

**ABSTRACTS OF
THESIS PROJECTS
SPRING 2014**

BAYLOR HONORS COLLEGE

**The Honors Program
University Scholars**



BAYLOR
UNIVERSITY

HONORS THESIS ABSTRACTS

MAY 2014 GRADUATES

Syed Adil Ahmed, Biology

Trent Dougherty, mentor

The Moral Permissibility of Medically-Assisted Suicide

Despite the many medical advances made in the past century, the effects of disease, traumatic injuries, and old age will obviously continue to occur. While cures have been found for some medical conditions, many continue to take their toll on patients. Although treatments can ease the suffering, they do not necessarily cure it and in some case can cause more suffering. Thus, this thesis delves into the legality and ethics of medically-assisted suicide. This thesis also distinguishes medically-assisted suicide from murder and other forms of suicide. Through many articles and texts, I examined the reasons and consequences for someone to be medically euthanized. It has shown that while the population seeking this route is small, it is steadily growing. The primary reasons to approach medically-assisted suicide have been because of the suffering they endure to the effects of terminal illnesses or the effects of old age. This suffering disables us, preventing from being independent and having a simply lifestyle. While the issue remains controversial, opinions are slowly changing. Physicians realize that some patients will not be cured. They understand the patient's ailments will kill them. Hence, states such as Washington, Oregon, and Montana have passed laws and protocols allowing patient's to pursue medically-assisted suicide. Overall, I argue in favor having the option of medically-assisted suicide available to patients who are permanently disabled by their medical issues.

Braden Allman, Political Science

Andrew Hogue, mentor

The Relationship Between American Political Leadership and Morality

Politicians have always walked on the shaky ground of public opinion, but now more than ever it seems their personal lives have come into play in the political arena. The American People are no longer satisfied with leaders who pose as good citizens in public but have deep secrets in private. Rather the dynamic has shifted, and it is clear that there is a distinct relationship between American Political Leadership and Morality. Interestingly, I have found that over time the definition and perception of this idea has shifted. Americans have always embraced leaders they believe to have good character, but in today's political climate this character is built more upon complete honesty than on moral integrity. The way in which political scandals are handled has shifted dramatically over the last half-century, and as a result the model for political leadership has changed. Richard Nixon began this trend by fundamentally changing America's view and trust of politicians and awakening a watchdog media, Bill Clinton and Newt Gingrich continued by defiantly admitting to private infidelities, all of which has led to the present. An American public willing to forgive Mark Sanford within 3 years of a sex scandal, and re-elect him to the United States Congress, with nothing more than an honest apology for his error.

Estela Rodriguez Alonso, Medical Humanities

Helen E. Benedict, mentor

A comparison of children living in extreme urban poverty participating in an enrichment program with a control group on narrative skills using responses to a story telling task

Economic disadvantage is linked with harsher environments, which lead to poor cognitive, social, academic, and emotional consequences for children involved. It has been shown that an early period of schooling is of critical importance for future academic success among low-income children. This study intended to determine the effectiveness of the treatment method Talitha Koum Nurture Center Program. This was done by assessing how the children receiving intervention differ in narrative skills from children from comparable backgrounds. The procedure instructed children to complete stories after the stem of the story (or beginning) about everyday problems had been given to them by the examiner. The experimental children participated in the Talitha Koum intervention program from two months of age until time of testing or age five. The control children were recruited from a low-income housing neighborhood highly similar to the neighborhoods of the experimental children. Of the thirty-one children between the ages of three and five that were part of this study, 16 told stories that could be coded; seven from the experimental group and nine from the control group. The results showed that TK children told more stories and longer stories than the control group. The language used was more complex as indicated by the significantly higher mean MLU and significantly higher use of descriptors, qualifiers, and internal state terms than the control group.

