

**ABSTRACTS OF  
THESIS PROJECTS  
SPRING 2013**

**BAYLOR HONORS COLLEGE**

**The Honors Program  
University Scholars**



**BAYLOR**  
UNIVERSITY

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# HONORS THESIS ABSTRACTS

## MAY 2013 GRADUATES

**Jake Abell, University Scholar**

Dr. Robert Miner, mentor

*Untimely Meditations on the Need for Roots: Imagining a Culture of Human Need in Nietzsche and Simone Weil*

This thesis identifies and examines similar conceptions of culture and education in Nietzsche's essay, Schopenhauer as Educator and Simone Weil's book, *The Need for Roots*. The two writers share the premise that culture, rightly understood and practiced, is oriented towards acquiring human metaphysical needs. Each author also distinguishes between such a culture, understood as authentic, and various forms of "sham" culture. The thesis distinguishes between Weil and Nietzsche's respective understandings of such cultural debasement, and principally suggests that each writer shares a positive understanding of culture rooted in and in pursuit of goodness, beauty, truth, and justice. Finally, a comparison with Plato throws into relief the differing ways in which Weil and Nietzsche understand the relationship of justice to beauty, truth, and goodness. That comparison suggests that Weil's account of culture differs most greatly from Nietzsche's account in its broad inclusion of political activity, suggesting that the unity of justice with beauty, truth, and goodness brings the political sphere into a meaningful account of culture alongside the fine arts, sciences, and education.

**Ariadne Aberin, Professional Writing**

Dr. Michael-John DePalma, mentor

*Mining the Prospects of Community Literacy: A Tentative Model for University-Community Collaboration*

The social tensions between the Waco community and Baylor University, often ill-perceived, are complicated. While the university is a place that fosters a sense of community among its students, there is still a disparity between the university and surrounding Waco community. Both the university and the community have taken measures to increase collaboration and connection between the two, in order to address social issues within the community, such as poverty and educational needs. My thesis explores the role of community literacy in bridging social disparity, specifically its role in community improvement in Waco. Rhetoric scholars Higgins, Flowers, and Long define community literacy as a way to expand our understanding and use of rhetorical practices in the public realm, in a way that crosses boundaries and leads to community improvement. In my thesis, I draw upon and outline studies by scholars in rhetoric and composition who have researched the benefits of service-learning and community literacy in the classroom, as well as in the community. These studies discuss community literacy and present various models of university-community collaboration, in which service-learning and community literacy are used as means for social change. I then present my primary research on the perceived areas of improvement in the Waco community, and present my proposal for a tentative model of university-community collaboration that specifically aligns with the needs and goals of both the Waco community and Baylor University.

**Sai S. Achi, Business Fellows**

Dr. William Hillis, mentor

*GABA Stimulates Aldosterone Production in Intact Zona Glomerulosa Cells in Fetal Bovine Adrenal Glands*

Aldosterone is a steroid hormone produced in the adrenal cortex. It is mainly used in regulating ion movement such as Na<sup>+</sup> and K<sup>+</sup> via Na<sup>+</sup>/K<sup>+</sup> pumps and thus it regulates mean arterial pressure. GABA (Gamma Amino Butyric Acid) is an inhibitory neurotransmitter that is found predominately in the central nervous system (CNS). This study aims to understand the effects of GABA on the aldosterone production in intact zona glomerulosa cells in fetal bovine adrenal glands. An Enzyme-Linked Immunosorbent Assay (ELISA) test was used to assess the effects of GABA on aldosterone production. GABA was given to an experimental group in varying concentrations of: 1.4 micromoles/ml, 2.8 micromoles/ml, and 5.6 micromoles/ml. It was observed that the aldosterone production increased at each concentration: 1.4 micromoles/ml increased by 7.85752% (with p=0.00014), 2.8 micromoles/ml increased by 4.81063% (with p=0.00012), and 5.6 micromoles/ml increased by 3.82624% (with p=0.00364). The data indicate that a dose dependent curve relationship exists as the GABA concentration increased and the aldosterone production increased.

**Lucas Alexander, University Scholar**

Dr. Sara E. Alexander, mentor

*The Cost of Conflict: Policy Proposals to End Ethnic Violence in South Sudan*

In July of 2011 South Sudan became an independent country. Since then, militias associated with several of the country's ethnicities have killed thousands of people. Though the conflict has deep roots and is multifactorial, studies by Paul Collier suggest that a driving force behind any civil war is a low opportunity cost: when there is little to lose, violence becomes more frequent. Using this theoretical framework, and taking into account the history of the country and case studies from other developing countries, this thesis explores policies that the new government might implement to promote peace by increasing the cost of war. These policies are aimed at strengthening local institutional capacity, providing economic opportunities to broad segments of the population, and reforming the current government.

**Stephanie Michelle Allen, Biology, Medical Humanities**

Dr. Lisa Baker, mentor

*The Effect of Education, Contraception and Reproductive Health Knowledge on Unplanned Pregnancy and Child Death in Rural Western Kenya*

East Africa carries the highest burden of unplanned pregnancy worldwide. Many studies have stressed the importance of family planning programs in preventing unplanned pregnancy and maternal and child morbidity and mortality.

However, even when family planning services are available, a decrease in birth rate and poor birth outcomes, including child death, does not necessarily follow. In the context of the highest HIV rates in East Africa, this failure is particularly alarming. Child death in the Nyanza province of Kenya is the highest nationally, and HIV rates among the Luo tribe of that area are also the highest in the country. This cross-sectional study analyzes 2011 survey data from a sample of 112 Luo women from a culturally traditional, rural part of the Nyanza Province in western Kenya. Women had an average of 4.51 children, and over one-third had had at least one child die. Despite available family planning resources, only 54.63% of women had ever used birth control, while 26.92% of women were currently using birth control. The results of the study indicate that the subset of women who use scientific birth control are statistically significantly younger, more educated, and more knowledgeable about family planning, yet the use of birth control has not been effective in decreasing their number of births or infant deaths. On the other hand, there appears to be another group of women (less educated, older, less knowledgeable) for whom the very notion of planning births or birth intervals seems foreign. More than half of the overall sample said that they knew no women who had more babies than they wanted. These results show that a single approach to educating and providing family planning methods without acknowledging vast cultural barriers will not be successful. However, knowledge alone is not enough, and structural barriers must also be addressed for successful family planning.

**Blessing Amune, Biology**

Dr. Rodney Bowden, mentor

*Analysis of Irritable Bowel Syndrome and Fish Oil Supplements as a Potential Treatment*

Irritable Bowel Syndrome (IBS) is a gastrointestinal disorder of growing interest, both in the United States and globally. In this thesis, I discuss and analyze various aspects of IBS, including the symptomology, potential causes and risk factors, the diagnosing process, and clinical manifestations. Further discussion includes current treatment and management plans for IBS. Fish oil supplements are also another area of growing interest in the medical field, and discussions about relevant findings regarding fish oil that indicate that it may be beneficial to patients suffering from IBS will be included. Finally, recommendations include a study to test whether fish oil supplements could serve as a potential treatment for IBS.

**Will Barnes, Astrophysics**

Dr. Lorin Matthews, mentor

*Astrophysical Applications of Dusty Plasma Physics*

In an astrophysical context, a gas can be ionized and become a plasma, a sea of ions and electrons. The introduction of dust into the ionized gas forms a dusty plasma, a colloidal mixture of micron- to submicron-sized grains and charged particles. This thesis examines the role of dusty plasmas in two separate astrophysical environments: circumplanetary rings, specifically Saturn's F Ring, and protoplanetary disks. Numerical calculations of the orbits of grains in the F Ring are carried out in an effort to better understand the plasma parameters of this poorly understood system. Perturbing forces on a single grain are calculated and numerical integrations are performed to find the orbital position in time. Within protoplanetary disks, fractal dust grains collide and stick, forming small-scale structures believed to be the seeds of planet formation. A numerical model is used to study the impact of charging on these fractal aggregates and how said charging impacts aggregate morphology.

**Evan Bauer, University Scholar**

Dr. Kenichi Hatakeyama, mentor

*Simulation Studies of the Time Digitizer for the CMS Hadron Calorimeter Upgrade*

The Compact Muon Solenoid (CMS) detector will be upgraded in the coming years in order to cope with increasing energies and luminosities to be provided by the Large Hadron Collider (LHC). As part of this upgrade, new electronics will be installed for readout of the CMS Hadron Calorimeter, including a time digitizer component known as the Time-to-Digital Converter (TDC) that provides high-resolution time information. This thesis investigates simulations of the upgraded CMS detector in order to gain a better understanding of the TDC functionality in the upgraded CMS configuration. These simulations enable calibration of TDC-based timing information, and they reveal that the timing resolution gained through this calibration makes it possible to reject key backgrounds. The advantages of this background rejection provide strong motivation for the proposed upgrades to the CMS detector.

**Katie L. Benjamin, Neuroscience**

Dr. Darrin J. Bellert, mentor

*A Computational Examination of the Transition Metal Cation Assisted Decomposition of Acetic Acid*

As the world's reserve of fossil fuels continues to deplete, the need to investigate alternative means of fuel production continues to rise in global relevance. Whether alternative fuel production arises from an established means or from a new technology, it is necessary to explore all plausible options. Ideally, one would take an industrial waste product or environmental contaminant and convert it into a green fuel source. Doing so generates a usable fuel source while minimizing waste and contamination. One potential means of such fuel production is through the transition metal assisted decay of an organic molecule. Although numerous organic compounds produce gaseous fuels after decomposition, acetic acid has been identified as a prominent byproduct of industrial processes with the potential to yield a green fuel source. This thesis examines the Ni<sup>+</sup> cation assisted decomposition of acetic acid into methanol and carbon monoxide.

**Nathaniel Philip Ira Berry, University Scholar**

Dr. David Clinton, mentor

*Moral Equality in Michael Walzer's Just and Unjust Wars*

In his book *Just and Unjust Wars*, Michael Walzer distinguishes between the just causes for going to war -*ius ad bellum*- and the just conduct of war itself -*ius in bello*. In order to articulate the system of permissions and prohibitions governing of *ius in bello*, Walzer relies on the concept of the moral equality of soldiers. Regardless of the justice of the cause for which they fight, soldiers on both sides of a conflict are responsible for the conduct of war. They are not responsible for its causes. In my thesis, I question this separation of responsibility, saying that soldiers do indeed bear some level of moral responsibility for *ad bellum* considerations. In the first chapter, I propose a modification of Walzer's delineation. In the second, I discuss my foundation for this proposal and some of its practical effects. In the third, I consider some of its moral and legal ramifications. Overall, I attempt to modify Walzer's system while respecting its general structure.

**Michael Bonow, University Scholar**

Dr. Troy D. Abell, mentor

*The Effect of Family Functioning on Birth Weight: A Prospective Cohort Study*

Bringing an infant into the world is a complex biopsychosocial undertaking for the expecting mother. A variety of factors influence how the infant grows while in the womb. This NIH-funded prospective cohort study followed 1,206 mother-infant pairs from their first prenatal care visit to delivery. We looked at the impact of one particular psychosocial factor, family functioning, on infant birthweight. We hypothesized that family dysfunction would lead to infants that weighed less at delivery. After building a basic linear regression model that included the major known determinants of infant birthweight (gestational age of the infant, sex of the infant, parity, maternal height, maternal weight, ethnicity, smoking status, and weight gain during pregnancy), we incorporated the family functioning variable. The result of this study was that family functioning was not associated with infant birthweight (Adjusted  $r^2$  difference between basic model and model with family functioning variable = -0.0071, p-value: 0.6870).

**Kaitlin C. Burt, Business Fellows, Economics, Marketing**

Dr. Greg Leman, mentor

*Launchpad Asia, Road Building Business Plan*

China's twelfth five-year plan calls for 2.15 million kilometers of rural roads to be built and repaired through 2015, creating an unprecedented demand for a long-lasting and cost-effective construction solution. Currently, there is no surface material that can provide such a solution. Launchpad Asia, an American based distribution company, is the sole proprietor of two soil modifiers, which differentiate themselves from past base stabilizers through innovative technologies. These products can build durable and environmentally safe roads efficiently and cost-effectively. This business plan outlines the specific marketing, organizational and financial and strategy for Launchpad Asia to affectively penetrate the rural road building market and capitalize on the 85 billion RMB market opportunity.

**Rachel Butcher, University Scholar**

Dr. David L. Jeffrey, mentor

*The Monk, the Monarch, and the Court Painter: On the Production, Uses, and Artistic Significance of the Green Collection's Speculum humanae salvationis*

The purpose of this thesis is to introduce the reader to the Green Collection's copy of the *Speculum humanae salvationis* (Shelfmark MS.GC.000321), a previously unstudied illuminated manuscript which I have had access to through the Green Scholars Initiative. Produced for a Cistercian community in fourteenth century Austria, the Green *Speculum* is one of many extant editions of a medieval typological work called the *Speculum humanae salvationis* ["The Mirror of Human Salvation"]. The book presents an illustrated summary of the Christian story, showing the reader how the salvific events of the New Testament are prefigured in those of the Old. My thesis work deals—among other things—with the manuscript's origins in the Tyrolean court, its place in the tradition of *Speculum humanae salvationis* production, the significance of its illuminations, and its theological resonance in the Cistercian context.

**Susan Calhoun, German, International Studies**

Dr. Jennifer Good, mentor

*Representation and the Game in the Film Lola Rennt*

The purpose of this research is to examine the use of game studies, the symbolic use of color and time, female representation, and postmodernism in the film *Lola Rennt*. *Lola Rennt* is a German film that was released in 1998, directed by Tom Tykwer and starring Franka Potente. Game studies is used to study the structure of the film: the narrative is separated into three sequences of the same mission that have differing outcomes. Color is an indicator of whether something is good or bad; most notably, the color red is present whenever a part of Lola's mission fails. Time in the film is Lola's opponent, as her mission has a time limit. Tykwer examines the reversal of stereotypes, particularly concerning the different masculine and feminine aspects of Lola's character. Finally, postmodernism is used to examine the film with respect to Germany's history. By applying postmodernism, it is possible to examine how the film applies to German reunification. *Lola Rennt* is a philosophically and visually stunning film, and the intention of the study is to explore these aspects in order to better understand the film

**Anna Casey, University Scholar**

Dr. David Nichols, mentor

*An Institutional Approach to Presidential Rhetoric*

In the United States, the relationship between presidential rhetoric and political institutions is complex. In one sense, presidential rhetoric is shaped and informed by the political structure outlined by the Constitution and embodied by the U.S. government. At the same time, presidential rhetoric itself shapes how our political institutions act and interact. When the president acts as the lone voice for the country, our politics operate in a particular way. In this thesis, I consider how the institution of the presidency itself both empowers and moderates presidential rhetoric. I use President Reagan as a case study to explore how the institution impacts rhetoric in a particular situation. For instance, looking at his memorable *Challenger* address, I liken Reagan to a pastor, a parallel that reveals the president's unique rhetorical position. In conclusion, I contend that my institutional approach has particular advantages to other frameworks for evaluating presidential rhetoric.

