donated sum will financially back the production of a original theatrical piece, which gives a dynamic view on teenage life during the civil rights period. The first stage of this project, which is active now, involves researching and analyzing various grant donation databases. Foundation websites will sometimes present their donated grants with specific outlines of information. This information includes who the funds were awarded to, when the donation was given, and the donation amount. To the current point in the research, there has been a large report created holding that specific information from a wide range of foundation sources. The future of this project will include the crafting and writing of the script, the grant applications, and the production of the theatrical piece.

Christina Noe, Computer Science

Faculty Mentor: Jeff Gray, Computer Science

Web-based Application for Virtual Exercise Regimen

The WAVER (Web-based Application for Virtual Exercise Regimen) project takes advantage of available 3D motion technology to provide rehabilitation patients with an inexpensive and more accessible alternative to conventional rehabilitation. Specifically, WAVER uses the 3D LEAP Motion device to assist patients who have upper-limb mobility and dexterity limitations due to a stroke, disability, or even sports-related injury. Patients may face physical adversity in pursuing rehabilitation. Not all patients are conveniently distanced from a medical facility and may find that commuting daily worsens their pain, lightens their wallets, and forces them from the comfort of their homes as they deal with the pain and circumstances affected by their disability. The WAVER solution to these problems is a web-based application that utilizes the 3D LEAP Motion sensory controller, which is an affordable and compact device that can be used by any home computer or laptop. WAVER presents drawing exercises to a patient that can be performed by the patient in their own 3D space, which is then tracked by WAVER for on-screen feedback to the patient, as well as the potential to share the results remotely with a therapist.

Clare Ols, Biological Sciences

Faculty Mentor: Eben Broadbent, Geography

Trail and forest animal diversity and composition in a biological reserve with active ecotourism on the Osa Peninsula of Costa Rica

**International focus*

Costa Rica is widely known to contain some of the highest biodiversity of plants and animals. For this reason it has become one of the most popular touristic destinations in the world. As the public has become increasingly aware of the importance of ecological conservation and preservation, the sustainable tourism industry in Costa Rica has grown. Ecotourism, such as the Lapa Rios Lodge in Costa Rica's Osa Peninsula, serve not only as tourist destinations but also as biological reserves. In particular, the Lapa Rios Ecotourism is home to nearly one thousand acres of flora and fauna. This project seeks to determine the abundance and composition of animal species in the Lapa Rios biological reserve through the use of noninvasive, high resolution camera traps. The analysis of the images provided by these camera traps reveals the various factors, such as weather and interactions with humans, that affect the composition of the animal species present in this region. Long-term collection and analysis of these images will provide us with an increased understanding of the seasonal changes in species abundance and composition. This long-term collection is of increased importance in ecosystems with large amounts of human interaction, such as the Lapa Rios, and allows us to monitor the sustainability of the ecosystem and ensure that it is being preserved.

Catherine Osorio, Psychology

Faculty Mentor: Andre Souza, Psychology

The Cyber Mind: the role of cognition on people's evaluations of technology

Technology is an essential part of modern living and, the tech industry has become one of the largest players in the world of finance. Companies invest copious amounts of money into research on usability to maximize acceptance of products which mainly focuses on appearance and cost effectiveness. While these things are important, there are psychological, specifically cognitive, factors that should be factored in when deciding usability. Oddly, not many studies focus on this aspect of customer judgment on usability. The purpose of this study is to allow for tech companies as well as consumers to have a better idea of what affects usability from a cognitive standpoint. Specifically, this research will investigate three psychological and cognitive influences (processing fluency, need for cognition, and motivational regulatory forces) on consumers' judgment on usability of smartphones and smartwatches. In order to do this, two studies will be done. The first will involve about 200 participants (ages 17-35) who will perform a task such as adding a contact into a smartphone or smartwatch provided to them. The goal is to investigate the influence of processing fluency and need for cognition on usability judgements by consumers. In the second, 200 participants (ages 17-35) will perform tasks to highlight either positive or negative aspects of the product. The purpose is to manipulate the motivational regulatory forces and investigate how this affects consumers' opinions on usability.

Anna Grace, Communicative Disorders

Faculty Mentor: Anthony Buhr, Communicative Disorders

Speech Fluency in English as Second Language Speakers

This research study examined the level of speech fluency attained by individuals who learned English as a second language. Interviews with native French, Dutch, and German speakers were transcribed and their speech disfluencies were coded in order to determine the number of disfluencies throughout each interview. Results of the study will address whether or not the level of second language proficiency directly corresponds to the age at which the second language was initially learned.

Elizabeth Patton, English

Faculty Mentor: Sarah Cantrell, English

Looking Inward and Outward: J. M. Barrie's Peter Pan in the Classroom

My research focuses on British author J. M. Barrie's Peter Pan and its potential for inclusion in secondary school English curricula. Building on the work of Catherine Lynch and William Blackburn, I argue that Peter Pan remains a relevant cultural myth and also speaks to past and current definitions of childhood and maturity. As such, Barrie's instantly recognizable tale offers students an opportunity to reflect on their own journeys toward maturity as they explore the pitfalls of idolizing eternal youth too blindly. Moreover, my own analysis of Barrie's novel examines how the themes of love and desire correspond to the nature of growing up. Presenting this novel in the classroom also requires that teachers acknowledge and teach their students how to recognize and respond to the text's problematic depictions of "otherness." In this vein, the work of Ann Wilson and Mary Brewer permits me to examine how Peter Pan illustrates Victorian perceptions of race, class, and gender in the context of the British imperialist colonial project. I conclude that exposing young students to this familiar narrative will foster their abilities to think critically about literature as a cultural and historical product. I maintain that teaching Peter Pan is a valuable pedagogical approach because it allows students to both apply its lessons about maturity to their lives and to look critically at the assumptions of the text as well as their own assumptions about people outside their own culture.