Jillian Anderson, Journalism

Sara Stone, mentor

Citizen Journalism and Democratization in Egypt: How Social Media Can Connect People and Change Situations

Using Egypt as a focal point, social media and its role in citizen journalism will be examined. Because of many factors including technological advancement and proliferation, demographic changes, and economic disparity; a perfect storm was created that resulted in change. Social media played a large role in facilitating and organizing this revolution. This thesis will analyze historical information with current events to give perspective to how and why social media and citizen journalism were so effective during the Lotus Revolution of 2011

Autumn S. Averitt, Philosophy

Todd Buras, mentor

The Zombie Argument and Its Implications for Naturalism

In the discipline of philosophy today, there is no topic more popular than the nature of consciousness. Additionally, there is a general consensus on the truth of naturalism. This thesis investigates whether a naturalist conception of consciousness is tenable. The zombie argument against the naturalist program is very striking, as it clearly delineates the apparent differences between the phenomenological and psychological concepts of the mind. This thesis explores the naturalist program and the nature of consciousness. It then outlines the zombie argument and evaluates naturalist responses to the argument. It concludes that the strongest naturalist response still falls short of defeating the zombie argument. Naturalism therefore fails to adequately account for consciousness.

Ashley Elizabeth Bergfield, International Studies and Political Science

Thomas Offit, mentor

Posh Pageantry or Mere Fairytale? An Ethnographic Study of Pageantry in the Modern United States

Pageantry has been belittled as an “archaic” and “passé” amusement, yet over time society has remained charmed with its search for a modern-day Cinderella. Today, the industry has burgeoned into a multi-billion dollar affair hosting a variety of pageants ranging from Miss America and Miss Rodeo America to television reality shows such

as “Honey Boo Boo” or “Toddlers and Tiaras.” However, despite this rise in popularity, criticisms have failed to subside. This work will approach the arguments of critics by assessing pageants’ promotion of a “certain class of girl” through incorporation of past and present titleholder experiences as well as an ethnographic study of the various Miss Rodeo competitions. Moreover, by defining “contradicting identities,” this thesis will consider the struggle between a titleholder’s personal identity with that of an organizational or national ideal. This work will conclude by suggesting pageantry’s future implications as it relates to younger generations and changing demographics within American society.

Sara Bitting, Social Work

Helen Harris, mentor

An Overview on Death and Dying Including Cultural Influences Within the Major Non-White Populations of the United States

This piece outlines the meaning of death, dying, and bereavement in the United States through artistic, medical, and psychological definitions of the words, all unique and different in their own ways. Medically, death may occur when the brain dies, but the existence of life support instills a sense of hope in loved ones. Media and art representations of death can show an inordinate amount of violence and unhealthy coping skills. The foundation of dying stages is laid out by Kubler-Ross’ five stages of grief. At the same time, this alters for different races and ethnicities. Common funeral practices and coping skills as well as death in art and history is shown for the African American and Mexican American populations.

Shannon Blankenbeker, Philosophy

Michael Morrison and Charles Beckenhauer, mentors

Title IX vs The US Military on Cases of Sexual Assault

My thesis sets out to examine the mission statements of military Reserve Officer Training Corps (ROTC) programs to see if they are adequately preparing students for the transition from college life to military life. I focus specifically on the treatment of crimes of a sexual nature. I drew my research from the military ROTC websites, the Title IX Legal Manual and the Uniform Code of Military Justice (UCMJ). I also examine specific cases of sexual assault in both the college and military environments to see how they were handled comparatively. I state that the transition from college to military life is a drastic transition. The attitude surrounding crimes of a sexual nature in college is different from the attitude surrounding the same crimes in the military. Therefore, ROTC programs need to do more to make the transition smoother, especially with regard to the attitudes about crimes of a sexual nature.

Ivan Boudreaux, Political Science

Michael Boerm, mentor

Is French a Creole Language?

Creoles are a unique clan of languages. Slaveholders needed a way to communicate with their slaves and vice-versa. In order to do this, a pidgin language developed in which only the bare essential of a language is used to communicate. Later, when the pidgin language develops native speakers, it is known as a creole. Creole languages have generally agreed upon structures that set them apart from other languages. Given these facts, I analyze similar grammatical structures and functions of French and Haitian Creole. I ultimately contend that French is not a creole language based on comparing its verbal morphology to that of Haitian Creole.