**Fai Ho (Evan) Choi, Psychology**

Dr. Matthew Stanford, mentor

*The Faithful and the Distressed: How Likely are Christians to Seek Psychotherapy Treatment for Psychological Distress?*

Current evidence suggests that there are differences across groups and cultures in how they attribute psychological disorders to different causes as well as their willingness to attend psychotherapy sessions. In this study, differences in explanation (biological, psychosocial, spiritual) of five types of psychological disorders (depression, bipolar disorder, schizophrenia, anxiety disorders, ADHD) and types of counseling/therapy (pastoral care, Christian therapy, secular therapy) people are willing to seek were examined between four groups: 1) Hong Kong people and Americans, 2) Christians and non-Christians, 3) Hong Kong Christians and Hong Kong non-Christians and 4) Hong Kong Christians and American Christians. A brief online survey was used to collect the data. Results were mixed as to how people of different groups attributed various types of disorders to various types of causes but generally, Christians more than non-Christians attributed the disorders to spiritual causes and they were also more willing to seek pastoral care and Christian therapy. Hong Kong people also reported being more willing to seek therapy (across types) than Americans.

**Andrew T. Cody, Chemistry**

Dr. Kevin Pinney, mentor

*Design and Synthesis of Functionalized Thiosemicarbazone Analogues as Potential Anti-metastatic Agents*

Metastasis is often the ultimate cause of death among cancer patients. An emerging target in the treatment of metastasis is cathepsin L which facilitates the degradation of the extracellular matrix thereby providing a pathway for the movement of cancer cells to secondary locations in the body from the primary tumor. A variety of potent small-molecule cathepsin L inhibitors bearing the thiosemicarbazone moiety have been discovered through the collaboration of the Pinney Research Group and Trawick Research Group at Baylor University. A compound known as KGP94 is among the more potent inhibitors discovered and has been re-synthesized for further studies. The majority of inhibitors of cathepsin L are asymmetrical and prone to isomerization about the imine bond of the thiosemicarbazone functional group. Since isomerization may interfere with the effectiveness of these compounds to inhibit cathepsin L, a series of symmetrical thiosemicarbazone analogues were prepared and evaluated as inhibitors of cathepsin L.

**Sarah Cook, University Scholar**

Dr. Julie deGraffenried, mentor

*Britain and Russia: A Historical Comparison of Two Great Empires*

This work examines key elements of the British and Russian empires in order to present a new perspective on how much these two powers hold in common. Though radically different on the surface, Britain and Russia possess similar national characters and historical experiences. This work is not an attempt at a comprehensive record of the British and Russian empires and their similarities. Rather, it focuses on specific ideas – the two nations’ beginnings, their imperial ideologies, the Great Game in Central Asia, both nations’ modern identity crises – in order to prove greater similitude between Britain and Russia than has previously been discussed as part of the historical narrative. A variety of primary sources are used, though secondary sources make up a great deal of the evidence presented. This thesis is not chiefly a reinterpretation of sources, but a reconceptualization of the information and interpretations already part of the historical narrative.

**Hannah J. Corning, University Scholar**

Dr. Elizabeth Corey, mentor

*Same-Sex Marriage: A Constitutional and Social Debate*

The debate about same-sex marriage is fraught with emotion, often making fruitful discussion of the issue virtually impossible. In this project, I distill the important points of contention both for and against same-sex marriage as well as the legal issues involved. There are important points to consider in the debate and in the effort to secure equality and protections for all Americans, and, on the other hand, to preserve certain moral norms. I hope to familiarize readers with the legal and social issues that surround this debate in order that they will understand better what has made this such a divisive issue and be able to evaluate where the debate stands given the predominant arguments.

**Brianna Cortez, Chemistry**

Dr. Erica Bruce, mentor

*The Effects of Polycyclic Aromatic Hydrocarbons on Human A549 Cells*

Asthma is a chronic respiratory disease affecting people of all ages and most studied in children and the elderly. This disease causes swelling of the lung's airways leading to wheezing, shortness of breath, chest tightness, and coughing. Many different factors can trigger an asthma attack including, but not limited to, tobacco smoke, mold, weather changes and outdoor air pollution. Polycyclic aromatic hydrocarbons (PAHs) comprise a large portion of air pollution. They are a class of chemicals formed during incomplete combustion reactions, and found in the ambient environment. In this experiment human A549 lung cells were exposed to 5 PAHs, Benzo[a]pyrene, Pyrene, Fluoranthene, Acenaphthylene, and Phenanthrene, and evaluated for viability, proliferation, and inflammatory response. Results indicate that PAHs have a detrimental effect on cell growth and viability. Overall viability results indicated cells were more damaged throughout the treatments and for certain dosing regimens the proliferation was inhibited.

**Rob Covington, History**

Dr. Elizabeth Corey, mentor

*Chick-fil-Hey: An In-depth Look Into John Stuart Mill's Harm Principle and Its Application in Modern American Society*

Americans claim to deeply cherish the rights of Freedom of Speech and Expression. We have firmly cemented these rights into our legal code through numerous Supreme Court cases. The only legal limit on speech, in the United States, is when that speech clearly violates the safety of another human being, which is a very permissive limit. American society however is a different story. While most Americans claim to be open minded and willing to discuss ideas they find offensive, the facts simply do not support that notion. The negative reaction of a major section of the United States population to statements made by Dan Cathy, CEO of Chick-fil-a, where he spoke against same-sex marriage, highlight how American society is not very inclusive to conflicting or offensive opinions. This conflict between what is legally allowable versus what is socially acceptable is what this thesis is seeking to investigate. In the end, Mill's Harm Principle, which the American Legal System has so carefully adopted, should be adopted by American Society as well; if we as Americans hope to have a thriving and intellectual society.

**Ed Culham, Philosophy**

Dr. James Marcum, mentor

*Thomas Kuhn and Abiotic Oil*

Fossil fuel theory and abiotic oil theory (also known as the abiogenic theory or the R-U theory) are the two dominant theories of how oil is created in the Western world and the Eastern world, respectively. For decades, scientists in the United States have held that oil is created by decaying life forms that died millions of years ago. A theory that has historically been dismissed in the United States, the theory of abiotic oil (that oil is created without biotic particles) has gained new prominence among some scientists when a group of scientists conducted an experiment in 2004 that theoretically proved the abiotic theory correct. Despite this, and other evidence explained by these same scientists that seems to conclusively prove that the fossil fuel theory is false, not only does fossil fuel theory cling to life, it thrives. Why? Because science is not the ever changing, eager to self-correct, and unbiased force that its supporters like to claim it is. Thomas Kuhn, in his book *Structure of Scientific Revolutions* explained that contrary to much popular belief, science is a social construct that takes apparent facts and explains them in a way the majority of scientists accept, then vigorously resists change. Science will even resist this change when it is clear beyond a reasonable doubt that current thought is flawed. This happened when Copernicus said the earth was not the center of the universe, and it is happening again with new evidence showing that oil is not the product of decaying plants and dinosaurs. In this paper we will examine both fossil fuel theory, abiotic theory, the evidence of any anomalies (as Thomas Kuhn would say), and how this new discovery could have very strong potential consequences.

**Megan Danner, Secondary Education, English/Language Arts/Reading**

Dr. J. Wesley Null, mentor

*Technology, Education, and Literacy: An investigation into the Cyborgial Nature of Education in the 21<sup>st</sup> Century*

In modern, American high schools technology has changed the way we view education and the teaching of literature. In this thesis, I do not seek to rule completely in favor of or against technology in education. Rather, I wish to simply explore the consequences of a technologically rich classroom on the teaching of literature. New media such as Facebook, YouTube, and other social and creative outlets are explored and analyzed for effects on the teaching of literature, specifically in high school education. Also, I explore the shifting idea of the Digital Divide in the modern classroom and investigate the new and developing causes of this separation between man and machine. In today's classroom, teachers must work in a state of absolute coalition with technology. However, has the teaching of literature shifted for good or for ill?

**Merritt Denman, University Scholar**

Dr. Maura Jortner, mentor

*A Storied Present*

This project sets out to explore the form and function of storytelling as it applies to the sociological, emotional, and spiritual aspects of human life. The first portion of the project is a preface to the project itself while the bulk of the project is a play. The preface explores the works that inspired the play, namely Jane Austen's *Emma* and Sarah Ruhl's *Passion Play* along with others, and the ways in which they engage the subject of story. The play itself follows a young woman whose tendency to confuse the conventions of story and plot with reality causes her to come in conflict with some of the decisions that she must make.

**Pamela Dobberstein, University Scholar**

Dr. Vincent Yang, mentor

*Dissident Political Parties in China*

Although China is a one-party state, dissident thinkers have a long history in China and have even been encouraged by the Chinese Communist Party at specific times during the last century. In recent times, many of these thinkers have coalesced into dissident political parties, some based on democratic principles and some based on Sun Yat-sen's principles. Several of these parties are highly critical of the Chinese Communist Party. This thesis translates documents recently published by some of these political parties, and provides an introduction to recent dissident thinkers in China.

**Teal Dodrill, English**

Dr. Greg Garrett, mentor

*The Mason Jar*

My idea of original research for this thesis project was to search inside of myself to create a work of art that is my very own: a culmination of some of the most important lessons I have learned in my life up until now, especially during my time as an undergraduate at Baylor. The connecting strand between all of the stories is the very idea of human connectedness itself—something that I have come to understand as both difficult to achieve but absolutely necessary in order to live a fulfilling life. The stories navigate their way through the different ways in which people achieve this. The first story—a coming of age piece—focuses on connecting with one's self, showing that we cannot understand others until we learn to understand ourselves. The next couple of stories explore the ways in which people can be the most encouraging and the most hurtful to the ones they love the most. The final stories look at the ways in which people connect to strangers, and most difficult—enemies. Concentrating on simple, realistic situations and the emotions that constantly turn and shift underneath the surface, my goal in writing these pieces was to explore the commonalities between human beings and the underlying universal desire within each person to feel loved and validated. *The Mason Jar* works to authentically portray suffering and the difficulties people face in attempting to connect with one another, as well as uphold the hope of reconciliation—which often appears in ways that one does not expect.

**Blake Dowdy, Psychology**

Dr. Christine Limbers, mentor

*Adverse Life Events on Disordered Eating Behavior, Negative Self-Regard, and Body Image Disturbance*

Individuals with eating disorders typically report greater levels of body dissatisfaction, lower self-esteem, and increased body image disturbance. Several studies confirmed the association between eating disorders and negative self-evaluations of worth, highlighting the importance of low self-regard in the development of potentially detrimental eating patterns. Decreased self-esteem, particularly in adolescent groups, is related to the endorsement of stereotypical beliefs concerning thinness and dissatisfaction with appearance and weight. Body dissatisfaction, for a number of recent researchers, is most often associated with body mass and abnormal eating behaviors. This poor self-image, coupled with an increase in dieting behaviors and specific eating disorder symptoms, particularly anorexic and bulimic patterns, is common among adolescents rivaling stressful life events. For some, the transition from high school to college induces significant anxiety, disrupting established perceptions and evaluations. Many individuals redirect a universal need for control away from these psychologically stressful situations to areas he or she can perceive effectiveness, namely eating behaviors and an adjusted body image. The current study aims to observe a correlation among adverse life events, a distorted self-image, disturbed body-esteem, and abnormal eating behaviors in a sample of college students.

**Catherine Allaire Downs, Entrepreneurship; Management**

Dr. Mary Simpson, mentor

*Influence of fashion industry and media on individual body perceptions held by female college students as compared to perceptions held by middle-aged females*

Fixation on body shape and attaining societal beauty ideals is no new concept. History shows that body shaping can be dated back to early civilization. Modern American culture heavily emphasizes the female body, and clearly suggests an ideal form. Contrasting the reality of the body size/ shape of the modern American woman, the commonly held female beauty ideal in modern western society emphasizes thinness. This study examines the presence of body dissatisfaction among college females at a private Southern University, as compared to middle-aged females from the same region. Body dissatisfaction was found to decrease with age, and body ideal perceptions tend to become increasingly realistic, attainable, and “healthy” as age increases.

**Ashley Eisele, Health Science Studies**

Dr. Richard Gochis, mentor

*An Overview of Research in Manual Therapy*

Manual therapy techniques are often used to augment the healing process by professionals such as massage therapists, athletic trainers, and physical therapists. The term manual therapy includes a wide variety of techniques such as stretching, massage, joint mobilization, Active Release Technique, Strain-Counterstrain, Myofascial Release, and the Graston Technique. Though a wide variety of manual therapy techniques are extensively used, the evidence based research to support these techniques remains relatively low. This thesis will review the different types of manual therapy, take an in-depth look at the research behind the Graston Technique, and examine the future of research in manual therapy.

**Lukas J. Farbiak, Neuroscience**

Dr. Darryn Willoughby, mentor

*Resistance Exercise Effects on Serum Total and Free Testosterone, Skeletal Muscle Testosterone and Dihydrotestosterone Content, and Skeletal Muscle Androgen Receptor mRNA Expression and Protein Content*

Testosterone is the primary male sex steroid hormone. Testosterone exerts its effects on a specific nuclear androgen receptor. Upon binding testosterone, the androgen receptor translocates to the nucleus of the cell. Once in the nucleus of the cell, the active androgen receptor complex binds to the androgen response element on DNA resulting in an up-regulation of gene expression. Androgen receptors are found in skeletal muscle which is responsive to testosterone. The activation of testosterone – androgen receptor – DNA binding results in the promotion of protein synthesis (anabolism) and a decrease in the breakdown of muscle tissue (catabolism). Both androgen receptor expression and testosterone levels affect muscle protein balance. Testosterone levels can also alter the expression of insulin-like growth factor and myostatin, both of which also are integral regulators of muscle protein balance. It is known that high intensity resistance exercise increases endogenous serum testosterone levels. Therefore, the purpose of this study is to examine the ability of this elevation in serum testosterone to increase skeletal muscle testosterone, 5 $\alpha$ -dihydrotestosterone (DHT), androgen-androgen receptor-DNA binding, androgen receptor mRNA and protein content. In a randomized cross-over design, venous blood was obtained in male participants immediately before, after, and 30min, 1 hr, 2 hr, 3 hr, and 24 hr after a single bout of exercise. Muscle samples were also obtained immediately before, after, and 3 hr, 24 hr after exercise. Exercise bouts consisted of both a lower body resistance exercise program (knee extensions) followed by rest for one week, and also an upper body/lower body resistance exercise program (bench press, seated rows, shoulder press, knee extensions). From each blood sample, the levels of serum and total testosterone were determined. From each muscle sample, the concentration of testosterone, and dihydrotestosterone (DHT) was determined, along with the mRNA expression and protein content of the androgen receptor. Statistical analysis was performed by utilizing separate 2 x 4 (Session x Test) factorial analyses of variance (ANOVA) with repeated measures. Further analyses of the main effects were performed by separate one-way ANOVAs. Significant between-group differences were then determined involving the Tukey's Post Hoc Test.