Benjamin Pearsall, Culverhouse School of Accountancy

Faculty Mentor: James Cover, Economics, Finance and Legal Studies

How Canada's Economic Policy has Changed, Adapted, and Grown

**International focus*

The purpose of this research project was to study Canada's economic policy over the past 50 years and find the points of important change in fiscal policy and government spending as they relate to tax revenues and GDP. Although most of my research took place independently, I worked with faculty mentor James Cover throughout the process to organize my information and create the presentation. The major time periods of change and reform in the Canadian government took place in 1981-1982 when Canada dealt with a large recession due to stagflation, in the early 1990's when Canada again went into recession and as a result vastly altered their Keynesian based view that had largely guided fiscal policy to that point, and most recently in dealing with the Global recession of 2008-2009. Based on our findings, we look to see what has worked for Canada, and what has failed. From there, we observe their current policy and hypothesize whether or not that will provide success in the future.

Michelle Plese, Biological Sciences

Faculty Mentor: Martha Crowther, Psychology

Familial History and Shared Narratives: Strengthening Bonds Between Custodial Grandparents and Grandchildren

The present study uses a family history construction in an effort to strengthen the bonds and understandings between grandparents and grandchildren. Fifteen sets of grandparents/grandchildren will participate in co-writing a family-history comic book. Pre and post intervention questionnaires will center on participants' knowledge, empathy, and understanding of the other party. Specifically, the grandchild in each set will be trained as technology informants, with someone from the research team teaching them how to use the ReadWriteThink.org online comic creator. During this training, the researcher will record the session and administer verbal versions of pre-test assessments. While the grandchild is being trained, another researcher will administer pre-tests assessment to the grandparent, including physical and mental health as well as a questionnaire to assess grandparenting. After the training and pre-tests are complete, the dyads will work together; with access to the research team for help, on creating their family comic book. The grandparent will think of a story that is a "representation" story that tells why the relationship with their grandchild is important. The grandchild will turn the story into a comic book. The grandparent and grandchild will each receive \$15.00 at the conclusion of the session.

Jessica Prestel, Mechanical Engineering

Joanna Leung, Mechanical Engineering

Laurel Johnson, Mechanical Engineering

Faculty Mentor: Marcus Ashford, Mechanical Engineering

RPER: Rapid Prototyping Research Engine

Combustion research in IC engines is notoriously difficult due to problems in establishing repeatable operating conditions. Devices such as rapid compression machines have been created to repeatedly simulate engine conditions but they typically fall short of replicating the true combustion environment. Single cylinder research engines exist, but they are expensive and still suffer from considerable operational variability. Moreover, the engine geometry cannot be changed. The Rapid Prototyping Research Engine (RPER) is being developed to address these issues. All of the moving parts within the RPER, including the piston and valves, are electromechanical and independently computer-controlled, unlike real engines in which all moving parts are mechanically coupled. This affords the mechanical operation to be changed through simple adjustments in software. Key benefits include the ability to precisely set and repeat operating conditions and the ability to mimic virtually any engine. It also allows examination of transient events such as starting and accelerating to be repeated accurately, which a feat unattainable in real engines. Last, the RPER can operate on exotic engine cycles-such as unequal compression and expansion strokes, etc. We are currently selecting componentry for the RPER and hope to begin operation in summer of 2015.

Peyton Presto, Chemical and Biological Engineering

Faculty Mentor: Juliet Davis, Management and Marketing

Adult Living Facilities: Comparing Quality of Care and Profit Status

The purpose of this research is to determine if any correlation exists between the quality of care of adult living facility residents-primarily among nursing homes-and the facility profit status. Previous studies have indicated that most nonprofit nursing home residents report a higher quality of care than residents of for-profit nursing homes. This research primarily draws upon resources such as numerous medical journals, resident questionnaires, and published senior living facility reviews. The majority of the general public is not aware of the vast differences in amenities and accommodations provided by these services; therefore, the aim of this study is to offer current and reliable information to caregivers going through the difficult process of determining the correct senior living facility for elderly family members.

Emory (Grey) Price, Psychology

Faculty Mentor: Matthew Jarrett, Psychology

Attention-Deficit/Hyperactivity Disorder (ADHD) Symptoms, Neuropsychological Functioning, and Self-Reported Driving Behaviors

Attention-deficit/hyperactivity disorder (ADHD) is associated with greater motor vehicle accidents (Barkley & Cox, 2007) and difficulty in driving simulations (Epstein et al., 2013). The current study examined how undergraduate students with and without ADHD differed on self-reported behavior. In addition, we examined how memory and sustained attention related to driving. 500 undergraduate students participated in an IRB approved research study. Drawn from the PY101 Subject Pool, participants were grouped into those meeting criteria for ADHD (n=58) and those not (n=337). Those with ADHD were significantly more likely to have driven with no license ($\eta^2=.01$), been in a driving accident ($\eta^2=.02$), at fault for an accident ($\eta^2=.02$), reckless driving ($\eta^2=.01$), received a speeding ticket ($\eta^2=.03$), a parking ticket ($\eta^2=.01$), and total citations ($\eta^2=.05$). In regression, after controlling for years of driving experience, we examined the following predictors: visual working memory, sustained attention, and current symptoms of inattention and hyperactivity/impulsivity. Inattention was a significant predictor of driving with no license ($\beta=.15$), been in a driving accident ($\beta=.18$), being at fault for an accident ($\beta=.22$), receiving a speeding ticket ($\beta=.17$), receiving a parking ticket ($\beta=.15$), and total citations received to date ($\beta=.27$). These results suggest that those with ADHD are significantly more likely to have driving impairments, best predicted by self-reported attention symptoms.

Angelo Rabano, Chemical and Biological Engineering

Faculty Mentor: Xiangrong Shen, Mechanical Engineering

Using Arduino Microcontrollers to Control Electronics

In the technology driven world that we live in, the average person does not stop and think about what goes into the electronic devices that are prevalent in our day to day lives. My research aims to explain how to control electronic devices using Arduino microcontrollers. This past semester, I designed controllers for a robot arm and hand. The Arduino acts as the processing brain of any electronic system. Using simple programming, a creator is able to ask the system to run logic tests. Based on the results of the test, the system will perform an action. A controller's task is to receive human input, translate it into values that the electronic system can understand, and send signals to the device being controlled. One system, the robot arm, used three DC motors in order to move the arm with three degrees of freedom. A joystick is used to receive human input, an encoder is used to provide ancillary information in order to determine range of motion, and the Arduino relays the information to the motors. The other system,

the robot hand, uses a glove to move the fingers of the hand simultaneously with the hand of the user. The glove has flex sensors receive values as they are bent, then the Arduino translates the values into a degree of movement for each of the five motors on the hand.