Andrew Bowman, Baylor Business Fellow

Bryan F. Shaw, mentor

Oral-based Molecular Models for Educating Visually Impaired Students

Historically, it has been difficult for blind students to pursue careers in biochemistry-related fields. The reasons for this under representation are complex, but partially caused by: (i) the preponderance of visual-oriented teaching tools, and (ii) the required manual operation of laboratory instrumentation. These roadblocks are being slowly removed by decades of advances in occupational technology (e.g., the development of audio-assisted lab equipment for blind students) and new teaching tools (e.g., the development of tactile/touch-based or audio teaching tools), but a career in biochemistry—especially structural biology (i.e., the study of protein of protein and nucleotide structure) remains out of reach for many visually impaired students. Upon researching the following: the blind and their nearly insurmountable barrier in studying advanced topics, the dearth of proper instrumentation to instruct the blind, and the heightened ability of the visually impaired to learn with tactile stimulation (both of the hands and lingual nerve)—I, along with Dr. Bryan Shaw and Alireza Abdolvahabi, am attempting to help them develop a set of appropriately-sized 3D models of important molecules. The first run of molecules will be different conformations of hemoglobin and calmodulin, which will be donated to the Dallas Independent School District for proof of concept.

Susannah Brister, University Scholar

Alden Smith, mentor

Tastefully Written: Reflections on Fiction and the Feast

From Homer to Shakespeare to Dostoyevsky, authors of fiction have found that meal scenes may prove to be rich repositories of symbolism for their narratives. In the introductory chapter of this thesis, I attempt to answer the question of why authors include scenes of feasting in their stories, tracing both the symbolic implications inherent in the act of eating and the significance of the feast to ancient Jewish and Greek culture. To this introduction, I append two creative works--a short story and a short film screenplay--that make use of the symbolism of feasting to tell a story about the humbling of pride and the extension of forgiveness.

Samantha Brokenshire, Biochemistry

Rizalia Klausmeyer, mentor

Controlled Release Mechanisms for Mesoporous Silica Nanoparticles

In recent years, mesoporous silica nanoparticles (MSNPs) have been extensively researched for application as a drug delivery method. The nanocarrier's high surface area to volume ratio and ability for the exterior and interior surface to be selectively modified has inspired a full array of surface functionalization systems, including controlled release mechanisms. Controlled release mechanisms refer to the construction of chemical structures that can efficiently restrict and permit the release of medicinal cargo after application of a stimulus. Throughout this review, I have given a look into several proposed controlled release designs, including dimer photocleavage, snap-top machines, nanovalve machines using Cucurbit[*n*]uril and cyclodextrin rings, azobenzene nanoimpellers, and polymeric designs. These designs can be stimulated through a variety of triggers including light, pH, heat, reducing agents, enzymatic degradation, or other substrate concentration. Each design system offers a unique and promising architecture to be used in effective drug delivery.

Dustin Buller, Biochemistry

Kevin L. Shuford, mentor

Effects of ethanol on ion transport in the NavMs voltage-gated sodium channel: A molecular dynamics study

The behavioral effects of alcohol on the human nervous system are widely studied and understood due to an increased cultural interest in alcohol consumption and alcoholism. Multiple studies of ion transport in various tissues have suggested alcohol-mediated effects on ion transport as a viable cause for these behaviors. However, specific targets or a precise cellular mechanism for these effects have yet to be identified. Molecular dynamics simulations of ion transport were conducted *in silico*, 10 ns in length, using the NavMs voltage-gated sodium channel. NavMs is a bacterial homologue for human channels found in nerve cells. The channel was modeled in a virtual cell-membrane system with appropriate solvent and lipid models. A trans-membrane electric potential generated to simulate the electrochemical gradient of neurons and to induce ion transport. Simulation was repeated with a high concentration of ethanol (~0.1 M) in the extracellular fluid in order to compare rates of ion transport. Finally, video trajectories of the simulations were generated and analyzed. These simulations suggest a significant increase in the rate of ion transport in the presence of ethanol. Reasons for this increase are observed and discussed. Future work will include similar simulations of proteins homologous to human voltage-gated potassium and calcium channels in order to assess effects on neuron signal transmission as a whole.