**Brianna N. Firminger, Biology**

Dr. Elizabeth Corey, mentor

*NFIB v. Sebelius: An Analysis of the Individual Mandate in the Affordable Care Act*

In June 2012 the Supreme Court ruled on the constitutionality of the Patient Protection and Affordable Care Act (ACA). This landmark case has set a new precedent that will have long-lasting effects on the relationship between the populace, Congress, and the Judicial Branch. In order to understand the details and implications of the decision, it is necessary first to review the case law, scholarly debate, and the arguments submitted to the Court. Only then is it possible to grasp Chief Justice Roberts' reasoning in the Majority Opinion. This thesis presents the necessary background information and attempts to clarify some of the complexities of the case so that readers may make their own informed judgments about the wisdom of the decision.

**Crina Floruta, Business Fellows, Biology**

Dr. Joaquin Lugo, mentor

*A Correlation Between Autism and Epilepsy: A Study of Social Behavior in PTEN Knockout Mice*

There is increasing evidence of a strong comorbidity between autism and epilepsy. One pathway that may be a significant mediator of the two conditions is the mammalian target of rapamycin (mTOR) pathway. The mTOR pathway is a key component of mRNA translation, cell growth control, and cell proliferation. Hyperactivation of the mTOR pathway has been reported in several animal models of epilepsy and in some mouse models of autism. One of the core diagnostic criteria for autism is aberrant social behavior. The focus of this project was to observe the effect of deletion of the PTEN gene on social behavior in mice. PTEN serves as a regulatory inhibitor of the mTOR pathway, so its deletion results in hyperactive mTOR pathway. The social partition and social chamber tests were used to measure social behavior in PTEN knockout and wildtype. The outcome of both tests illustrated that the PTEN knockout mice had a significant decrease in social behavior. These results indicate that an overactive mTOR pathway may indeed result in an autistic phenotype, and comorbidity between epilepsy and autism should further be considered.

**Gregg Fox, Biology**

Dr. Tamarah Adair, mentor

*Investigating inhibitory synergy between blue light irradiation and antibiotic treatment of Staphylococcus aureus*

*Staphylococcus aureus* is a Gram-positive pathogen responsible for significant infections in both the hospital and the community. Rising antibiotic resistance has led to increased infection rates, while *S. aureus*' ability to form protective biofilms on medical implants continues to contribute to life-threatening instances of recurrent bacteremia. In an effort to better combat these enhanced defenses, recent research has focused particularly on biofilm disruptors and other alternative treatment methods such as antimicrobial photodynamic therapy (aPDT), all of which have demonstrated synergistic inhibitory effects when combined with antibiotic therapy. This experiment was conducted to search for similar synergistic effects when irradiation with visible blue light, another emerging technique, is coupled with standard antibiotic treatments of oxacillin, neomycin, and ciprofloxacin. During testing, bacterial samples in 24-well plates were exposed to uniform 470nm blue light via an adjustable lightbox. The effects of combined therapy were ascertained through a modified broth microdilution assay with CFUs/mL measured periodically. Data from these tests reveal that the inhibitory effect of blue light alone is relatively dose-independent in the short term, with dosages as low as 5 minutes showing significant inhibition four hours after the beginning of treatment. Combined therapy is even more promising, evincing rapid inhibition which then remains low through 24 hours, thereby compounding the benefits of blue light irradiation and antibiotic treatment in the short and long term. Taken together, these results suggest that synergy between 470nm light irradiation and antibiotic treatment is highly likely.

**Amy Freeman, University Scholar**

Dr. David L. Jeffrey, mentor

*The Ordinary Works of Daily Life in Medieval Spirituality*

This thesis is a study of ordinary work in medieval spirituality and is focused on several texts selected for their continuity of themes: *The Rule of St. Benedict* (6<sup>th</sup> century), the Middle English pastoral treatise *Our Daily Work*, and the Middle English writings of Walter Hilton, namely *The Scale of Perfection* and *Epistle on the Mixed Life*. In this thesis, I use the term "ordinary work" to refer to manual labor and deeds of mercy. In all these texts, ordinary work is good not just for the sake of the things it produces. Nor is it just something one does, but is closely related to the purpose of one's life. First, ordinary work can be offered to God in loving service. The Hebrew concept of *avodah*, a term for both work and worship, can be seen in the use of the Latin term *opus* or the Middle English term *werke*. Second, ordinary work is good for man, serving as a remedy for *acedia* and helping to cultivate virtue. Finally, for these authors, manual labor and deeds of mercy are an integrated part of a life of prayer. Prayer overflows into all ordinary work of daily life.

**Joy Freemyer, University Scholar**

Dr. David L. Jeffrey, mentor

*Encountering the Suffering Servant: A Study of Affective, Imaginative Treatments of Isaiah 53*

Historically, Christians have interpreted Isaiah 53 as a Christological prophecy and, consequently, have drawn from this passage to develop accounts of Christ's suffering. In this thesis, I argue that affective, imaginative treatments of Isaiah 53 offer unique, necessary insight into the passage and allow Christians to respond correctly to Christ's suffering. In order to demonstrate this, I analyze treatments of the passage from different historical periods. I first analyze early Christian treatments of the text, demonstrating that early Christians viewed Isaiah 53 as an important Christological prophecy. Next I turn to medieval treatments of the passage, demonstrating that Franciscan meditations on the passage offer necessary insight into Christ's suffering that contemporary, analytical treatments fail to offer. I then turn to the poetry of John Donne and George Herbert, arguing that these two writer's poetic treatments of Isaiah 53 guide readers to correct emotional responses to Christ's suffering. Finally, I turn to Georges Rouault's treatment of Isaiah 53 in his series of etchings, *Miserere*. I argue that Rouault's artistic treatment of the passage helps viewers to understand the relationship between Christ's suffering and human suffering.

**Kayla L. Fricke, Biology**

Dr. Tamarah Adair, mentor

*The Effects of Blue Light on the Biofilm Formation and Disruption of Staphylococcus aureus*

The formation of biofilm complicates the treatment of *Staphylococcus aureus* infections. This experiment measured the effect of 470 nm blue light, a possible antimicrobial agent, on biofilm formation using a biofilm assay. Blue light irradiation for 2 hours on dilute cultures inhibited biofilm formation, and irradiation on saturated cultures after 48 hours of growth resulted in strain-specific changes in the amount of biofilm. There was a positive correlation between cell count and biofilm formation and no correlation between cell count and biofilm disruption. Strain specific variation is observed for the formation of biofilm per cell on blue light treated cultures. It is hypothesized that molecular and genetic variability among strains led to these results. Blue light has the potential to serve as a preventative for infections in a clinical setting, but further investigation is needed to make progress in treating disease.

**Caitlin Giddens, Journalism**

Dr. Greg Garrett, mentor

*The Freshman*

This series of short stories explores the relevant issues plaguing young adults. Each of the characters overcome obstacles during their freshman year of college, and then form a bond by the conclusion of the final story. I hope these stories redefine the young adult genre and show the strength of my generation.

**Grace Goble, Language and Linguistics**

Dr. Lydia Grebenyova, mentor

*The Acquisition of the /-s/ Morpheme in English*

In this study, we investigated children's understanding and production of the English complex possessive phrases. Children are able to learn language without any instruction other than what they hear from the adults around them. This input, however, is not labeled or organized in any way. Due to the homophony between the possessive and plural constructions in English, there must be some way in which children organize and learn these rules. During the study, we presented children ages 3-5 with different options on how to form complex possessive structures. Surprisingly, their preferred construction is also one that Universal Grammar predicts never will occur. By looking at how they chose to form them and how adults form the construction, we hoped to shed more light on not only the children's understanding of the structure, but the adults' as well.

**Taylor Goldammer, Biochemistry**

Dr. Erica Bruce, mentor

*The Effect of Penetratin and Silica Capping Agents on Silver Nanoparticle Cellular Uptake in a Caco-2 cell line*

Understanding the biochemical pathway of nanoparticle uptake in human cells has important implications for nanomedicine and health risk assessments. The mechanism of NP uptake in cells remains largely unknown, and studying the pathway of NPs may lead to improvements in nanotechnology and a better understanding of the risks involved with occupational exposure. The hypothesis was that silver nanoparticle uptake is dependent upon its capping agent. The goal was to evaluate the uptake kinetics of two different capping agents on AgNPs and the extent of NP uptake in a Caco-2 cell line. This was done by measuring and comparing the NP mass in the free media, adsorbed to the cell surface, and taken up into the cells. The Caco-2 cells were exposed to AgNPs for 24 hours, the NPs with penetratin and silica capping agents had an 11.54 and 0.97 mean percent of cellular uptake, respectively. AgNPs with a penetratin capping agent had a significantly greater amount of cellular uptake than AgNPs with a silica capping agent, which can be explained by the charge and hydrophobicity of the capping agent. This study is significant because this data helps to understand the kinetics and extent of AgNP uptake in human colorectal adenocarcinoma cells. If we are able to learn the pathway of NPs in cells, then this information can be applied to develop new cancer treatments involving nanotechnology and assess the human health risk of environmental exposures to NPs from sources such as soil and air pollution.

**Morgan Goodwin, Mechanical Engineering**

Dr. David A. Jack, mentor

*Modeling and Predicting the Behavior of Viscoelastic Materials*

Polymers are ideal materials for structural applications because of their low weight to high strength ratio. However, polymers are both time and temperature dependent. This causes the mathematical modeling and prediction of polymers to be difficult yet necessary, especially as the structural use of polymers increases. This study focuses on the derivation of the differential equations that model polymers during different loading scenarios and discusses how the differentials affect the polymeric behavior. This study also predicts the behavior of a polymer in the future by using the Time Temperature Superposition Principle (TTSP). Using the Dynamic Mechanical Analysis (DMA) the storage models for different polymers were gathered for varying temperatures and frequencies. Then using the Williams-Landel-Ferry (WLF) equation to shift the datasets a master curve for each polymer is created using MATLAB. This master curve shows how the storage modulus of the polymer behaves over very long periods of time.

**Joseph D. Guillory, Biology**

Dr. Mary Lynn Trawick, mentor

*Biochemical Evaluation of Thiosemicarbazone Inhibitors of Cruzain*

Chagas' disease is caused by a flagellate protozoan known as *Trypanosoma cruzi*. As determined by the World Health Organization, effective therapeutic medications do not exist for Chagas' disease. In addition, these medications tend to be highly toxic. Recent research has shown successful inhibition of cathepsin L with synthetic compounds. Cruzain, the recombinant form of cruzipain, is the validated model of cysteine protease involved in cell invasion, immune evasion, and metabolism of the *T. cruzi* parasite. It has been confirmed that the cruzain protease is very similar to cathepsin L of the papain protein family. Therefore, it is possible that inhibitors for the *T. cruzi* parasite may be found from among the same library of synthetic inhibitor compounds that inhibit cathepsin L. These compounds of interest are thiosemicarbazones and one semicarbazone, two functional groups that are expected to interact with the cysteine-25 residue in the active site of the cysteine protease cruzain from *T. cruzi*. In this study, a microplate reader was used to perform fluorometric assays to target this enzyme. The release of 7-amino-4-methylcoumarin from a fluorogenic substrate was monitored in a 96-well plate format to determine the concentration of compound that would inhibit the enzyme reaction 50% (IC50 value). Advanced kinetic studies were also carried out in order to understand the binding between cruzain, the protease, and Z-Phe-Arg-AMC, the substrate

**Allison E. Hainline, Statistics**

Dr. Jeanne S. Hill, mentor

*Frequentist and Bayesian Modeling in the Presence of Unmeasured Confounders*

Biostatistical studies of medical data are extremely important in distinguishing relationships between drugs or treatments and the patient's medical response. These studies generally use data from large health care databases, which provide immense amounts of information while allowing the researcher to analyze long-term effects that may not be shown in a typical randomized controlled trial. However, when using large databases, one must be particularly aware of the effect of unmeasured confounding on statistical models. Confounding arises when factors unrelated to the particular study have a hidden effect on observed health outcomes. Bayesian statistics provides a mechanism for model fitting which synthesizes the data with prior information about bias, allowing the researcher to control confounding through the inclusion of additional variables from independent data sets. In this thesis I will provide a background of the proposed method as well its application to two independent analyses: the prediction of low birth weight babies and the prediction of parental separation anxiety.

**Troy Lee Hales II, Business Fellows, Economics**

Dr. Gary Carini, mentor

*The Long Tail: An Evaluation of the Causal Assumptions in Market Determination*

The “Long Tail,” is a market distribution wherein obscure products sell in large aggregate amounts, allowing them to comparatively well with the few popular products in the same market that sell well individually. This type of market came to the forefront of business research in a 2006 trade book by *Wired* editor-in-chief, Chris Anderson, titled *The Long Tail: Why the Future of Business is Selling Less of More*. Focusing on the example of the book publishing industry in the United States, the paper explores each of Anderson’s three assumptions he claims are the causes necessary to the emergence of the Long Tail in a market—the “democratization of production,” the “democratization of distribution,” and supply filters. I utilize the Counterfactual framework established by Morgan and Winship that draws from Judea Pearl’s Directed Acyclic Graphical model in order to portray Anderson’s assumptions in conjunction with additional considerations absent in Anderson’s framework.

**Katherine E. Horton, University Scholar**

Dr. Lori Baker, mentor

*Human Biological Variation and the Application of Personalized Medicine*

Multidisciplinary advances have progressed the idea that medical therapy may be tailored to the genetics of an individual patient through personalized medicine. The concepts of race, ethnicity, and ancestry have been utilized as ways to describe human biological variation. Race is not a biological classification system but rather a cultural construct that changes through time. The study of DNA sequence, expression of RNA, proteins and their derivatives, and DNA methylation contribute to this growing field. Certain medications are prescribed in a manner tailored to human genetic variation. The anticoagulant warfarin is viewed as a case study of an application of personalized medicine. Further research into the connection between the efficacy of treatments and the ancestry of population groups is needed. This study has addressed the use of race in medical literature and the ability of the concept to provide appropriate personalized care.