Nicholas Radivoj, Mechanical Engineering

Faculty Mentor: Ajay Agrawal, Mechanical Engineering

Reducing Emissions and Increasing Efficiency in Combustion Process

The purpose of this project is to try to increase efficiency and reduce emissions in the combustion process in an engine. This project is important and effects everyone on the planet because let's face it, our carbon footprint right now is way too high and is eventually going to hurt us. The safe limit for CO₂ in the world's atmosphere is supposedly 350 parts per million and we are currently sitting at 396 parts per million, so it is imperative that we try to increase efficiency and reduce emissions. In this project, our method of burning is using a combustion chamber while using air and burning methane. We study the resultant flame by using very proficient high speed cameras. We compare the flame with the standard liters per minute that was used for both the air flow and methane and compare that with the equivalence ratio we get when we hit an instability. This project is currently in progress and we hope to begin experimenting with liquid fuel in the near future.

Carter Reed, Biological Sciences

Faculty Mentor: Andrea Glenn, Psychology

Emotional Reactions to Internet Videos

Many psychological studies, including behavioral or brain imaging, utilize images of facial expressions in order to elicit a certain emotion. Often, these images are taken from databases in which actors have been instructed to show a certain emotion often resulting in unnatural-looking or exaggerated expressions. There is concern that use of these unnatural expressions may skew data from what actually occurs in real life. The purpose of this study is to gather a database of emotions naturally expressed from a population of undergraduates by watching videos selected to specifically elicit certain emotions. These emotions include anger, sadness, shock, fear, happiness, confusion, interest and disgust. The purpose is to create a new, more natural database for distribution to other researchers for future studies. At the current time, the research is not complete.

Andrew Reed, Psychology

Samantha Thomas, Psychology

Lauren Browning, Psychology

Faculty Mentor: Philip Gable, Psychology

Time on the Brain: Neural Mechanisms of Motivation Modulate Time Perception

Approach motivated states relate to hastened time perception while withdrawal-motivated states lead to slowed time perception (Gable & Poole, 2012). However, the neural correlates of this emotion-modulated process are unclear. The Contingent Negative Variation (CNV) is a late ERP component that has been associated with judging time intervals (Ng, Tobin, & Penney, 2011). In the current study, participants completed a temporal bisection task in which they judged the durations of approach and withdrawal motivating stimuli presented for the same amount of time while EEG was recorded.

Participants judged the negative withdrawal-motivating pictures as being displayed longer than the positive approach-motivating pictures, consistent with past research. Additionally, they were faster to respond to approach-motivating stimuli. CNV amplitudes were larger to approach-motivated pictures than withdrawal-motivated pictures. Faster reaction times to approach-motivated stimuli for short decisions related to greater CNV amplitudes. CNV amplitudes did not relate to reaction times to negative stimuli. These results suggest that the CNV is sensitive to approach-motivated time perception. Moreover, the CNV is a neural correlate of hastened time perception in approach-motivated states.

Andrew Rice, Biological Sciences

Faculty Mentor: Julie Olson, Biological Sciences

Examination of secondary metabolite genes in bioactive marine bacteria

Bacteria associated with a host organism often produce secondary metabolites that assist in the adaptation of the host and/or bacteria to the ambient environment. Functions of secondary metabolites include protection against pathogens and/or competitors, enhanced or disrupted cell-to-cell communication, and cues for larvae settlement. Using 54 bacterial isolates recovered from the external surfaces of marine lionfish that inhibited the growth of various fish pathogens, previous research evaluated the presence of secondary metabolite biosynthetic genes for nonribosomal peptide synthetases (NRPS) and polyketide synthases (PKS). These genes were initially selected to determine if the isolates had the capacity to inhibit pathogen growth via the production of antibacterial compounds. To assess whether the growth inhibition of the pathogens was due to interruptions in cell-to-cell communication, this project examined the same 54 bacterial isolates for the ability to produce N-acylated homoserine lactone (AHL)-lactonases, molecules which interfere with bacterial quorum sensing communication systems, via molecular genetic techniques. Preliminary results indicate that 4 of the 54 isolates possess an AHL-lactonase gene, suggesting that the remaining isolates utilize other mechanisms for disrupting pathogen growth. These findings highlight the diversity and complexity of genes expressed by bacteria in response to environmental stressors or cues.

Jacob Robinson, Chemical and Biological Engineering

Annkay Alexander, Biological Sciences

Chris Mayhugh, Chemical and Biological Engineering

Jianfa Ou, Chemical and Biological Engineering

Faculty Mentor: Margaret Liu, Chemical and Biological Engineering

Metabolic engineering of Clostridium tyrobutyricum to decrease byproduct formation for butyrate production

Butyric acid is an important chemical used in industries with the application of making clean biofuels, polymers, food flavorings, and perfumes. Butyric acid is mainly produced by chemical synthesis, and researchers have been working to develop a sustainable, biomass-based approach via the anaerobic fermentation of the bacteria *Clostridium tyrobutyricum*. Our research has focused on optimizing its metabolic pathway by knocking- out the ack gene, which encodes the enzyme acetate kinase. Cells will then be prevented from using acetyl-CoA to make acetate, a major byproduct in fermentation. More intermediate products will be available for target product synthesis. Based on the previous achievements on gene down-regulation, we designed a novel knock-out plasmid, CloStron ACK2, which

is established on the high-efficient Group II intron technique. This plasmid was transformed into *Escherichia coli* for pre-treatment before it can work in *C. tyrobutyricum*. Single colonies were isolated and used to obtain purified plasmids. The size of the plasmids was determined to be correct through restriction endonuclease treatment and agarose gel electrophoresis. It indicated that Clostron ACK2 had been transformed into *E. coli* successfully and treated appropriately. Clostron ACK2 is now ready to be transformed to *C. tyrobutyricum*, and the mutant strains can then be evaluated through fermentation.