Kevin Burns, University Scholar

David L. Jeffrey, mentor

The Jewish and Christian Iconography of Dura Europos: A Study of Dionysian and Baptismal Elements

The discovery and excavation of the ancient city of Dura Europos, located in present-day Syria, provided the world with the earliest extant example of Jewish narrative art and some of the earliest Christian art dating to the mid-third century. The Durene synagogue and Christian baptistery, both covered in scripturally themed frescoes, borrow iconography from the surrounding culture, namely that of the cult of Dionysos, and adopt it for their own cultic use. In this thesis, I examine the purpose of such borrowing, interpret iconographically various frescos, and draw conclusions concerning the relationship between the synagogue and baptistery.

Leslie Calhoun, University Scholar

Greg Garrett, mentor

The Rising Fall of the Imperial Order

For my honors thesis, I wrote a fantasy novel that reimagines the era of Nazi Germany and explores issues of morality and prejudice alongside the themes of bravery, trust, and loyalty. Drawing from fantasy and dystopian novels as well as from the scholarly works of great fantasy writers such as Tolkien, Lewis, and Madeleine L'Engle, my thesis argues that fantasy and story have the ability to ask deep questions about human nature and provide a meaningful commentary on our society. The fantasy world of Almaen is oppressively ruled by an immortal Imperial, whose reign will last forever unless he is killed by a blood relative. Jaemar Ralour, a sixteen-year-old boy who has never known a life outside the Order, discovers that he is the Imperial's nephew and thus one of the last alive who can end the Imperial's life. Forced to become a pawn among the larger forces in Almaen, Jaemar must fight to remain true to his own beliefs while deciding whether to become a victim or a sacrifice.

Ian Ross Campbell, University Scholar

Wade Rowatt, mentor

Suppression of Prejudicial Attitudes in the Presence of Out-Group Members

Racial prejudices exist in today's society on many levels and some stereotypes are more openly expressed than others. Oftentimes a person's willingness to express their opinions about a racially significant topic will depend on their immediate surroundings and who can hear them. To test how much people might censor themselves when

discussing racially charged court cases based on the audience they are addressing, the current study had 145 participants write essays about Trayvon Martin and Oscar Grant under the assumption that the NAACP and the APA would read those essays. The results seem to indicate that people did not significantly suppress their opinions, operationalized as writing a shorter essay, based on the target audience. Other measures of implicit stereotypes were also assessed. These seem to indicate a connection between internal motivation and writing longer essays, but stereotypic explanatory bias, external motivation, social distance, symbolic racism, and IAT (Implicit Association Test) scores did not affect essay length.

Kaitlyn Carlson, Biology

Meghan DiLuzio, mentor

Household Religion in Rome: An Examination of Domestic Ritual and its Role in Shaping the Roman Family

In ancient Rome, each household maintained a vibrant religious practice lead by the patriarch of the family. They worshipped various deities responsible for the safety and well-being of the household. These included Vesta, the goddess of the hearth, the Penates, protectors of the food supply, the Lares, guardians of the home and estate, and the genius, the guiding spirit of the family patriarch. In addition to daily and annual worship, Romans performed various rituals during significant transitional periods such as marriage and death that invoked the household deities. This thesis examines those rituals, their implications for the nature of the Roman family, and the ways that domestic cult dealt with changes to the family structure.

Shannon Carter, Biology

Darrell Vodopich, mentor

Effects of Habitat Complexity on Intraguild Predation and Cannibalism in an Assemblage of Size-structured Predators

Intraguild predation (IGP) and cannibalism substantially affect community dynamics but often are poorly documented in food web studies. Feeding choices of generalist predators often relate more to size of prey than to species identity, leading to IGP and cannibalism. Size-structure of predator populations and physical habitat complexity further complicate predator-prey interactions. Densely-vegetated habitats provide refuge for prey and diminish predator hunting success. This experimental research examined effects of habitat complexity and population size-structure by intraguild larval aquatic beetles (*Cybister fimbriolatus*) and larval dragonflies (*Anax junius*), common predators in fishless ponds. In mesocosms, predation for all pairwise combinations of large and small top predator, *C. fimbriolatus*, and large and small intermediate predator, *A. junius*, was measured. Predation in replicate trials of these six predator/size combinations was measured at high and low habitat complexity. High habitat complexity decreased predator success. In some cases, the size of competing predators influenced a predator's success. In a choice test, predator preferences to consume either conspecifics (cannibalism) or heterospecifics (IGP) were also tested. *C. fimbriolatus* consistently consumed a conspecific before a heterospecific, while *A. junius* consumed a heterospecific before a conspecific. Preferential cannibalism by the top predator *C. fimbriolatus*, coupled with low cannibalism by an intermediate predator, *A. junius*, could help explain sustained coexistence of these predators.