**Hannah Hwang, English**

Dr. Luke Ferretter, mentor

*The Artist as “Is:” A Creative and Critical Analysis of the Aesthetics of E.E. Cummings in his Poetry and Painting*

Edward Estlin Cummings, more commonly known simply as E.E. Cummings, dedicated his life to the pursuit of remaining in an active state of creating, and therefore experimented with a plethora of artistic mediums including, but not limited to, poetry, prose, playwriting, choreographing, acting and painting. Although he is primarily known for his poetry, in which his unconventional experimentation with grammar, punctuation and spelling brought him much attention, his passion for painting equally served as an effective method of self-expression for the avant-garde artist. Regarding his obsession with aesthetics, Cummings wrote in a series of his “nonlectures” for the students of his Alma Mater, Harvard University, “so far as I am concerned, poetry and every other art was and is and forever will be strictly and distinctly a question of individuality... (as it happens) poetry is being, not doing.” By analyzing both a poem and a painting from five different periods of his life, I seek to find the instances in which the relationship between Cummings as a human being and Cummings as an artist coalesce. These instances within his art, in which his intellectual pursuits yield visceral sensations for both himself and his readers define who he was: an authentically unique individual dedicated to spreading feeling, truth and beauty. As I also uphold and desire to share these virtues, I will follow each pair of analyses with an original poem and painting inspired by Cummings’ works because, as he believed, to create is to feel, and “to feel something is to be alive.”

**Christina Iversen, Psychology**

Dr. Tyler Smith, mentor

*Juvenile Idiopathic Arthritis: Disease Treatment and Management from a Family Perspective*

Juvenile idiopathic arthritis, JIA, is a chronic disease that impacts many children worldwide. JIA is marked by joint pain and inflammation, and includes several categories of disease depending on the patient's symptoms. As there is no cure for JIA, successful treatment plans are vital to managing symptoms and maintaining a high quality of life. Treatments vary and can include medications and/or more conservative alternative therapies. Although only the patient carries the JIA diagnosis, the patient, other family members, and the family system as a whole are impacted by the disease. Despite the fact that JIA negatively impacts the family physically, psychologically, and emotionally, many resources exist to provide information about the disease and aid in coping.

**Kody Jackson, History**

Dr. Julie deGraffenried, mentor

*Their Daily Bread: Stories of Suffering and Survival in Nazi and Soviet Labor Camps*

While my friends complain about many of their classes, they harp on history the most, saying that they would rather spend hours in the lab than read even a short history article. How did so many people come to view history as so boring and even painful to learn? In this paper, I seek to answer this question and remedy this problem by using personal testimony (in the form of memoir) to examine the daily joys and tribulations of those who suffered through the Nazi and Soviet labor camp systems. Beginning with an analysis of the strengths, flaws, and practicality of memoirs as historical sources, this paper then embarks on a journey through the respective camp systems. In separate chapters on the Nazi and Soviet camps, it explores events like the prisoners' interrogations, back-breaking labor, and death and themes like religious devotion, moral transformation, and the obligation to testify. Next, it discusses Margarete Buber-Neumann, a survivor who lived through both sets of camps, as a bridge between these two atrocities and a way to bring them together into a comparative history. Finally, this paper discusses how survivors remember their experiences and what that means for all of us who wish to understand the Nazi and Soviet camp systems and to infuse history with the power of personal testimony.

**Suzie Jacob, Biology**

Dr. Rizalia Klausmeyer, mentor

*An Examination of Non-Nucleoside Reverse Transcriptase Inhibitors*

The Human Immunodeficiency Virus, or HIV, is the cause of AIDS, an immune syndrome that continues to have profound effects in the United States and around the world. There is currently no cure for AIDS, but there are several classes of medications that inhibit the reproduction of HIV, one of which are non-nucleoside reverse transcriptase inhibitors, or NNRTIs. This class of medications suppresses the enzyme reverse transcriptase, a HIV enzyme which converts viral RNA into human-compatible DNA. NNRTIs have become a cornerstone of the treatment of HIV, and continue to be used in treatment of patients along with a combination of other antiviral drugs. While there are several drawbacks to NNRTIs, they remain highly useful in patient care, and research continues in improving these medications and the lives of AIDS patients around the world.

**Kaila L. Jurado, Accounting**

Dr. Bill Thomas, mentor

*Reducing the Risk of Fraud in Ugandan Churches*

While many organizations are susceptible to fraud, there is evidence that churches are especially vulnerable. Unfortunately, most fraud prevention suggestions are not tailored to churches in developing countries. This paper focuses on fraud in Ugandan churches. My main question is whether any observable features in Ugandan churches are associated with accounting practices that reduce the likelihood of fraud. If not, then explicit foreign instruction may be necessary. To answer my question, I collect an original dataset surveying Ugandan pastors and students. I introduce a new summary measure of internal controls, called the Internal Control Index, based on best practices described in accounting literature. Using this measure, I find that none of the characteristics observed, such as theological views, pastor and accountant experience, or denominational affiliation, are systematically associated with anti-fraud accounting practices. This suggests that direct foreign instruction may be necessary to reduce the risk of fraud in these churches.

**Jaehyun Kim, University Scholar**

Dr. Alden Smith, mentor

*A Healing God Comes to Rome: Aesculapius and the Effects of the Arrival of His Cult*

The importation of Aesculapius, the Greco-Roman god of medicine, into Rome was a monumental event in Roman history. In order to comprehend the implications of the arrival of Aesculapius as well as the importance of his healing cult to the Romans, this thesis, through careful readings and analyses of various ancient literary works, explores the historical background of Aesculapius, the epigraphy of his importation, the effects that his healing cult had on the Roman world, and the downfall of Aesculapius and his cult that was mainly effected by the rise of Christianity in antiquity. For many Romans, the healing god's departure from Epidaurus, his former dwelling, and arrival at Rome signified more than a mere dismissal of the outbreaks of the plague for which they had summoned the deity. The importation – Aesculapius' "willingness" to come to the aid of the Romans – indicated that the gods favored the Romans and that Rome, now the capital of the world, could find the healing it would need to be the international hub.

**Sarah Suhhyun Kim, Biology**

Dr. Beth Lanning, mentor

*Meta-Analysis of Psychotherapy and Alternative Treatments for Combat-Related PTSD*

Post-Traumatic Stress Disorder (PTSD) is a psychological disorder that can affect returning combatants as they try to reintegrate into civilian life. Recent estimates indicate that 25% of veterans returning from Iraq and Afghanistan experience symptoms of PTSD, and more will experience additional mental health issues such as depression, substance abuse, increased family conflicts, and social phobia. In response to the increase in the number of PTSD diagnosis, there has been a focus on finding effective treatment modalities. Currently, several different types of psychotherapy as well as alternative interventions are used to treat the symptoms of PTSD, many of which are evidence-based treatments. Several meta-analyses evaluating overall effectiveness of treatment modalities for PTSD have been published. However, no meta-analysis for combat-related PTSD in VA and non-VA programs has been conducted. The purpose of this study was to address the need for more empirical data in this area. A meta-analysis was conducted to examine efficacy of combat related PTSD interventions in VA and non-VA settings, examining studies published between 2003 and 2012.

**Westin King, University Scholar**

Dr. David Arnold, mentor

*An overview of the Goldbach conjecture*

Goldbach's conjecture, proposed in 1742, is one of the oldest open questions in mathematics. Much work has been done on the problem, and a solution remains elusive. The goal of this paper is to give an introduction to Goldbach's conjecture and discuss the history of the problem, summarize important papers on the subject, examine methodologies used to attack the problem, and explain related problems and consequences of the conjecture.

**Holland T. Korbitz, Biochemistry**

Dr. Charles Garner, mentor

*The Synthesis of New Pyrylium and Pyridinium Salts*

The synthesis, properties, and applications of symmetrical and unsymmetrical pyrylium and pyridinium salts is investigated. Our group has found particular interest in chiral pyrylium salts due to the fact that they are almost unknown in the literature. We have applied the reaction of acyl chlorides with *tert*-butanol to the preparation of new pyrylium tetrafluoroborate salts. Some of these pyrylium salt derivatives form diastereomers when prepared. Moreover, they are favorable to study epimerization at the alpha centers. The ease of epimerization at pyrylium chiral centers has not been studied previously. Our group has also found interest in positively charged pyridinium salts, which provide a route for the possible improvement on the bioavailability of hydrophobic compounds and also an interesting interaction with different substrates. We optimized reaction conditions for reacting substituted pyrylium salts with primary amines to obtain pyridinium salts. Future work will be directed towards obtaining pyridinium salts from primary amines with known biological activity. The objective of this study is to synthesize new pyrylium and pyridinium salts.

**Devyn Lambell, Neuroscience**

Dr. L. Joseph Achor, mentor

*Auditory Brainstem Response: History and Future in Medicine*

The Auditory Brainstem Response (ABR) is a neurophysiological test used to assess the functionality of the central auditory pathway, which includes structures from the auditory nerve to the caudal brainstem. The ABR provides a reading that measures hearing ability based on the electrical output from the different structures along the pathway. The waveforms in the results show the strength of each response and the time it takes for the auditory signal to travel between structures. Deviations in ABR output point to central auditory pathway dysfunction. These deviations can be used to diagnose sensorineural hearing loss due to diseases, lesions, and tumors at various points within this system. The objective of this thesis is to discuss the history of the ABR and the various ways in which this procedure has been used in the medical field. The discussion will cover a variety of medical uses, with a particular focus on the implementation of the ABR in a universal hearing screening for newborns and the benefits it provides by allowing for early detection and intervention for children with hearing loss.

**Gunhee Isaac Lee, University Scholar**

Dr. R. Alden Smith, mentor

*Latin Inscriptions in the San Antonio Museum of Arts*

In my presentation, I plan to examine and categorize Latin inscriptions from San Antonio Museum of Art. First, I will introduce the significance of epigraphy in the academia. Secondly, I will comment on the history and development of scholarship in Latin epigraphy. Thirdly, I will review the classification and categories of epigraphy and the works of previous epigraphers such as Theodor Mommsen and Hermann Dessau. Finally, I will examine my rendition/interpretation of my inscriptions and compare and contrast them with the *Corpus Inscriptionum Latinarum* by Dessau.

**Andrew Leistensnider, University Scholar**

Dr. Pham Hoang Van, mentor

*The Potential Benefit of the United States Exporting Liquefied Natural Gas for Japan: Forecasting Liquefied Natural Gas Price Changes*

This paper estimated the change in price of liquefied natural gas (LNG) in world LNG markets and U.S. domestic markets if the U.S. were to start exporting LNG. We then calculated the estimated effect of such a change in the world price of LNG on the Consumer Price Index of Japan and the U.S. We considered what Japan's demand for LNG would be if it ended its nuclear energy program. This paper uses the price elasticity of world demand and U.S. demand for LNG to estimate future price changes in five year intervals from 2015 until 2035. We found that the world price of LNG would drop 4-8% at current supply conditions and 6-12% at high natural gas well recovery conditions. We found that the U.S. price of LNG would rise around 10% every five years at current supply conditions and around 20% every five years at high natural gas well recovery conditions. Japan would benefit from the U.S. exporting LNG and the U.S. would also benefit.

**Rachel Marks, Biology**

Dr. Stephen J. Trumble, mentor

*Lifetime Profile of Testosterone in a Blue Whale Using its Waxy Earplug*

Matrices such as ice cores and tree rings have been analyzed for chemical profiles that yield telling data on environmental fates, climate change, and contaminants [1, 2]. Much like these layered matrices, earplugs of the baleen whale species (e.g. *Balaenoptera musculus*, blue whales) are shown here to contain lipophilic chemical secretions of hormones, in addition to other anthropogenic chemicals. Whales secrete earwax into their ear canals like all other mammals; however, the earwax remains compacted within the ear meatus for the entirety of the whale's lifespan, resulting in the formation of a layered earplug. The layers of the earplug, called lamina, have been used to age whales, as each layer represents migratory and feeding patterns over time. It was hypothesized that lipophilic chemicals would be secreted along with the lipophilic cerumen matrix over time, yielding an earplug that contains an archive of a whale's life of chemical exposures and secretions. A method was successfully developed to analyze the chemicals within the earplug. This thesis focuses on the feasibility of extracting testosterone from a male blue whale earplug sample.

**Laura McMillion, University Scholar**

Dr. David L. Jeffrey, mentor

*Authority and Inspiration: Bible Translation from St. Jerome to the Present*

Until Jerome translated the Latin Vulgate version of the Bible in the late fourth and early fifth centuries, the Scriptures and translations used by the church were based on the Septuagint. Jerome's preference for the Hebrew for the OT and Greek of the original text set a decided precedent for most Biblical translation after his own time. His desire to return "ad fontes," to the source of the Scriptural text, that is, to its original language, influenced the way in which Christian theologians understood the authority and inspiration of Holy Scripture. Up to and, largely, for the duration of the early Reformation period, as Scripture and its interpretation became increasingly central to doctrine, Jerome's word choice affected translation in both thought and practice. However, beginning around the time of the Reformation, with the literal sense taking precedence amidst a loss of figural readings, new methods arose. This thesis considers some of the implications of divergent approaches to Bible translation in the historical context of its practice from the fourth century forward.

**Nicole McQuiston, History**

Dr. David A. Smith, mentor

*Fitzgerald and the Modern Perception of the 1920s*

F. Scott Fitzgerald is remembered as one of the most candid and influential writers of his era, the Roaring Twenties. From the swinging parties to the increased use of the automobile, Fitzgerald chronicled the dramatic social changes that were occurring during one of the most memorable periods in American history. But how far was fiction from actual fact? Fitzgerald saw the world of the 1920s through an upper class lens and glamorized the lifestyle of the wealthy youth who partook in the swinging life of the Jazz Age. And because Fitzgerald saw the 1920s through such a narrow lens his stories only reflect the experience of one class. As such, Fitzgerald has influenced the modern interpretation and understanding of the 1920s because he focused on one social group leaving modern readers to accept his chronicle as the norm for the day. With an analysis of the social history of the 1920s, we as modern Americans can clearly see how skewed Fitzgerald's interpretation is and how little we really know about the era as a whole.