Steven Scaglione, Biological Sciences

Faculty Mentor: Katrina Ramonell, Biological Sciences

Physiological Effects of Iron Oxide Nanoparticles on Arabidopsis thaliana

Nanoparticles have grown in prominence due to their many applications in materials science, biomedical research, and industry. It is essential to observe the potentially negative effects these charged nanoparticles have in *A. thaliana* to evaluate their impact on the environment and the organisms within it. In this work, plants were treated with a concentration of nanoparticles to replicate potential environmental exposure levels. Magnetometer analysis indicated that nanoparticles were absorbed through the roots and delivered to leaf tissue within 48 hours. To investigate physiological effects in these plants, root lengths were measured and compared. Positively charged nanoparticles at a concentration of 25 mg/L was shown to negatively affect root length and this was found to be statistically significant. Chlorophyll content was measured to examine changes on a chemical and efficacy basis. Additionally, pollen viability was studied to evaluate potential loss of reproductive efficiency.

Michael Scaglione, Psychology

Kathryn Reynolds, Psychology

Lauren Browning, Psychology

Faculty Mentor: Philip Gable, Psychology

Contentment as a Withdrawal-Motivated Emotion: Evidence from Time Perception

Most positive emotion research associates all positive affects with approach motivation, or the impetus to move towards (e.g., desire). However, recent work suggests that some positive affects may be associated with withdrawal motivation, or the tendency to move away (e.g., contentment; Harle & Sanfey, 2010). Approach-motivated positive states tend to hasten time perception, whereas withdrawal-motivated negative states tend to slow time perception (Gable & Poole, 2012; Gable, Browning, & Poole, 2015). Past work has not examined whether positive affects with different motivational tendencies have diverse effects on time perception. If contentment is a positive withdrawal state, then contentment should cause time to slow down. To measure this, we used a temporal bisection task (Study 1) in which participants judged the duration of pictures evoking contentment or neutral states. Consistent with predictions, contenting images were judged to be on the screen for longer than neutral images. In Study 2, participants estimated the duration of a contentment and neutral film, which were equal in length. Participants estimated the contentment film was longer than the neutral film. These results support the hypothesis that contentment causes time to slow relative to a neutral condition. Contentment may evoke withdrawal-motivation as evidenced by the similar slowing of time observed with other withdrawal-motivated states.

Sydney Schaefer, Geological Sciences

Faculty Mentor: Ibrahim Cemen, Geological Sciences

Permeability of Chattanooga Shale Deposits in Northeast Alabama

With the growing need for gas and oil, industries are now searching for new ways to obtain materials that can be used to produce energy. One route these companies take is to look subsurface for shale, which is compositionally rich in producible oil and natural gas. Chattanooga shale is black shale found in Northeast Alabama, with high concentrations of organics, which are producible natural resources useful to the energy and industrial sectors. When analyzing shale, Geologists study fractures in order to evaluate potential permeability. One contemporary means to analyze fractures is by use of LiDAR. LiDAR is a light detection and ranging technique by which terrain can be imaged with laser precision. This instrument images a surface with high resolution, allowing precision and accuracy when evaluating fracture relationships. Through these techniques and understanding, Geologists are able to analyze fractures and find useful natural gas reserves.

Megan Schmidt, Curriculum and Instruction

Faculty Mentor: Christina McDonald, Psychology

The Effects of Taekwondo Training on Executive Functions in Children

Abstract Executive functions include abilities such as self-control, problem solving, planning, and inhibition. These abilities have been shown to be linked to school performance and mental health, among other things. There is some research to suggest that traditional martial arts training, such as taekwondo, may improve executive functioning skills in children and adolescents. The purpose of this study is to test the effectiveness of the Tiger Rock taekwondo curriculum in Tuscaloosa on children six to ten. As children first enroll in the program they will be given a baseline assessment which includes a computerized task that measures their executive functions. Parents will also complete a questionnaire to provide more information about their child's behaviors. A follow up assessment will be performed eight weeks later. Researchers hope to find a positive change in the children's executive function performance.

Lara Scott, Chemistry

Faculty Mentor: John Vincent, Chemistry

Spectroscopic Studies of Low-Molecular-Weight Chromium-Binding Substance in Non-Aqueous Solvents

While trivalent chromium (Cr) has been shown at high doses to have pharmacological effects improving insulin resistance in rodent models of insulin resistance and diabetes, the mechanism of action of chromium at a molecular level is not known. The chromium-binding and transport agent low-molecular-weight chromium-binding substance (LMWCr) has been proposed to be the biologically active form of chromium. LMWCr has recently been shown to be comprised of a heptapeptide of the amino acid sequence EEEEDGG (where E is glutamic acid, D is aspartic acid, and G is glycine). A complex of Cr and the peptide when administered intravenously to mice is able to decrease area-under-the-curve in intravenous glucose tolerance tests. In the presence of insulin in skeletal muscle cells, it can also increase the phosphorylation of the enzyme Akt (part of the insulin signaling system) while it can also restore insulin-stimulated glucose uptake in insulin-resistant muscle cells. However, determining the structure of the Cr-peptide complex has proven to be problematic as the complex has little solubility in

water at near neutral pH (similar to that of body fluids). Hence, the focus of this work is to attempt to form the Cr-peptide complex in a non-aqueous solvent where it might be sufficiently soluble to characterize by a variety of spectroscopic and magnetic techniques. Preliminary work toward this goal will be described.