Courtney Catt, History

Stephen Sloan, mentor

Trapped in the Kitchen: How Advertising Defined Women's Roles in 1950s America

This thesis examines the portrayal of middle-class women and their role in 1950's America. The primary evidence comes from advertisements published in four popular magazines of the decade: *Saturday Evening Post*, *LIFE*, *Good Housekeeping*, and *Ladies Home Journal*. These advertisements limit the placement of women into two overlapping molds, the wife and mother, perpetuating specific qualities that women should uphold to succeed in these roles. Such qualities vary between the roles; however, both demonstrate the need for training young girls to prepare them

for such duties. Lastly, advertising assumes that even when portrayed in different settings, a woman is never disconnected from her role of wife or mother. Once these statements are proven, an analytical comparison is made between the reality of 1950's women and their idealized, advertised roles.

Vivienne Elana Clark, University Scholar

Lori Baker, mentor

Patient Autonomy and the Expressivist Objection in Prenatal Screening and Selection Practice

Prenatal screening and selection is the process of detecting diseases and conditions in fetuses or embryos, and choosing whether or not to carry a fetus/embryo to term in the event of a particular disease or condition. Such screening and selection practices are rapidly becoming a routine aspect of healthcare for expectant women; however, they are accompanied by many serious ethical considerations. One argument against prenatal diagnosis, known as the expressivist objection, is the concern that such prenatal practices express an inherently discriminatory attitude toward people with disabilities. One common criticism of the expressivist objection is the assertion that preserving patient/maternal autonomy ought to take higher priority over concern for potential injustice toward the disabled. However, this thesis seeks to demonstrate that due to inherent bias against the disabled in healthcare and medical counseling practices, expectant parents do not receive sufficient support to make fully informed, autonomous choices about fetal screening/selection, effectively violating both patient autonomy and social justice for the disabled.

Eric Cline, Biology

Karol Hardin, mentor

Working with Spanish-speaking Interpreters in a Family Health Setting: Assessing Language Needs and Implementing Training

An estimated 53 million Hispanics currently live in the United States, comprising 17 percent of the total population. By 2060, this number is projected to rise to 128.8 million, comprising 30 percent of the population. Despite these numbers and numerous studies highlighting the low level of training and availability of Spanish-language interpreters in health care settings, current initiatives to prepare for the projected population increase are limited. This thesis examines the use of interpreters at the Family Health Center clinic system in Waco, TX, providing an analysis of current issues and recommendations for ongoing training. Research instruments used in this project included a language needs assessment based on previous research, interpreter and clinician training interventions, Spanish language proficiency exams, and patient satisfaction surveys. Results indicated that additional training was needed, and response to the initial interventions was positive, suggesting that future training programs might provide additional benefits.

David Coalson, Neuroscience

Charles Weaver, mentor

Self-serving bias: A review of contemporary literature

Self-serving bias, the cognitive bias in which individuals fail to accurately perceive their own faults and shortcomings, is a common process by which self-esteem is maintained. The majority of individuals experience this bias at various points during their life, though some are able to recognize their faults more easily than others. Self-serving bias presents a rapidly evolving area of research that incorporates multiple disciplines including psychology, sociology, and neuroscience. In this review, the factors that cause self-serving bias to be experienced differentially are investigated, as well as common and upcoming techniques used to research them. Likewise, literature concerning the effects of self-serving bias in different facets of life is considered.

Carrie Cooper, English

Dan Walden, mentor

Literary Portraits of Native Americans: Connecting Identity with Environment in Novels by Brown, Cooper, and Sedgwick

As the republic of the United States was forming, the early American people felt a need to craft a narrative for the purpose of both creating and claiming a distinctly American identity. One of the main ways early white American authors achieved this was through the Othering of Native Americans. My research is focused around three novels that present a portrait of the Native as the cultural Other: *Edgar Huntly: Memoirs of a Sleepwalker* by Charles Brockden Brown, *The Last of the Mohicans* by James Fenimore Cooper, and *Hope Leslie* by Catherine Maria Sedgwick. The common thread between these novels is that each of these authors focus on interactions with the environment, rather than on ethnicity, in their formation of the Other. Brown presents the Native as purely savage while Cooper portrays the Native as the idealized and equally unrealistic romantic hero of the wilderness. However, Sedgwick provides a more nuanced and complicated portrait of the Native within the wilderness, contradicting the assertions presented in *Edgar Huntly* and *The Last of the Mohicans*. All three novels, nonetheless, cause us to realize that, while the portraits of the Natives are captivating, the hand of the white American holds the brush.