**Lyndsay McReynolds, University Scholar**

Dr. David L. Jeffrey, mentor

*The Biblical Tree of Life in Modern Literature and Art*

Ever since antiquity, trees have been used as symbols and literal embodiments of religious beliefs for mankind. One special symbolic tree shared by many cultures is the tree of life. This thesis will attempt to explicate the meaning of the tree of life from a few examples of modern literature and art in order to understand the purpose in its representation. One goal of this thesis is to recognize and trace elements of the Christian tradition and the themes of nature and grace through the modern tree of life symbol. The following chapters will explore historical interpretations of the tree of life, and where characteristics of the biblical tree of life appear in the works of J.R.R. Tolkien, Terrence Malick, and Bruce Herman. The overall argument of this thesis is that through the tree of life theme present in each of these works, there is a showing of man's desire and propensity to engage in a relationship with divinity, oftentimes that being Christ.

**Carlton Metcalf-Doetsch, Mechanical Engineering**

Dr. David A. Jack, mentor

*Tensile Test Method for the Determining of the Structural Properties of Individual Carbon Fiber*

With the advancement and continuing integration of composite materials and technology in today's modern industries, research in this field is becoming more and more significant. Predicting these composite materials' properties and how they will react under trauma and over time is one of the most critical aspects that researchers are striving to understand and expand knowledge in. Most research exercises plural composite plies to find ways to make these predictions. Others use entire fiber bundles or resin/epoxy blocks to relate their properties to the plies they are used to form. However, what are the properties of the fibers that the fibers in the fiber bundle are composed of, and can it be used to predict the properties accurately while consuming less of the material? This thesis conveys a test method designed to determine mechanical properties and characteristics of specifically carbon fibers, but could be used for other fibers, and for use to design composite materials.

**Elizabeth Mims, University Scholar**

Dr. Donna Walker-Nixon, mentor

*Awake and Blind: A Novella*

In my thesis, a fictional narrative, I have created a fantasy story that explores the philosophies of Descartes, Hobbes, and Plato with regard to the question of reality. *Awake and Blind* follows Liam through a journey when he wakes to a world where he cannot trust what he sees. He must seek to uncover the source of the illusion and rediscover the truth of reality for the world. In addition to the works of Hobbes, Descartes, and Plato, this story draws upon ideas from many sources, including *Utopia*, *The Prince*, 1984, and Tolkien's *On Fairy Stories*. My thesis project is centered around the exercise of writing a long piece of fiction, and it also contains an analysis to explain my sources and artistic decisions within the work. Ultimately, within the work, I try to grapple with the concept of interacting with reality and to determine what matters most when we cannot trust anything.

**Jessica Morrison, Neuroscience**

Dr. Joaquin Lugo, mentor

*The role of the mTOR pathway in learning and memory*

Research implicates the mTOR pathway, now known to be a regulator of protein synthesis, as a major player in both neuronal development and cognition. This study demonstrates, both through meta-analysis and experimentation, how disrupting the function of the mTOR pathway may have adverse effects on synaptic plasticity and thus learning and memory. Through delayed fear conditioning procedures, trace fear conditioning procedures, and a novel object test, this study demonstrates marked deficits in learning and memory in homozygous PTEN knockout mice. This opens the door for further research on potential treatments to alleviate the effects of the knockout that may then be implemented in the treatment of mTOR related disease.

**Ashley Murillo, Health Science Studies**

Dr. Peter Grandjean, mentor

*The Initial Effects of High and Low Intensity Exercise*

Postprandial lipemia (PPL) is an exaggerated elevation in the blood triglyceride levels during the hours that follow a meal. In the Western world, most of the population lives in an absorptive state for at least 16 hours a day; therefore, measuring one's lipid concentration after a meal is a more accurate representation of the total triglyceride exposure to the arterial wall over a 24-hour period. The Bruce Protocol Treadmill Stress Test is administered to seven participants to represent different exercise sessions. It is administered at 70-80% maximal oxygen consumption to represent a high intensity session and 40-50% to represent a low intensity session. Heart Rate, Blood Pressure and Oxygen Consumption are collected before the exercise session, during, and after, until the participant is back to resting state. Once at resting state, a high fat shake is given to the participant and blood is drawn at 0, 2, 4, and 6 hours. The data is used to compare the the initial effects of high intensity and low intensity exercise on PPL, vascular function, oxygen consumption and energy consumption after a meal.

**Michelle Nam, History**

Dr. Thomas Kidd, mentor

*The Whig Ideology's Influence on American Politics*

As America's political conscious was forming during the eighteenth century, British political ideas were very influential, especially the Whig Party's ideology. Whig ideology, shown through the writings of John Locke, John Trenchard and Thomas Gordon, and important Whig Party members such as William Atwood, Robert Ferguson, and Henry Hallam, defended ideas such as virtue, sovereignty in the people, and separation of power. The principles inspiring the Revolution reflected the Whig ideology, as did important founding documents written during and after the American Revolution. Whig ideology demonstrates that British political thought remained central to the creation of America's national identity.

**Navya Tej Nandamudi, Business Fellows, Accounting**

Dr. Carie Ford, mentor

*The Presence of Automaticity in the Performance Evaluations of Auditors*

Automaticity is the control of one's internal psychological processes by external stimuli and events in one's immediate environment, often without knowledge or awareness of such control. Automaticity has been shown to be present in varying degrees in tasks that generally have been thought to be fully cognitive, and current studies in psychology have challenged the assumptions that cognitive thought is the primary process in deliberative tasks. An example of a task that would have been considered fully deliberative would be a performance evaluation. Auditors are trained to be deliberate and professional when completing objectives, and most auditors would consider performance evaluations to be deliberative and fully cognitive task processes. This paper seeks to explore the presence of automaticity in varying degrees within the performance evaluation of auditors and highlight areas of future research in auditor performance evaluations in order to improve on current evaluation processes.

**Chi T. Nguyen, Biology**

Dr. Bryan Gibbon, mentor

*Influence of Rapamycin on Zea Mays Seedlings*

The Target of Rapamycin (TOR) Signal Transduction Pathway is a conserved mechanism that plays a significant role in the regulation of cell growth, and autophagic inhibition is one method in which TOR kinase pathway is able to regulate cellular energy balance. Rapamycin, a natural immunosuppressive, is a known inhibitor of the TOR kinase pathway, and thus is expected to increase autophagic activity in the cellular system. The objective of this study is to examine this inductive effect of rapamycin on the autophagic recycling process in W64A+ maize seedlings. This is carried out by phenotypic observations of root growth in maize grown in varying concentrations of rapamycin, and the results have indicated increased root growth in maize germinated in minute amount of rapamycin, suggesting autophagic induction. However, the rapamycin-induced autophagy observed for rapid root growths failed to be quantitatively analyzed due to dysfunctional primers, preventing comprehensive analysis of the autophagic expression in the W64A+ maize samples.

**Stephanie T. Nguyen, Biology**

Dr. Jim Ellor, mentor

*Family and Nursing Staff Assessment of Alzheimer's Disease in Seniors at a Care Facility*

Alzheimer's disease is a fatal neurological disease causing progressive deterioration of intellectual functions such as memory, reasoning, organization, language, and judgment (Narins 2005, Moore 2004). Seniors with Alzheimer's are often cared for by family members; however, as the disease progresses it may become increasingly difficult for the family to care for their loved ones leading to the decision to move the senior to a long term care facility (Galasko 1997, Gruetzner 2001). At some care facilities, residents are placed in various units corresponding to the resident's care needs, physical health, and social and behavioral appropriateness. For the family, a unit transfer is a tangible indicator that their loved one has slipped further in the disease progression. Unit transfers are important transitions for the staff, the resident, and the family. It provides information about the resident's disease progression, care needs, and how the family has dealt with the disease. Important to this project is how the family responds to unit transfer compared to how the care staff, having had a direct role in the transfer, feels.

**Michael Nichols, University Scholar**

Dr. Jeffrey Fish, mentor

*The Reflections in Seneca's De Clementia*

Seneca's fame arises from three different personas: he was the advisor to Nero, a brilliant rhetorician, and a Stoic philosopher. Seneca employs all three of these personas in his *De Clementia*, which is a treatise advising Nero to be a virtuous -- and specifically a clement -- ruler. To accomplish his task of advising a sometimes volatile emperor, Seneca offers his treatise to Nero as though it were a mirror. Seneca claims that the image it reflects back is of Nero as someone who will be among the happiest of men. Upon a close reading of the treatise, however, one finds other reflections created by Seneca's mirror, as well as other eyes besides Nero's that will catch sight of these reflections. This thesis explores the reflections of Nero, of the Roman people, and of Seneca found in *De Clementia*. The meaning of each reflection is teased out, relating each image to its own particular audience.

**Barret Jackson Nye, Political Science**

Dr. Victor Hinojosa, mentor

*Cartels: The New Face of Mexico's Democracy*

This thesis will demonstrate why the Mexican drug cartels pose the single greatest threat to Mexico's democratic institutions. A comprehensive analysis of the shift in Mexican politics from the authoritarian rule of the PRI to the current democracy it is today, coupled with the concurrent shift in the drug trade market provided the perfect opportunity for the cartels to emerge as the most formidable threat to Mexico's fledgling democracy. This thesis examines how this concurrent evolution occurred which allowed the cartels to infiltrate and corrupt the foundational institutions that are the backbone to a democracy. In addition, an analysis is provided detailing the insidious influence the cartels have on the political sector, the military, law enforcement agencies, and elections. This thesis concludes that had the concurrent shifts not occurred simultaneously then Mexico's democracy would offer not only a better quality of democracy to its people, but also safety within its borders.

**Rachel Olutoyin Osomo, Neuroscience**

Dr. Joaquin Lugo, mentor

*Research on the Neural Linkage Between Autism and Epilepsy*

Autism and epilepsy are neurological diseases that have similar symptoms such as impaired cognition, communication, and social practices. The neurological processes involved with each disease utilize certain proteins which have specific relationships with each other. These commonalities indicate that there may be a specific neurological process incorporating some or all of these proteins that contributes to their common symptoms. Research is underway to uncover this linkage. The objective of this thesis is to analyze the proteins involved in the neural pathways of these diseases, discuss their relationships with one another, and to present updated results of ongoing research in uncovering the extent of their significance to autism and epilepsy.

**Aundrea Payne, Political Science**

Dr. Pat Flavin, mentor

*The Political Cure for A Societal Ill With No Borders: A Comparative Analysis of Sex Trafficking Problems and Policies in Prominent Countries*

The U.S. has many flaws in its sex trafficking policies which can be attributed to many sources. However, the sex trafficking problem is not solely confined to the U.S. and the problem of human sex trafficking requires cooperation across national borders, among both state and non-state actors, and between national and local governments. Working within this framework of collaboration, state actors should strive to implement the various provisions identified globally as the best legislative practices for combating trafficking. With this being said, in Chapter 1 I will give a brief overview of the sex trafficking policy in the United States and the failings of current legislation in combating the problem. In Chapter 2, I examine sex trafficking policies in “tier one states/countries” compared to sex trafficking efforts in Tier 2 states/countries and point out the strengths and weaknesses of each respective country. In Chapter 3, I examine cities that are successfully combating sex trafficking and cities that are failing in this arena. The implications for each city are also noted. Chapter four concludes the thesis with practical policy recommendations for the U.S. based on the successes and failures of other countries and cities within the U.S.

**Alex Perry, English and German**

Dr. Ann McGlashan, mentor

*Striving in Marlowe's Doctor Faustus and Goethe's Faust*

In Christopher Marlowe's *Doctor Faustus* the character of Faustus is defined by the striving that leads to his fatal despair. After the Enlightenment alters the course of Western thought Johann Wolfgang von Goethe's Faust's experiences reveal that intellectual striving may lead to the brink of despair, but the greater sin is to act on that despair and to stop striving. This thesis explores how striving can be either a source of damnation or salvation.

**Luci Ponders, Great Texts**

Dr. William Weaver, mentor

*Spenser's Golden Chain of Concord*

In my thesis, I examine the virtue of concord as it appears in the Edmund Spenser's *Faerie Queene* and how it links together the various titular virtues in a “golden chain of concord”. Before discussing the image of the golden chain as it appears in the text, I first observe the nature of concord itself through a close textual examination of Cambina, a figure Spenser establishes as a persona of concord, as she functions in founding the various friendships of Book Four. Through studying Cambina, I come to articulate the importance of the concept of *concordia discors*, the idea that harmony can arise even out of conflict, to the virtue of concord. I go on to establish how the notion of *concordia discors* proves crucial in understanding how the initially competing virtues, and the knights which represent them, interact and eventually come to harmonize. Lastly, I discuss how the binding together of titular knights and their virtues in a golden chain of concord frees all the knights to the grace which Arthur embodies. In discussing concord through the image of the golden chain and its linking of the virtues, I establish the importance of a holistic approach to understanding Spenser's virtues rather than relying on a book by book analysis of them.

**True Price, Bioinformatics**

Dr. Erich Baker, mentor

*Analysis of Resting-State fMRI using Pearson-VII Mixture Modeling*

In the past two decades, functional magnetic resonance imaging (fMRI) has been widely used to research and characterize neural activity in the brain based on measuring the hemodynamic response correlated to neuronal firing. A main goal of fMRI analysis is to characterize functional connectivity – correlation in activation pattern – between different regions of the brain for different task- or disease-related events. Here, we present a novel, data-driven method for identifying functionally connected regions of the brain using a Pearson-VII mixture model learning algorithm (p7-means). This method is complementary to independent component analysis (ICA), which derives underlying source signals, rather than probabilistic distributions, to characterize brain components. The p7-means algorithm is powerful in its ability to model a range of leptokurtic to Gaussian components, which makes it robust in identifying core functional components in noisy images. Additionally, p7-means has the advantage of learning the number of components from the data set, rather than returning a fixed number of components matching dimensionality. We apply the algorithm to resting-state monkey fMRI and compare the discovered components to those found in ICA. Correlational analysis shows consistent activation components between the two methods, although p7-means appears to result in more spatially localized groups.