Elizabeth Selmarten, Advertising and Public Relations

Faculty Mentor: Chris Roberts, Journalism

Pacing of Presidential Political Advertising

The purpose of this research is to test hypotheses related to differences in the pacing of video advertisements created during the 2012 presidential election cycle. The hypotheses assume that the political discourse themes in the ad (to attack, acclaim, or defend) influences the ad's pacing. I have been provided by Dr. Roberts a sample of political ads from the 2012 U.S. presidential primary and general election to code in an online database, as well as a coding sheet. I watch each ad multiple times to examine its political discourse(s) and pacing, including the number of cuts and scene changes, amount of imposed text, length of active motion and music, and the amount of talking. A doctoral student in telecommunications has been replicating the coding, and our results are compared for intercoder reliability. It is hoped that this study will determine whether or not pacing can be taught to a standardized level.

Alexander Shaver, Chemistry

Faculty Mentor: Stephen Woski, Chemistry

Dipole Effect on Universal Bases

Variation in the nucleotide sequence of DNA and RNA poses a particular obstacle to the design of accurate, functional oligonucleotide primers and hybridization probes. This design obstacle can be overcome by the synthesis of a nucleoside containing a universal base. If successful, the base would be able to pair non-selectively with any of the five naturally-occurring bases found in DNA and RNA, without destabilizing the nucleic acid's three-dimensional structure. Ideally, it would also function as a substrate for polymerases just as the other bases do. While some universal bases exist, we believe that one even more compatible with the naturally-occurring bases and the three-dimensional structure of DNA can be realized. We have worked on the synthesis of the phosphoramidite derivative of 2,7-cyanocarbazole. This is one of several cyanocarbazole derivatives being studied to investigate the effect of dipole moment on the base's ability to pair indiscriminately. We hypothesize that carbazoles with larger dipole moments will act as a less selective, more stable base than any currently available. This hypothesis will be tested by incorporation of the novel phosphoramidite into synthetic oligonucleotide primers and examination of the stability when paired with complementary DNA strands.

Kathryn Shay, Geography

Faculty Mentor: Eben Broadbent, Geography

Development of methodology and preliminary data collection for a soundscape monitoring program of the seasonal dynamics of avian composition and abundance in Alabama

Alabama supports among the highest biodiversity of all states in America, but is also among the greatest risks for loss of species. Projected changes in climate coupled with increased conversion of natural

habitats to anthropogenic land uses will only further exacerbate these problems. In this context, interactions among native and exotic bird species may also play a role in causing large changes in bird composition and abundance. Understanding future changes in bird populations requires creating a good baseline understanding of present day population dynamics and then extending this monitoring approach into the future. Enhancing present efforts with automated approaches bears promise to increase the temporal resolution and length of monitoring and at multiple locations using highly comparable methodologies. In this project we propose to develop a method such an automated method to bird population monitoring through automated analyses of high fidelity omnidirectional audio recordings at locations at the University of Alabama arboretum. Results from this project will include a new methodology for monitoring avian composition and abundance, a good understanding of seasonal variations in their populations and linkages with climatic variables, and the collection of critical preliminary data necessary to write up a more ambitious proposal to monitor bird population dynamics across the entire state of Alabama using the methods developed and tested in this project.

Garrett Skurka, Economics, Finance and Legal Studies

Brian Brathovd, Geological Sciences

Faculty Mentor: Rona Donahoe, Geological Sciences

Impact of Acid Mine Drainage on Water Quality at Lake Harris, Tuscaloosa County, Alabama

The purpose of this research project is to assess the present day impact of acid mine drainage (AMD) from the reclaimed strip mine on Lake Harris through the geochemical analysis of stream water, lake water, and sediment samples collected approximately monthly between August 2014 and February 2015. The main water quality parameters used for impact assessment are pH, concentrations of dissolved metal ions, and dissolved sulfate. The major results of this geochemical study show that, relative to the lake water, iron concentration in the stream is 4 times higher, calcium is 20 times higher, and magnesium is 30 times higher. Sulfate, which can be expected to produce a drop in pH, is 45 times higher in the stream than the lake. The pH is significantly lowered in the stream by AMD as it measures from 3.6 to 4.2 at the point furthest from the lake. When pH falls below 4 in an aquatic environment, almost all aquatic life (plants and animals) cannot survive and dies. Additionally, the Iron(III)oxide-rich sediment will act as a long term source of metals leaching into the water column and serving the benthic organisms in the lake; this leads to bio magnification through the higher trophic levels in and outside of the aquatic environment. In conclusion, the environmental impact of the coal strip mining activities at Lake Harris are still present and damaging nearly 30 years after reclamation.

Laura Smith, Biological Sciences

Faculty Mentor: Norma Cuellar, Capstone College of Nursing

Mindfulness-Based Stress Reduction for Treatment of Restless Legs Syndrome

Restless Legs Syndrome (RLS) is a neurological disorder affecting 20 million Americans, characterized by uncomfortable sensations resulting in an urge to move the legs. Symptoms of RLS are most prevalent during rest and at night, causing sleep disruptions that reduce daytime functioning and quality of life. Many pharmacological treatments can be costly and ineffective. Mindfulness-Based Stress Reduction (MBSR) is an empirically supported alternative treatment approach that has been proven effective for a variety of medical conditions that are intensified by stress and anxiety. The purpose of this study is to

determine the feasibility of MBSR as an effective treatment for participants with RLS. The design of this study included an 8-week MBSR group intervention, paired with a randomly selected control group. Persons recruited for this study were interested in MBSR, but experienced problems focusing through the 2-hour classes intended for the treatment group. Participants reported issues performing mindfulness exercises in the presence of RLS symptoms. Results have not yet been calculated pertaining to statistical efficacy of MBSR treatment for RLS symptoms. The consequences of this study will allow for identification and revision of problems with MBSR training for persons with RLS, and will contribute to the design of larger experimental studies.

Jason Solomon, Economics, Finance and Legal Studies

Faculty Mentor: Robert Brooks, Economics, Finance and Legal Studies

An Enterprise Perspective of Performance Attribution

Research In Progress Dr. Brooks and I have been intrigued by the effect of interest rates on a particular enterprise. The enterprise term can be used to define small cap banks (less than \$500M under management), a high net-worth individual or smaller financial institutions. From a financial risk management standpoint, firms have clients that have varying degrees of exposure to debt or equity or cash etc. That being said, a common problem in the industry is the personalization of portfolios to maximize performance and hedge against risk. The main risk being a loss in permanent capital. WE has found that interest rates touch all aspects of an enterprise. This fact, while obvious in theory, is hardly practiced in the industry as most Financial managers and planners apply interest rate predictions and thus protections solely to the equitable assets of an enterprise (or worse design a generic portfolio and apply it to various clients). Think home mortgages and savings accounts, while they aren't necessarily controlled by a financial manager, they should still be taken into account so assets can be allocated effectively. We have collected 3 interest rates' data and are attempting to fit a yield curve over all three to accurately predict future rates and thus properly allocate portfolios. We are using C++ coding and a Nelson Siegel Svensson model to fit the curve. We hope to expose the curve to rate shocks and observe the effects on each respective component of the enterprise.

Thomas Sperry, Mechanical Engineering

Faculty Mentor: Rachel Frazier, AIME

Improving Patient Care Using an Early Warning System

Nurses are required to answer alarms and monitor conditions of numerous patients on a daily basis. With the constant sounding of alarms and various systems demanding attention, nurses have difficulty reacting to alarms and noticing the decline in vital conditions of their patients. As a result, errors in treatment occur, which increase patient mortality. Such mortality could have been prevented through early an early response system. Through interviewing active nurses and administration at a local hospital, Dr. Carter-Templeton and I found that it was beneficial for nurses to have a system that would allow for them to be alerted about declining vital trends in specific patients and be notified either through cellular phones or other mobile devices that are kept in the nurse's possession. When vitals appear to be declining, an alert is sent to the nurse in charge of that patient so they may respond as quickly and appropriately as possible. This is meant to reduce errors, decrease the stress on the nursing staff, and decrease patient mortality.

Henry Stere, Computer Science

Faculty Mentor: Susan Vrbsky, Computer Science

GPU Implementation of H.264 Video Codec

Video encoding is often referred to one of the most CPU intensive tasks and serves as a benchmark for CPU performance. The aim of this project is to implement the H.264 video codec in such a way that a CUDA enabled GPU can encode the data rather than the CPU. The reason behind implementing the program so that the GPU can carry out the task is simple: GPU's in general have more cores than a CPU and are able to process large amounts of data much quicker than the CPU. The outcome of this project is a program that depending on the hardware, will be able to encode a video file much faster than a CPU is able to. So far, there is no data as most of the time has been spent learning how to code with CUDA, a platform that allows C, C++, and Fortran code to be read and interpreted by NVIDIA GPUs so that they can carry out the program. Predictions for the outcome of this code are that it will work, but depending on the GPU used, results will vary in speed and quality. This is because the GPU used for testing is consumer grade and does not offer the same amount of accuracy as other professional grade GPUs. Video editors would benefit from this as it would drastically cut down on time spent waiting for videos to encode.

Daniel Stucki, Aerospace Engineering and Mechanics

Faculty Mentor: Gary Cheng, Aerospace Engineering and Mechanics

Computational Aeroacoustics

This research regards computational aeroacoustics - which concerns the acoustic radiation of subsonic and supersonic air flows past rectangular cavities. Acoustic radiation from cavities has many real world applications in the realm of aerodynamics which include: the effects of cavities on heat transfer and drag, the role of cavities in producing sound, the effects of large cavities [i.e. store bay doors] in generating turbulence, and many more. In the past, experiments concerning this area of study lacked the technological details, which are now at our disposal, and thus give us a better understanding of this phenomenon. Further, present day research concerning this subject is no longer dependent upon wind tunnel experiments which require a great deal of labor and financial asset, but is rather done via computational simulations, which enable us to have better understanding of the underlying physics with a lower cost. Under Dr. Cheng's guidance, I was able to learn how to generate grids with a meshing software known as Pointwise[®], which allows for the creation and analysis of geometric shapes of the interest. Using this, I was able to create a grid of a two dimensional geometry [cavity], with which I can simulate the flowfield of the subsonic and supersonic flows around it, and then determine the acoustic waves generated from the presence of the cavity. Due to the complexity of this subject, and my lack of numerical results, I am presenting this as a work in progress.

Jamie Talecki, Information Systems, Statistics and Management Science

Faculty Mentor: Glenn Richey, Management and Marketing

Supply Chain in the Business Industry

Through my mentorship with Tyler Morgan, a Marketing PhD Candidate, and Dr. Glenn Richey, I am an assistant on two research projects. The first project I have worked on is in regards to supply chain and big data. Supply chain is a rapidly growing topic as information is becoming more readily available to

stakeholders around the globe. Tyler Morgan's main focus in his dissertation is the effects technology adoption has on an industry in regards to sustainability. Some important questions he has had me look at are "how sustainable is a company if it adopts influential technology?" and "what are some ways that companies can improve their supply chain management?" Through my weekly meetings with Tyler, I have been immersed into some important aspects in today's global business industry. Before becoming an emerging scholar, I did not know what supply chain dealt with or what the term big data means. So far in my work, I have compiled data, become proficient in Microsoft Excel, designed an online survey forum, reached out to survey takers, and completed preliminary research on various topics important in the industry. These topics include logistics service quality, big data utilization, and technology complementarity. For this preliminary research, I have used online databases such as Google Scholar to find reliable and useful sources. For my Emerging Scholars presentation in May, I expect that my project will be in progress since Tyler and Dr. Richey are some time away from comple

Jamie Tesh, Chemical and Biological Engineering

Faculty Mentor: Elizabeth Papish, Chemistry

Study of Transition Metal Complexes for Water Oxidation

We have been studying the water oxidation properties of organic ligands bound to transition metal ions. Our research focuses on the 6,6'-dihydroxybipyridine (6,6'-dhbp) ligand which has been shown to enhance the rates of water oxidation when in iridium complexes at near neutral pH (Papish et al. Inorg. Chem. 2013) and in copper complexes (Papish et al. Inorg. Chem. 2014). Currently, we are working to build more stable dihydroxybipyridine complexes utilizing earth-abundant first row metals which would be cheaper to produce.