**Adithi Rajapuram, University Scholar**

Dr. Pat Flavin, mentor

*Determining the Cost Effectiveness of Providing Free Prenatal Care to Hispanic Illegal Immigrants*

Providing illegal immigrants with free resources using taxpayer funds is a highly controversial and hotly debated topic. While some argue that it rewards illegal immigrants at the expense of law-abiding residents, others counter that it is inhumane for the government not to provide basic resources to individuals on the basis of legal status. In my thesis I attempt to determine which solution is most cost-effective, free of political bias. Through analyzing economic data from states and countries that provide varying levels of free prenatal care to Hispanic illegal immigrants, my objective is to find which amount of free care, if any, will leave government budgets least negatively impacted

**Lauren Rivers, Religion**

Dr. Jonathan Tran, mentor

*God's Hiddenness in the Life of a Believer: Exploring Mother Teresa, Job, and the Psalms*

Within the contemporary church, a believer's relationship with God is often gauged, at least colloquially, by how close or far away from him they feel. The underlying assumption between this dichotomy—that distance from God is necessarily a problem—belies an impracticable understanding of faith, not least because it often engenders a stigma for believers faced with God's hiddenness. This hiddenness is a persistent theme within the Christian tradition. In this paper, I will consider St. John's *Dark Night of the Soul* as one description of the purpose of this hiddenness. Mother Teresa serves as a contemporary example of this phenomenon, whereas the book of Job and the Psalms attest to the substantial place that distance from God holds among the witness of God's faithful. Finally, I will address constructive ways for individuals and the church to address the tension between God's presence and his hiddenness in a way that promotes enduring faith.

**Halle Halle E. Ross, Psychology**

Dr. Matthew Stanford, mentor

*Effects of the Training and Education of M.Div. Students on the Identification and Treatment of Individuals with Serious Mental Illness*

Individuals with serious mental illness often seek assistance from clergy members before others in the community. The respect and trust people place in clergy members, the low cost, and the confidentiality implied in the clergy's assistance all combine to make clergy the "gatekeepers" in the community. Unfortunately, many pastors are not well equipped to recognize serious mental illness in an individual and provide intervention or refer to a professional. In this study, the researcher surveys accredited M.Div. seminary programs in the United States, Canada, and Puerto Rico in order to assess the training M.Div. students receive in the areas of counseling and mental illness. The results of this study reveal that M.Div. students do not receive sufficient training to recognize serious mental illness and treat it or refer the individual to a professional psychologist. The results of this study contribute to existing literature on the subject and reveal additional areas for future inquiry

**Daniel Saca, Biology**

Dr. Christopher M. Kearney, mentor

*Development of mosquitocidal bait: a recombinant fusion atracotoxin (Jun a 3/ACTX) produced by viral vector in Nicotiana benthamiana offered in various matrices*

Mosquito-borne diseases are a persistent global concern that is currently addressed through the use of pesticides. These pesticides are a source of environmental and human concern due to their lack of specificity. As a result, both environmentally beneficial insects and pests are exterminated in the same degree. My research is focused on the development of a target specific toxin and the selection of a mosquito-attractant matrix. The toxin of choice is an invertebrate-specific peptide neurotoxin (ACTX), which was isolated from the venom of Australian funnel-web spiders. With the use of a viral vector system dependent on the FECT/40 vector, originally from the foxtail mosaic virus, and the addition of Jun a 3 as a signaling protein we were able to produce the recombinant fusion protein (Jun a 3/ACTX) in *N. benthamiana*. To address the matter of the proper matrix, solutions high in sugar content were chosen. Studies indicate an innate attraction of mosquitoes towards solutions high in sugar, which plants usually offer as a lure for cross-pollinators such as mosquitoes. Therefore, Jun a 3/ACTX and some protein standards were tested for degradation levels in matrix candidates such as honey, high fructose corn syrup, and carob solution. Mosquitocidal properties of the bait were tested on adult *Aedes albopictus*.

**Kristen Semmes, English**

Dr. Hope Johnston, mentor

*The Changing Arthur: A Comparison of Malory and White*

T.H. White transforms the story of Arthur with his retelling of Sir Thomas Malory's *Morte Dathur* in his novel *The Once and Future King*. I argue that White's perception as a man of the twentieth century influences his take on the age old story of Arthur causing his work to diverge from Malory's, specifically in his representation of noble values. Through the characters of Arthur, Merlin, and the women in the work I will prove that due to the authors' differing personal experiences, the values upheld by Arthur's story change drastically. Malory, as a knight during the War of the Roses, emphasizes heritage, prowess in battle, and loyalty in his men while treating the women as secondary characters. White's characters, however, present the importance of individuality, pacifism, education, and motherhood. As these authors deviate from those before them, the characters of Arthurian legend reflect the change in what society considers noble.

**Lynn Shafer, Neuroscience**

Dr. Charles Weaver, mentor

*A Cerebellar Deficit in Dyslexia and How it Affects the Classroom*

The cerebellar deficit hypothesis is one theory explaining developmental dyslexia, an affliction of at least two percent of the population of the United States. Through a review of the current literature, I explained the theory, identified some key components of dyslexia research that can be agreed upon, and acknowledged other concepts that need more study. I determined that the cerebellum is involved in at least some cases of dyslexia, dyslexia manifests itself differently in different individuals, and many dyslexics learn to cope with their dyslexia by adulthood. After interviewing two classroom teachers, some noteworthy points I observed were that teachers between school districts are not consistently trained, the quality of dyslexia intervention differs between districts, and the schools surveyed did not track dyslexia intervention success rate. I determined that a reorganization of dyslexia intervention is necessary because there is no way to determine whether or not current interventions are successful. While more research is necessary from both an educational and scientific standpoint, I conclude by suggesting reorganization strategies for dyslexia intervention that would positively impact the classroom.

**Erika Sherhart, Distribution Management & Technology; International Business**

Dr. Daniel C. Parris, mentor

*The Bullwhip Effect: Recognizing the Phenomenon and Mitigating It Using the Theory of Constraints Illustrated by a Case Study From British Petroleum*

Many companies experience reoccurring problems that seem to grow increasingly worse throughout time. Attempts to fix these problems may prove temporary. These efforts are usually directed towards the symptom of the problem instead of the core problem, creating a cycle as the result of the bullwhip effect. This thesis introduces the phenomenon from academic approach and includes a business element via a case study and discussion of the Theory of Constraints. The opening section includes a definition of the effect and its four causes referred to throughout the text. The next section involves the environment, or a multi-variable system, where the phenomenon occurs. Following is a case study derived from observations of British Petroleum first-hand. Last, tools from the Theory of Constraints are introduced as one approach to mitigating the bullwhip effect.

**Simar Singh, Biology, Medical Humanities**

Dr. Lisa Baker, mentor

*The Role of Knowledge of Reproductive Health in the Prevalence of Nonconsensual Sex in Rural Western Kenya*

In developing countries characterized by traditional gender roles in the context of women's very limited economic and social power, the issue of nonconsensual sex is even more complex than in cultures where women have greater equality with men. The goal of this study was to investigate the prevalence of and attitudes about forced sex. One hundred and twelve women from a traditional rural community in western Kenya were interviewed regarding their knowledge of reproductive health and their attitudes and experiences surrounding forced sex. The results showed that 22.73% of the sample had been forced to have sex at least once, most often by their husbands (83.33%). According to this data, knowledge of reproductive health, though it may empower women in some ways, does not act to deter forced sex. Furthermore, the experience of sexual coercion cuts across all demographic groups. Women reported being forced to have sex when they were as young as 13, and the average age for these women to have had this experience was approximately 21 years old. Almost one-third (28%) of the women had not told anyone. Thus, the issue of nonconsensual sex is beyond the scope of the knowledge of reproductive health in this traditional community in rural, western Kenya.

**David Stephen Smith, University Scholar**

Dr. Linda Adams, mentor

*The Economics of Slavery: A Market-Based Approach of Combatting Human Trafficking*

Human trafficking is a rapidly-growing criminal industry that spans the globe, deeply entrenched in the functioning of the global economy. It is a market, with supply, demand, and commodities that are traded—but in this case, the commodities are people themselves. This paper analyzes the economic structure of the market for human trafficking, examines the current strategies of combatting human trafficking, and shows how those strategies do not adequately address the issues underlying slavery. This paper then introduces the market-based approach of combatting human trafficking, which is an attempt to identify the factors that affect supply and demand in the market, and then determine how to manipulate the supply and demand in order to move the market equilibrium—thereby decreasing the amount of victims of trafficking.

**Natalie Smith, Political Science**

Dr. David Corey, mentor

*Civic Flourishing and Individual Freedom: the Political Tension*

Which is more important: a perfectly flourishing city or a perfectly free individual? It seems that there is a tradeoff between personal freedom and civic health. All societies at all times and in all places deal with this tension. This thesis looks at thinkers who have described societies at different points along the continuum of resolutions to this question. In Plato's *Republic*, Socrates imagines a perfectly healthy city that is flourishing in the precise ways that a city can. This republic can serve as a thought experiment that allows us to look at the civic health end of the continuum. On the other, individualistic end, I look at both J.S. Mill's *On Liberty* and F.A. Hayek's *The Road to Serfdom* as descriptions of different ways to orient society solely for the purpose of increasing individual freedom. Somewhere nearer the middle of these two extremes lies the society that I find Socrates imagining and working toward in the *Apology* and the *Crito*. It may be that we can best navigate the issues of our own society by referring back to Socrates' principle found in those texts. The primary purpose of this thesis is to analyze these various points along this continuum between civic health and individual freedom.

**Jason Stanton, Biochemistry**

Dr. Charles Garner, mentor

*Synthesis of 4-cis-butyl-1-arylcyclohexanamine and examination of 4-tert-butyl-1-arylcyclohexanamine as a gelling agent*

The project will examine the amine derivatives of 4-tert-butyl-cyclohexanone for potential gelling properties. Organic gels have a variety of uses, and they are composed from various compounds that can immobilize certain liquids due to the interactions between the liquid and the compounds. However, only specific organic compounds are capable of forming organic gelling agents. In this experiment, the synthesis of 4-tert-butyl-1-arylcyclohexanamine will be conducted in order to evaluate the potential gelling properties. The amine may serve as a potential gelling agent because previous experiments have shown that a similar compound known as 4-tert-butyl-1-arylcyclohexanol successfully created an organic gelling agent when the aryl group occupied an axial orientation. Therefore, the aryl group on the 4-tert-butyl-1-arylcyclohexanamine may form a gelling agent if the aryl is in the axial conformation. Two different reactions schemes were proposed to synthesize 4-tert-butyl-1-arylcyclohexanamine, and nuclear magnetic spectroscopy, gas chromatography, and mass spectroscopy were used to monitor the mechanism. However, the two different mechanisms used in an attempt to synthesize 4-tert-butyl-1-arylcyclohexanamine did not succeed because x-ray crystallography confirmed that the aryl group was only present in the equatorial position to create 4-cis-butyl-1-arylcyclohexanamine. As a result, further research must be done to discover a mechanism that can successfully synthesize 4-tert-butyl-1-arylcyclohexanamine in order to determine if the compound can be used as a gelling agent.

**Jared Strickland, Asian Studies**

Dr. Xin Wang, mentor

*Humane Authority: Looking to pre-Qin Authors for an Alternative to Chinese Hegemony in the South China Sea*

Within the field of international relations, many look to China's aggressive behavior in the South China Sea and predict a bellicose future. Some say China is destined for revisionist ambitions and hegemonic desires, as all rising powers before it have been. These views, though, tend to stem from a long line of Western thought, dependent on an understanding of human nature and power as seen by classical Western thinkers like Thucydides and Machiavelli. In this thesis, I write that China could benefit from disregarding certain tenets of Western international relations theory and instead look to its civilizational roots for advice. I use the writings of Mencius, a Chinese scholar of the Warring States Period, and Yan Xuetong, a prominent international relations theorist from Tsinghua University, to provide the principles of "humane authority" as an alternative framework for China's rise in the South China Sea.

**Lauren Taylor, University Scholar**

Dr. Charles Weaver, mentor

*Acquisition of Theta Roles in Deaf Children with Cochlear Implants*

Deaf children with cochlear implants often display delayed language acquisition. As a result, researchers refer to "hearing age," the time elapsed since the implantation of hearing aids, in addition to chronological age, the time elapsed since birth. This subpopulation may be a possible new avenue of study for language development. I compared the ability of 7 children enrolled at the Southwestern Hearing School for the Deaf as they determined the subject and object roles in a sentence. Each participant was read a sentence and asked to select the correct corresponding picture. The sentences had varying levels of difficulty depending on the number of possible subjects and objects within the sentences. As expected, older children (measured by hearing age) made fewer errors. All children made more errors as the sentences became more complex. The relatively small sample size precludes strong conclusions, but provides tentative support for separating hearing age from chronological age.

**Adam Telatovich, Mathematics**

Dr. Markus Hunziker, mentor

*Topics in Basic Modern Algebraic Geometry*

In my thesis, I give an exposition of some topics in basic modern algebraic geometry, which is a branch of math that delves into some deep connections between algebra and geometry (as its name suggests). Certain problems are almost impossible to solve using geometric methods, but easy using algebraic methods – and vice versa! Linear algebra is the study of the solution sets to systems of linear equations (for example, what are the simultaneous solutions – if they exist – to  $x + 2y = 1$  and  $3x - y = 2$ ?). Algebraic geometry is the study of the solution sets to systems of *polynomial* equations (for example, what are the simultaneous solutions – if they exist – to  $2xy + 3y^2 = 1$  and  $2x^3 + 3 = 2$ ?) In this talk I will demonstrate some interesting connections between algebra and geometry.

**Emily Tichenor, Language and Linguistics**

Dr. Lydia Grebenyova, mentor

*Children's Discourse in a Problem-Solving Setting: A Cross-Gender Analysis*

Much research has been done on the differences between men and women's language. However, research is lacking on children's gendered language, especially in problem-solving contexts. This study presents an experiment involving children solving a puzzle and uses the data to analyze the language of these English-acquiring children (mean age 4). I analyze the transcriptions of the recordings for the ways children ask for help, use of pronouns and discourse markers, topic changes, and hesitation markers. The findings support boys and girls using language differently in the process of solving a problem, suggesting that each gender solves problems differently. Further, the findings have larger social implications on gender relations.

**Alexis Tracy, Biology**

Dr. Peter Candler, mentor

*Christianity and Creatureliness: The Need for Death and Suffering*

The denial of death and the desire to abolish suffering both empty a person of humanity; Christianity reconciles these issues while keeping creatureliness intact. For Ernest Becker, the denial of death results from man's paradoxical condition in which he possesses the gift of mind and the constraint of body. Though haunted with the prospect of death, with Christianity there is hope in choosing a life of truth rather than blind denial. Walker Percy demonstrates that the quest to abolish suffering implicates purging man of his consciousness of death and it is this very notion that has led to the "century of death." Pope John Paul II argues that in the absence of a religious outlook, there is no positive understanding of the mystery of suffering. Without such an outlook, death awareness and suffering serve no purpose.