Justin Timberlake, Computer Science

Faculty Mentor: Jeff Gray, Computer Science

Assisting Students with Motor Disabilities to Program by Voice in a Block Language

The purpose of Project Myna is to allow a new opportunity for those with disabilities to be able to learn the basics of computer science and programming. This was initially made possible in an earlier project by students at UA who create an interactive vocal interface to allow "Programming by Voice" in an environment called Scratch. With traditional Scratch, those learning to program for the first time can drag and drop blocks to create a program, rather than using a textual language that often presents challenges related to learning the syntax of a language. However, programming in a block language requires the use of a keyboard and mouse. To make these new learning experiences more accessible for children with a disability, voice commands in Myna are used to replace the need to click a mouse and type on a keyboard. My work focuses on extending Myna to work with programming puzzles that have been created by Code.org for the "Hour of Code" event, which has introduced over 100Million students, teachers and adults to programming. In a similar manner to the way that Project Myna drags and drops the blocks in Scratch, the same vocal-based interface will now also be available for interactions with the popular Code.org environment for children who have a physical disabilities.

Cullin Tripp, Information Systems, Statistics and Management Science

Faculty Mentor: Paul Drnevich, Management and Marketing

Examining Value Creation vs. Value Capture in the National Basketball Association

In organizations, value is both created and captured by different stakeholders and both contribution to, and appropriation of, value can vary greatly. In the NBA, value (basketball-related income), is created by the players and teams, and then appropriated based on a collective bargaining agreement (CBA). As expected, all stakeholders in the CBA believe they under appropriate value. We test this premise by measuring the true relationship between value creation and capture in the context of the NBA.

Hypotheses: Some stakeholders are contributing more value than they appropriate while others are appropriating more value than they contribute. Such that: 1. On average, an NBA player creates more value for the team than the player captures. 2. As a player's salary increases from the median, they will appropriate more value than they contribute to the team. 3. As a player's salary decreases from the median, they will appropriate less value than they contribute to the team. Methods: Using the NBA's advanced statistics, I conducted exploratory factor analysis to derive 5 factors to measure the value a player creates for a team, and to predict player value capture. I then compared the predicted and actual values by player, team, conference, and league. Findings: Because there are fewer players above the median salary than below it, the average NBA player appears to be capturing less value than he creates. Therefore, teams and "Star" players capture more value than they create.

Jared Tubbs, Music

Faculty Mentor: Amir Zaheri, Music

Music in Nazi Germany: Replacing the Irreplaceable

**International focus*

This research delves into the details of the Nazi Regime's failed attempt at replacing the non-German masterworks of classical music, such as the names of the commissioned composers and their pieces, as well as the composers' varying levels of success in their individual attempts at creating proper replacements. The Nazi Regime of World War II is historically known for its oppression of numerous people groups; in addition to people groups, the Nazi Regime was also very prominent in the oppression of all forms of art, crusading to purge the world of any art form viewed as "non-German". Though sanctioned by the government, this was not taken lightly by the German people; benchmark pieces of art, such as the Jewish composer Mendelssohn's "A Midsummer Night's Dream" were now off limits, leaving a large vacancy for high quality art. In an attempt to stifle the protesting, the Reich Music Chamber began commissioning various Aryan composers to create pieces of art that would replace pieces by composers like Mendelssohn with even better, more "German" music. The success of these commissions was marginal at best, as none of the pieces were ever considered good enough to be selected as a proper replacement. The findings of this research should provide further insight into this attempted process of replacing some of the most popular classical music of the twentieth century.

Jake Turner, Aerospace Engineering and Mechanics

Faculty Mentor: Vinu Unnikrishnan, Aerospace Engineering and Mechanics

Carbon Nanotubes: The Future of Engineering?

I'm working with the Aerospace Engineering department under Dr. Unnikrishnan. Located in the Northeast Research Center, Dr. Unnikrishnan has two current projects that the mentor-up students and undergrads can work on. One involves a fledging material in the engineering world known as carbon nano-tubes. These are highly specialized tubes that can be manufactured and engineered for many different purposes. As you can imagine, they are incredibly tiny, and can only be successfully modeled and simulated on computers, so their invention really wasn't possible until the modern era. I used a software called LAAMPS, developed by Sandia Labs, a federally funding project by the US Government. It is a command based text prompt that uses an input and a data file to model molecular structures with different variables. Using inputs like heat, volumes, pressure, and environment, LAAMPS can be used to observe how certain nano-tubes behave better than others. Getting down to specifics, I am looking at the thermodynamic properties of these tubes to determine which ones handle more heat under certain conditions. For example, LAAMPS runs one model simulation. Taking several results a second, the program compiles the information into a log file. Using Microsoft Excel, the data is then turned into a graph, which can be compared with other data. So far, results are pending, but I am certainly confident we can get valuable data in time for the Mentor-up conference, coming up on April 7th.

Caroline Waldo, Curriculum and Instruction

Faculty Mentor: Matthew Jarrett, Psychology

Attention-Deficit/Hyperactivity Disorder (ADHD) Subtypes in College Students: Differences on Anxiety and Depression

The presence of attention-deficit/hyperactivity disorder (ADHD) is associated with enhanced risk for internalizing disorders. Angold, Costello, and Erkanli (1999) found that those with ADHD were 3 times more likely to be diagnosed with an anxiety disorder and 5.5 times more likely to be diagnosed with depression. Although ADHD is clearly associated with internalizing disorders, there has been debate about whether these internalizing disorders are associated more with the Predominantly Inattentive Type of ADHD (ADHD-I) or the Combined Type (ADHD-C). For example, older research prior to DSM-IV found that internalizing disorders were more frequently associated with ADHD-I (Milich, Balentine, & Lynam, 2001), while more recent studies have found that there are either not differences between subtypes or that there is greater risk in those with ADHD-C (Willcutt et al., 2012). Importantly, the vast majority of these studies have focused on children. The current study will examine how undergraduate students with either ADHD-C or ADHD-I differ on measures of internalizing problems. 500 undergraduate students participated in an Institutional Review Board-approved research study. Participants were from the Psychology 101 Subject Pool. Groups will be compared on measures of anxiety and depression including the State-Trait Anxiety Inventory for Adults (STAI-A), the Beck Anxiety Inventory (BAI), and the Symptom Checklist-90-Revised (SCL-90-R). Implications of the results will be discussed.