**Drew Vincent, International Studies**

Dr. Joan E. Supplee, mentor

*From Airwaves to Newsfeed: Populism and Emerging Media Technologies*

As can be seen in Argentina, Cuba, and Venezuela, populists are often effective in capturing the hearts of the people of the Americas. Such leaders have shaped the histories of these countries in dynamic ways, continually highlighting the unifying power that a passionate orator can have when paired with citizens seeking social change. With this in mind, there is a clear relationship between the populist and his followers as well as an ever-present need for the populist to maintain his access to the people. Emerging technology has been relied upon for this reason. Through my thesis project, I will seek to demonstrate how populists such as Juan Perón, Fidel Castro, and Hugo Chávez have used and attempted to dominate their country's radio, television, or Internet media to control their message to the people.

**Christina Walther, History**

Dr. Julie deGraffenried, mentor

*Soviet Tourism and the Hosting of Guests during the Stalinist Period: 1921-1953*

After the Bolshevik Revolution, the new Soviet government was forced to seek alternative channels of diplomacy while waiting for official recognition by the West. Beginning with Lenin and the New Economic Policy in 1921 through the Stalinist Period to his death, four diplomatic "quests" developed alongside unconventional channels of diplomacy – the quest for formal foreign recognition through famine relief committees, the quest for formal foreign recognition through cultural diplomacy, the quest for formal foreign recognition of superiority, and the quest for formal foreign recognition of equality. Tourism and the hosting of guests was born and evolved in the context of these quests. Through travelogues, archival evidence, and examination of those books, pamphlets, and invitations that the two primary organizations – VOKS and Intourist – distributed in the West, one can see how these alternative channels of diplomacy became official means for showcasing (and funding) the greatness of the Soviet Union.

**Mitch Walton, University Scholar**

Dr. Bessie W. Kebaara, mentor

*The role of CTR3 in the copper tolerance of nmd mutants of Saccharomyces cerevisiae*

The nonsense-mediated mRNA decay (NMD) pathway is a mechanism by which eukaryotic cells degrade mRNAs with nonsense codons and some natural mRNAs. *CTR3* mRNA is a natural mRNA degraded by the pathway and codes for a copper transporter. This study seeks to investigate the regulation of *CTR3* by the NMD pathway and the contributions this regulation has on the copper tolerance of nmd mutants of *Saccharomyces cerevisiae*. This is accomplished through creation of *CTR3* gene disruption fragments and transformation of these fragments into *S. cerevisiae* with an active and an inactive NMD pathway. This creates strains with an active and inactive *CTR3*. These strains will be grown on both copper-limiting and copper-rich media to assess the copper-tolerant nature of nmd mutants with and without *CTR3*. At the time of writing, *CTR3* gene fragments have been isolated and transformed into yeast strains. Unfortunately, none of the transformants showed *CTR3* disruption.

**Elizabeth Wang, University Scholar**

Dr. Mary Lynn Trawick, mentor

*Metastasis and Cathepsin B*

Cancer is one of the leading causes of mortality in the United States as well as the developing world. Metastasis is responsible for about 90% of cancer deaths, and is a cause of morbidity in those who continue to battle it. Cancer can be attributed to genetic mutations as well as unhealthy behaviors, but a tumor can only progress from its primary site into the blood and to distant organs if the tumor microenvironment is supportive. A number of endogenous proteases, embedded in a complex protease network, are shown to be upregulated in cancers and aid in metastasis. Of these proteases, cathepsin B is reported to play an important role in tumor progression. It is usually regulated closely, but in metastasis it cleaves the extracellular matrix of cancer cells to aid in invasion. Inhibition of cathepsin B has been shown to limit metastasis, although ultimately, any attempt to curtail the metastatic process through proteases must consider the relationships of the protease network.

**David Welch, Great Texts**

Dr. David L. Jeffrey, mentor

*Translation and Re-interpretation in the Old English Genesis: Poetic Catechesis for an Oral Culture*

The Old English *Genesis* is a poetic paraphrase, in Anglo-Saxon oral-formulaic verse, of the first twenty-two chapters of the Biblical book, ending with the Sacrifice of Isaac. In this thesis I argue that the poem is effectively a translation of Genesis into the language of vernacular poetry for the purpose of catechesis. For the Anglo-Saxons, poetry was not merely a category of literature, but the traditional way of conveying what is most significant, the language of meaning; it makes sense, therefore, that the missionary-monks of England would have cast Scripture, the most meaningful Text, into the words of poetry. But this is not the only level on which *Genesis* engages the poetic tradition. It responds to the Germanic worldview and corresponding ideals of virtue that are communicated through oral poetry, re-interpreting them in the light of the revealed Word of God. By casting this Word into familiar words (the language of oral-formulaic poetry), themes (the beginning of the world, the relation of the gods and men, and the way men ought to live), and characters (the Germanic heroic ideal in contrast to Christian virtue), *Genesis* takes what is best in the pagan tradition and puts it into the service of Christian truth. Through the poem, the Word reveals Himself to the Anglo-Saxons by means of familiar terms and ideas, now re-interpreted and infused with new Life.

**Wylie Wyman, University Scholar**

Dr. Michael Foley, mentor

*The "Pearl of York" Playing Host: The Life of St. Margaret Clitherow, Martyr*

St. Margaret Clitherow, the "Pearl of York" was arrested in 1586 for illegally harboring Catholic priests in her home. She was put to death later that same year when she refused to proclaim either her guilt or innocence before the court. Her faithfulness to the Catholic Church is a testament to the spirit of the Elizabethan recusant movement. It is also the basis, in this thesis, for a discussion of the relationship between martyrdom and hospitality. In this thesis, I demonstrate that Clitherow's actions demonstrate the way in which the martyr, in making a positive witness for what is true and orthodox, establishes the walls of the Church. Thus does he make those within the Church able to welcome the stranger while maintaining the fullness of their corporate identity.

**Vanessa Wyns, University Scholar**

Professor Karl Umlauf and Dr. Katie Edwards, mentors

*Mysterious Elements*

The enigmatic nature of Gerhard Richter's black and white photorealist paintings with their blurred surfaces and hazy atmospheres is what originally inspired this project. The blur of the woman's face in his piece *Woman Descending a Staircase* provoked a psychological and sociological investigation that informed the first phase of my paintings. Working off of modern photographer Luca Desienna's imagery, I created figurative paintings in which I use an exaggerated blur to erase features of the image. Desienna's photographs are blurred like Richter's paintings, but for Desienna the motive behind the blur is to hide disfigured faces, decaying walls, and general squalor: not because he finds them unsightly, but because he wants to draw attention to the humanity of his subjects rather than the conditions in which they live. The second phase of my paintings moved away from Desienna's imagery and their psychological implications to abstract compositions with a distinct set of challenges. The paintings of this phase are made with acrylic paint and wood stain. The water based acrylic paint repels the oil based wood stain to create textural patterns that resemble topological ridges. Controlling this antipathy to create a compositionally successful piece became my primary concern.

## **AUGUST OR DECEMBER 2013 GRADUATES**

**Jessica Carver, Great Texts**

Dr. David L. Jeffrey, mentor

*An Orchestral Interpretation of Dante's Divina Commedia*

St. Augustine, in his *De Musica*, uses the example of the nightingale to describe those who know and create music only through sense, singing "harmoniously and sweetly" although ignorant to the "numbers or intervals of acute and grave tones" (Book I, Part IV, pg. 7) Until this past year, I was a nightingale. I thought myself an artist, composing notes that filled me with feeling and rhythms that moved me. Not until reading *De Musica* did I realize that merely having the ability to recognize beauty, instincts which Augustine claims "beasts" even possess, and creating sweet sounding melodies was not sufficient for being defined as an artist. According to Augustine, an artist must possess "the purity and truth of the intellect" or in other words rationally understand the inner workings and intricacies behind one's creative work, for instance, *why* a group of notes sounds pleasing to the ear or is further intensified by a particular rhythm (Book I, Part IV, pg. 12). During the process of completing my thesis work, composing three movements for a string arrangement finally enabled me to understand music no longer through sense alone but also through intellect, comprehending the order within my own work which was once to me only harmonious sound and movement. Working on this thesis not only allowed me to transform as an artist but also allowed me to see how art itself uses sensory tools to draw viewers or readers to a heightened intellectual understanding, not only of the work itself but also of truths that lie outside of the work. My string composition is a musical narrative which symbolically follows Dante through *Inferno*, *Purgatory*, and *Paradise* and therefore it will seek to lead the listener on a journey from sensory sound to intellectual understanding of Dante's text. Just as Dante uses his poetry, his beautiful, aesthetic art, to first draw upon the senses and eventually lead the reader to deeper spiritual understanding, so I hope that my own composition may first excite the senses through beautiful sound but then, through symbolism and connectivity to text, draw one's mind toward theological truths within the Divine Comedy. As an introductory or groundwork/background chapter, chapter one will explore the importance of music in Dante's Divine Comedy and to Dante Alighieri himself, from a historical aspect and in light of the medieval 'trinity' of arithmetic, astronomy, and music. The remaining three chapters will serve as a literary guide to the musical narrative I have created, one for each book in the Divine Comedy. These last chapters will explain the different motifs and symbolism which I attempted to portray through the medium of music.

**Megan Hermann, Biochemistry**

Dr. Sung-Kun Kim, mentor

*Potential Inhibitors of *Bacillus anthracis*' Metallo-  $\beta$ -Lactamase by Hydroxamate Functional Groups and G-Quadruplex Aptamers*

Antibiotic resistance is a growing problem among many strains of bacteria, especially within the populations that most commonly infect hospital patients. A variety of molecules have been found that are capable of inhibiting the enzymes responsible for conveying resistance in a number of bacterial strains, yet inhibition among certain strains of bacteria remains elusive. This study focuses on the inhibition of the metallo- $\beta$ -lactamase enzyme found in *Bacillus anthracis* by novel hydroxamic acid-containing molecules and G-quadruplex-based DNA aptamers. These molecules proved to be potent inhibiting molecules and therefore present a promising avenue for further research to combat antibiotic resistance in bacteria.

**Johanna Lee, Accounting**

Dr. Gia Chevis, mentor

*Measuring Poverty Alleviation: A Critical Look at Microfinance Institutions*

My thesis outlines the origin of microfinance institutions and their “double bottom line” business structure. Working to achieve a social good and a desired profit is worth the investment. Assessing the impact of these two goals educates the public about microfinance’s ability to alleviate poverty. I examine the current measures of success and their focus on the institution’s operations. These measurements do not always communicate if the borrower has come out of poverty. It is important that these measures are transparent and reflective of the borrower’s success in both the short and long term. Without proper measurements, an illusion of success in microfinance lending can hurt the poor. Proving that the poor are credit worthy is not enough to continue microfinance lending if the social mission is not being met. Finally, I survey the success of microfinance, by looking at multiple metrics, that when combined can unambiguously determine the success of the borrower.

**Priscilla Mendez, Psychology**

Dr. Christine A. Limbers, mentor

*Multicultural Personality and Attitudes on Psychosocial Well-being and Quality of Life*

The purpose of this thesis is to focus primarily on the diversification of college students at a university setting and introduce to the reader how multicultural personality and attitudes affect psychosocial well-being and quality of life. As college and university campuses throughout the United States become increasingly diverse further research on this topic will allow us to understand the differences of multicultural personalities from culturally diverse environments. We have gathered data from undergraduate college students at Baylor University in order to explore the influence of multicultural personality and how it can predict one’s psychosocial well-being and quality of life.

**Danielle H. O'Connell, Biology**

Dr. Bessie W. Kebaara, mentor

*Role of MAC1 in copper tolerance of Saccharomyces cerevisiae nonsense-mediated mRNA decay mutants*

The nonsense-mediated mRNA (NMD) pathway, present in most eukaryotic cells is a specialized pathway that leads to the recognition and rapid degradation of mRNAs with premature termination codons and some natural mRNAs. The regulation of natural mRNAs by NMD has been observed in organisms ranging from yeast to humans. Global expression profiling of the effect of NMD on mRNA levels in *Saccharomyces cerevisiae*, *Drosophila melanogaster* and humans show that approximately 10% of the transcriptome is affected when NMD is inactivated. The regulation of natural mRNAs by NMD has been most extensively studied in *S. cerevisiae* and has been shown to have physiological consequences. We have shown that nmd mutants tolerate higher copper concentrations relative to wild-type yeast cells. The tolerance to high copper levels by nmd mutants is dependent on the presence of *CTR2*. *CTR2* encodes a copper transporter of the vacuolar membrane that controls the flux of copper into the vacuole and is regulated by the NMD pathway in *S. cerevisiae*. Additional genes involved in copper metabolism in *S. cerevisiae* are also regulated by NMD. One of these genes is *MAC1*. The *MAC1* gene in *S. cerevisiae* is a copper-sensing transcription factor involved in the regulation of genes that are required for high affinity copper transport. In this experiment, we investigated whether *the* NMD pathway regulates *MAC1* and the role that *MAC1* plays in the copper tolerance of yeast cells.

**Dale Price, University Scholar**

Dr. Charles Weaver, mentor

*Categorical Perception as a Feature of General Perception*

Humans perceive linguistic phonemes categorically, that is, in distinct clusters rather than as continua. The same pattern of categorical perception has also been documented with a wide variety of other stimuli, including faces, colors, and musical tones. While categorical perception has often been assumed to be a distinct mode of perception, some studies have suggested that it is an emergent phenomenon that can occur with any general perceptual system. This thesis provides an overview of research on categorical perception, then examines findings on non-linguistic categorical perception and patterns of learning categorically perceived stimuli in order to address the hypothesis that categorical perception is merely a feature of general perception.

**Cole Evan Short, International Studies**

Dr. William F. Cooper, mentor

*Employee-Employer Relations in Japan: An Analysis of Honor-Shame and Authority-Power Relations within the Modern Japanese Workplace*

An analysis of interpersonal (employee-employer) relations within the contemporary Japanese business world. With emphasis placed upon the cultural and ideological implications of workplace interactions, comparisons between American and Japanese business practices are made. Such comparisons yield compelling policy implications and recommended business etiquette for men and women seeking to conduct business in Japan.