Alayna Watson, Psychology

Faculty Mentor: Ansley Gilpin, Psychology

Assessing the Vocabulary Levels of At-Risk Preschoolers to Improve Cognitive Assessments

Improving children's self-regulation skills early can produce lasting, positive effects in adulthood. Innovative preschool curricula targeting self-regulation may increase school-readiness, potentially

altering the course of children at-risk for school failure. Power PATH, an innovative integration of preventive interventions targeting self-regulation skills in at-risk preschoolers, has demonstrated improvements in self-regulation. To assess the effects of any intervention, researchers and clinicians use measures designed to assess children's self-regulation, such as their ability to inhibit impulsive behavior, remember rules, and pay attention to a task. However, many of these measures have verbal instructions, requiring children to have typical levels of receptive vocabulary to understand. When working with at-risk, impoverished populations, many children have very low vocabulary levels. Thus, it is hard for researchers and clinicians to determine whether a child performed poorly on a measure due to poor self-regulation skills, not understanding the instructions, or both. Using data I helped collect from an ongoing Power PATH intervention study sampling 200 Head Start preschoolers, I will examine relations between children's vocabulary scores and performance on self-regulation measures. This will help determine whether these measures' instructions should apply more behavioral examples when studying children from at-risk populations, such as Head Start, in future research.

Margaret White, Human Nutrition and Hospitality Management

Faculty Mentor: Yasmin Neggers, Human Nutrition and Hospitality Management

Obesity: Causes and Effects

The purpose of this research is to study the trends of obesity in the United States and in the state of Alabama, specifically childhood obesity and the consequences it can have both as a child and as an adult. Background research on obesity was conducted and data collection from children in rural Alabama occurred for a few years for the purpose of studying obesity trends and identifying effects.

Erik Witte, Chemical and Biological Engineering

Faculty Mentor: Whitney Hough, Technology Transfer

Developing Commercialization Plans for Innovative Technologies

With billions of minds at work in every corner of the world, how can cutting-edge and promising technologies enter into the marketplace? At The University of Alabama, the Office for Technology Transfer (OTT) bridges the gap between academic research and real world applications. Working alongside Assistant Director, Dr. Whitney Hough, I experienced a variety of activities from reviewing commercial assessments to cold calling potential customers. OTT is responsible for the protection of intellectual property and the resulting commercialization via licensing, startups, or joint partnerships. When a student, staff, or faculty members has a technology they wish to protect, OTT provides initial commercial assessments and then condenses the material into a short simple explanation comprehensible for all audiences. Based on the technology, possible industries that could use the technology are then researched. This allows for a targeted email campaign to identified companies that explains the technology in more depth. To increase the ability to form a relationship with the company, a phone call occurs which allows for OTT to receive feedback on the technology. While the process may seem too long for researchers and developers, at OTT our focus consists of providing the most beneficial commercialization process for our innovators. In addition, OTT encourages University faculty, staff, and students in becoming a part of the innovation that shapes our world today.

Cho Rong Won, School of Social Work

Faculty Mentor: Avani Shah, School of Social Work

Get Your Game On: A Review of Mental Health Intervention Games

There is limited research on mental health interventions delivered in a game format. This review focuses on understanding the existing effectiveness of mental health intervention games. Based on this review, we hope to develop guidelines for mental health intervention games. The review contains searches on prior game-based interventions from two databases: Academic Search Premier and PsycINFO. The search terms include: computer games, video games, serious games, games, mood, depression, anxiety, stress, and mental. Two hundred forty nine articles were found in Academic Search Premier. In PsycINFO, 165 articles were found. Of those articles, there were total of 13 articles that were useful in the review. All of the articles showed that the games effectively treated mental health issues. The guidelines in developing mental health intervention games will be presented.

Alexandra Wrist, Chemical and Biological Engineering

Kaitlyn Ryan, Chemical and Biological Engineering

Faculty Mentor: Ryan Summers, Chemical and Biological Engineering

Isolation of Caffeine Degrading Bacteria from Soil

Many foods and pharmaceuticals contain caffeine. While it is not toxic to humans at low to moderate levels, it is toxic to many bacteria and insects. Caffeine is able to get into the environment through plant decomposition and human waste. While caffeine is toxic to most bacteria, some bacteria have evolved and have gained the ability to degrade the chemical and use it for growth. Some of the metabolites formed when bacteria degrade caffeine are high-valued chemicals and can be used in the food, cosmetics, and pharmaceutical industries. Most degradation pathways have shown the N1-methyl group of caffeine being removed to create theobromine; however, it is possible for the N3-methyl group to be removed to create paraxanthine. We are currently isolating caffeine-degrading bacteria from soil to search for paraxanthine-producing bacteria. From this we will characterize the bacteria based on their metabolism as we search for new metabolites, genes, and enzymes.

Jacob Zarobsky, Computer Science

Faculty Mentor: Jeff Gray, Computer Science

Hiding Messages in Audio Files: A Case Study In Steganography

Storing and transmitting private data is becoming increasingly difficult in this digital age. Security minded individuals have started using strong encryption to protect their data from prying eyes during transit on the internet. However, encryption is inaccessible in some countries of the world and encryption is generally hard to set up and use by the end user, making it underused by a vast majority of the population. Instead of encrypting data, a technique that is becoming popular securing data during transit is called steganography. Steganography focuses on achieving "security through obscurity" by encoding private data in another medium before it is transmitted on the internet. Steganography allows for data to be hidden in plain sight as it travels through public internet infrastructure. In my research, I developed software to take any uncompressed audio file in the WAV or AIFF format and discretely encode any private data that could fit within the file without degrading the audio quality. I then designed a decoder that took a sound file and made a copy of the original data that had been encoded

in to that sound file. An encoded sound file could travel over the internet, or be hosted on a public server, where people with the decoder would be able to download the file and make a copy of the original encoded data.