# MAY 2014 GRADUATES

## **Elizabeth Bradshaw, University Scholar**

Dr. Trent Dougherty, mentor

### *The Conspirators: a Novel*

My book tackles the fundamental questions Who am I? and Why am I here? from the perspective of a detective story. The book is divided into three parts. In the first part, the protagonist is kidnapped and spends several days in captivity. His literal removal from everything and everyone he has ever known sends him on a search for the true nature of his identity. At the end of Part I, the hero is given a mission and has to choose whether or not to see it through. During Part II, the hero takes on a new identity in order to infiltrate a secret society. Here he encounters the question of how far a human being can go in pretending to be someone or something he is not and still retain his sense of self. He is also forced to answer the question of whether or not it is ever right to take justice into his own hands. He meets several characters along the way, all of whom have different answers to these important questions. The hero will have to choose an answer for himself at the climax of the story. In Part III, the questions that have been brewing all along culminate in a big decision for the hero. He realizes that his choices will determine who he is and who he will become.

## **Chamath Chandrasekera, Biochemistry**

Dr. Sung-Kun Kim, mentor

### *Characterization and Purification of TEM-1 $\beta$ -Lactamase*

The efficiency of  $\beta$ -lactam antibiotics, which are among our most useful antibacterial weapons, is continuously challenged by the emergence of resistant bacterial strains. This is often due to the production of  $\beta$ -lactamases by the resistant cells. TEM-1  $\beta$ -lactamases operate via an active site serine based mechanism and are a major source of resistance in bacteria. Extensive use of these antibiotics has placed substantial selection pressure on bacteria producing resistance to these compounds. Therefore there is a need for the in-depth study of the molecular biology and kinetic properties of this enzyme for future clinical applications. We successfully expressed and purified  $\beta$ -lactamase from *Escherichia coli* (TEM-1) and studied the kinetic parameters of TEM-1. The effect of different buffers and changes in ionic strength was also tested to determine if changes in these parameters had an effect on enzyme activity. As a result, we found that the  $K_m$  value was 90.3  $\mu$ M and the  $V_{max}$  was 412.4  $\mu$ M/min. Inhibition studies using metal chelators show no effect on the enzyme activity. Furthermore, enzyme activity was dependent on ionic strength and buffer concentration.

## **Jolene Damoiseaux, Biology**

Dr. Lisa Baker, mentor

### *Clinic Delivery Determinants among Native Luo Women in Rural Western Kenya: A Community Based Needs Assessment*

Maternal health services play a vital role in optimizing pregnancy outcomes, especially for high-risk women in developing countries. In order to understand why few women utilize such services, extensive interviews were conducted on the Nyakach Plateau in rural Western Kenya. Within a sample of 90 native Luo women (43 pregnant and 47 non-pregnant), 93% of the pregnant women intended to deliver at a clinic, but only 45% of previously pregnant mothers actually did. This study categorized the major determinants of clinic deliveries into "Accessibility" versus "Knowledge and Values." When weighing their relative contributions, it becomes clear that the women in this sample desired to deliver in the clinic but faced significant accessibility barriers. That these problems are crucial is emphasized by the fact that 38.3% of the previously pregnant mothers have other serious problems impacting or resulting from pregnancy, including HIV/AIDS, death of a child, delivering a sick baby, or having chronic physical consequences from a difficult delivery. Of the entire sample, 92.2% reported transportation as a barrier. These results ultimately reveal that heavily pregnant women must hike across rough terrain for an average of 1.2 miles to seek appropriate medical care – generally only doing so once labor begins. The other two most commonly identified barriers were money issues (75.6%) and a lack of clinic services (64.4%). In spite of the fervent and continuing need for education, these conclusions will direct significant intervention efforts toward transportation aid to increase the number of clinic deliveries on the Nyakach Plateau.

**David A. Dreier, Environmental Health Science**

Dr. Bryan W. Brooks, mentor

*Comparative Probabilistic Hazard Assessment of In vitro Endocrine Disruptor Assays*

Environmental and human health implications of endocrine disrupting chemicals, particularly xenoestrogens, have received extensive study. However, a critical question remains, how does one select an in vitro model for endocrine disruption when multiple model systems exist? ToxCast is an effort launched by the EPA that seeks to prioritize chemicals requiring additional toxicity testing. The primary objective of this study is to examine the comparative sensitivity of various endocrine disrupting assays from this program representing a diverse group of industrial chemicals and pesticides. We will specifically utilize chemical toxicity distributions to perform probabilistic hazard assessments. The benefits of these particular hazard assessment models can be important to environmental decision making. Not only do probability-based hazard models have the potential to predict toxicological properties of similar industrial chemicals, they provide a cost-effective initial approach to predict threshold of toxicological concern for specific types of toxicity pathways, thereby allowing future studies to prioritize the most problematic chemicals for additional toxicological testing. These models will also provide approaches to test the potential utility of employing green chemistry design guidelines to reduce toxicity.

**Reese A. Garcia, English**

Dr. William McDonald, mentor

*Moving Pictures: A Novel*

This is a postmodern work which draws much influence from writers like David Foster Wallace and Don DeLillo. This novel explores the differences between appearance and reality in the context of contemporary American society, specifically in terms of consumer culture and religion. The story follows Blake Hartz, a twenty-something ad agent who feels guilty towards his job and withdrawn from his marriage; and Miles Downing, a 14-year-old physics prodigy who is addicted to pain killers. Both of these characters, despite their differences, find their destinies intricately connected at least in part to the Atheist Society for the Procurement of Capital Advancement or, ASPCA--a suppressive organization who wields a firm grasp on the US government's actions and policies after singlehandedly redeeming it from economic recession. Blake and Miles each try to overthrow or at least free themselves from the ASPCA's imposed ethic of consumerism.

**Savannah Gosnell, Neuroscience**

Dr. Lea Steele, mentor

*Structural Brain Tissue Abnormalities in Patients with Mild Cognitive Impairment*

Alzheimer's disease (AD) is a widespread problem in our aging population, for which there is no cure. This neurodegenerative disorder is characterized by a progressive cognitive impairment, most notably in memory function, which manifests at later stages as a severe form of dementia. The few treatments available only work to slow the disease's progress and do not ameliorate the existing damage already present in the brain prior to treatment. There is an extensive amount of research describing the pathophysiology and progression of AD, however, there is still much left unknown. Amnesic mild cognitive impairment (MCI) refers to a probable early stage of AD. Patients with MCI have symptoms that are similar to, but less severe than, AD and are at high risk for progression to AD. This study will utilize neuroimaging data to determine whether measures of hippocampal volume and white matter integrity, particularly in the cingulum bundle and frontal cortex white matter tracts, can be used to distinguish subjects with mild cognitive impairment (MCI) from similarly-aged subjects with no cognitive deficits. This study will compare 18 subjects with MCI and 18 controls with no evidence of cognitive impairment, ages 60-75 years. Diffusion tensor imaging (DTI) data will be used to evaluate white matter integrity, including assessment and comparison of fractional, mean, axial and radial diffusivity as potential indicators of neuroinflammation. Multivariable statistical analyses will compare MCI subjects with healthy controls on imaging measures of structural volume and white matter integrity. Additional analyses will evaluate correlations between imaging data and neuropsychological measures of cognitive function. The study will provide new insights concerning neuroimaging measures that can potentially identify early indicators of cognitive impairment prior to progression to the later stages of AD.

**Robert Guidangen, Biology**

Dr. Lisa Baker, mentor

*Circumcision and High-risk Sexual Behavior among Luo males in Rural, Western Kenya*

The Luo people of western Kenya express the highest HIV prevalence (20.2%) of any comparable ethnic group in eastern sub-Saharan Africa. In an effort to combat the pandemic, the Kenyan government enacted a scale-up of voluntary male medical circumcision (VMMC) in 2008, using data from three randomized control trials reporting a consistent 60% protective effect from HIV infection for circumcised men as the basis for this expansion. As it so happens, the Luo ethnic group is the only major group that does not traditionally practice circumcision, but present literature indicates that the practice has recently gained some acceptability within the Luo population, primarily in urban areas, as a means to acquire some protective benefit against HIV infection. This study uses a sample (n=50) of Luo men in rural Nyanza Province to assess how the introduction of VMMC influences high-risk HIV sexual behavior. The effect of VMMC on high-risk sexual behavior is measured using the outcome variables of number of sexual partners and condom usage. Results indicate no statistically significant relationship between male circumcision and condom usage ( $\chi^2=0.1164$ ,  $p=0.7330$ ). The sample, however, does express a dramatic trend in condom usage, revealing that roughly 2/3 of non-condom users are circumcised males. It is also found that male circumcision is a significant predictor for a relatively high number of sexual partners ( $\chi^2=11.02$ ,  $p=0.0009$ ). These results provide insight into just how accurately rural Luo men perceive the protective benefit of circumcision and where current issues with VMMC may need to be addressed in order to attain optimal results for combating HIV incidence.

**Emily J. Johnson, Health Science Studies**

Dr. Andrew R. Meyer, mentor

*The Spiritual and Emotional Life Unleashed: Active Catharsis Experiences During the Great Brazos Relay*

Participants of competitive endurance athletic events experience a spectrum of emotions. Some researchers argue that an athlete can encounter catharsis, an emotional release through physical activity (Scheff, 1979; Csikszentmihalyi, 1990; Nesti, 2007; Watson, 2007). The concept of catharsis is a key element in the examination of sport specific emotional experience because “within a sporting context a more spiritual notion of catharsis can be detected in the lives of athletes” (Nesti, 166). This thesis will discuss data collected to ascertain whether participants describe cathartic experiences during the Great Brazos Relay. The researchers were interested in how this race might provide empirical evidence of spiritual cathartic experiences during endurance events, what we have termed *active catharsis*. Data was analyzed using themes found in spiritual catharsis literature. Results indicate that participating in an endurance event provides feelings of contentment, accomplishment, and overall life mentality change, indicating spiritual *active catharsis*.

**Alex Kimbrough, University Scholar**

Dr. Lisa Baker, mentor

*The Effectiveness of a Community Health Worker Program in Sigoti, Kenya*

Women from the Luo tribe have the highest HIV prevalence of any gender and ethnicity category in Kenya (22.8%). Due to the high prevalence of HIV, it is important that these women deliver their infants in health care facilities that provide antiretroviral treatment as a means to decrease the rate of mother to child transmission. Volunteer community health worker programs have been created in many developing nations in order to increase the use of maternal health services. However, the effectiveness of many of these programs has not been established. The purpose of this study is to examine whether a community health worker program in Sigoti, Kenya increased the use of maternal health services from January 2009 through May 2012. Data from the maternal registry at the Sigoti Health Center was analyzed in order to determine if utilization rates changed after the institution of the community health worker program. Data was divided into non-intervention and intervention time frames for comparisons. The number of facility-based deliveries increased from an average of 38 in the non-intervention time frames to 60 in the intervention time frame. This increase was statistically significant ( $p=0.014$ ). However, increases in the risk profile of the women ( $p=0.119$ ), the number of HIV positive women ( $p=0.102$ ), and mean birth weight ( $p=0.100$ ) were not statistically significant. These findings show that community health worker programs can be used to increase the number of facility-based deliveries. Through such programs, developing nations can potentially increase the number of pregnant women receiving antiretroviral treatment and thereby reduce the rate of mother to child transmission of HIV.

**Daniel Lewis, University Scholar**

Dr. Trent Dougherty, mentor

*Why God still is great: a response to Paul Draper's Humean argument from evil*

If God is so great, then why is this world full of evil, pain, and suffering? Throughout the ages, philosophers, theologians, and everyday people from all walks of life have tried to make sense of the apparent injustice, suffering, and arbitrariness of life. The conclusions that people have drawn are as various as the different methods they have employed to formulate the problem of evil. My thesis responds to a particular formulation of this problem: Paul Draper's evidential argument from evil. I begin by outlining the historical development of the problem of evil and then refute Draper. Chapters two through four are each a rebuttal to the three premises of Draper's argument. I aim to show that, even with our knowledge of the data of good and evil, we should not reject theism; on the contrary, we are warranted in believing the God of theism exists.

**Jenil Modi, Biochemistry**

Dr. Peter Candler, mentor

*The Misgivings between Faith and Reason: St. Thomas Aquinas' Contribution to an Evolving Discussion of Sin and Virtue*

Understanding our physical reality and its intimate relationship with our spiritual selves is a difficult task. It is common for people to tend to focus on one and neglect the other. So, when we choose reason over faith, or vice-versa, we are choosing to neglect certain divine truths. I argue that faltering in our spiritual or physical selves, or in other words, keeping parts of ourselves separate, we willingly participate in sloth. To make an effort to bolster our knowledge of divine truths, by fully aiming to understand and appreciate both our faith and reason, we live in the virtue of charity. Using the works of St. Thomas Aquinas, I aim to analyze the roles of sloth and charity in a discussion about faith and reason.

**Kaitlin Pleshko, University Scholar**

Dr. Jeter Basden, mentor

*Biblical Models of Church Leadership and Their Application for the 21st Century Church*

Leadership is one of our society's most popular and most discussed topics. Church leadership is often pushed to the wayside and is not often explored from an academic standpoint. This thesis will analyze and study biblical models of leadership to propose a model which biblically addresses the leadership issues facing the twenty-first century church today. Moses, Joshua, Jesus, and Paul illustrate universally applicable characteristics and traits which contributed to their success in leadership. This thesis will survey one hundred church leaders in fifty churches in the Baptist General Convention of Texas to explore leadership issues present in the modern church. Using the leadership model obtained through the analysis of biblical figures, this thesis will propose an application to the twenty-first century church which will aid church leaders in the issues they face today.

**Jack Stanley, Aviation Science**

Dr. Trey Cade, mentor

*Space Weather and Aviation*

Many aircraft today use satellites for GPS navigation, arrival and departure to and from airspaces, and for "shooting" non-precision and precision Instrument Approaches into airports. Due to the general, commercial, and military aviation industries all becoming more and more reliant on satellite and GPS technologies, the effects of space weather events on these systems is of paramount concern to militaries, airlines, private pilots, and other aviation operators. However, traditional radio-based means of navigation are also affected. Analyzing and publishing data recorded about effects on satellites, GPS systems, and radio navigation networks as well as discovering how and why technologies are affected are crucial to the conduct of safe flight operations now and improving systems for future use.

**Modupeola Thomas, Architecture**

Dr. Karen Pope, mentor

*Forms of sacred space: A study of the influence of Christianity, Islam, and Judaism on sacred architecture*

Religion has been a major driving force on the way architecture has evolved over the years. This paper seeks to understand the relationship between the three monotheistic religions: Christianity, Islam, and Judaism, and the architecture of their places of worship. The religious buildings of these monotheistic religions (The church, mosque, and synagogue) have certain structures unique to each one. I seek to identify these unique structures, find out their origins, understand their purposes, and lastly, see how these structures have evolved over the years until present times. This paper will explain whether or not each structure in these religious buildings plays any part in the rituals and worship of the followers of these religions.