Marissa Lynn Couch, Biochemistry

Jim Huggins, mentor

The Significance and Effect of the Medical Examiner in the Field of Forensic Science

Forensic science is a quickly growing field. New findings and techniques in the field are being discovered regularly and its presence has become a staple in any type of investigation. One major aspect of forensic science is the Medical Examiner. A Medical Examiner is responsible for performing an autopsy and determining cause and manner of death for a deceased individual. In this thesis, I discuss and analyze the significance of the Medical Examiner's work and the effect their role has on the field of forensic science. This includes topics such as defining death, the autopsy process, and the impact of the Medical Examiner's ruling in death investigation.

Jeff Cross, University Scholar

Alden Smith, mentor

Mental Pictures in a Rustic Setting: Ekphrasis in Virgil's Georgics

For the better part of the last century, the literary and rhetorical term ekphrasis has been applied primarily to poetic descriptions of art and architecture. Best known for its application to such famous examples as the shield of Achilles (*Iliad* 18) or the relief sculptures of the Trojan War within the temple of Juno in Carthage (*Aeneid* 1), ekphrasis has a much wider scope of application than has been previously supposed. I intend to analyze descriptive passages in Virgil's *Georgics* with a view to supporting a broader definition of ekphrasis while also evaluating the advantages and disadvantages involved with the methodology of categorizing such passages.

Aaron Dack, Biology

Robert Doyle, mentor

Determination of planktonic metabolism and trophic status in Texas shallow ponds

Potential daily aerial rates of plankton production and respiration for twenty-seven shallow ponds within the Bullhide Creek watershed between January and March 2013 were determined. Photosynthetic parameters were estimated using the oxygen change method in closed biochemical oxygen demand bottles (BOD). Daily potential planktonic production and respiration were estimated using the Walsby method and incident solar radiation data for a cloudless day during the survey period. Results contrasted original predictions with plankton communities being autotrophic on average (P:R = 1.39). Although recent research has concluded that most surface waters are heterotrophic, we found eight ponds were strongly heterotrophic (P:R < 0.7) nine were strongly autotrophic (P:R >

1.3) and ten in approximate balance (P:R 0.7-1.3). Plankton photosynthesis and P:R ratios were not affected by the abundance of submerged aquatic vegetation (SAV), ($p=.87$). Average P:R ratio for ponds without SAV averaged 1.61, with intermediate and abundant SAV averaging 1.14 and 1.79 respectively.

Patrick Donlon, History

Jeff Hamilton, mentor

The Statute of Uses: A Tudor Solution to the Evasion of Feudal Incidents and Its Consequences

Following the Norman Conquest of England in 1066, William the Conqueror instituted English feudalism. In return for their title to English lands, William's Norman supporters were obligated to provide military service and payment of feudal incidents. Essentially, the incidents were payments made to a feudal lord as relief to legally inherit property, compensation for transfer of property to a minor, and various other occurrences. Initial ambiguity concerning the extent of incidents enabled the Crown and other feudal lords to abuse their position. As monarchical authority fluctuated, English vassals consistently sought to establish limitations on the right to incidents. Vassals also began looking for a legal method of evasion preceding the reign of Edward I, whose predecessor established a bureaucratic office to pursue royal incidents relentlessly. Enfeoffment to use, a method of property conveyance that could be employed to avoid feudal obligations, increased in popularity as a means of flexible property settlement. Largely because of this legitimate end, uses were slowly incorporated into English property law. By the reign of Henry VIII, an enfeoffment to use often resulted in the avoidance of feudal incidents. The Crown, alone unable to benefit from the device's use, was most affected. Initially intent on compromising, King Henry VIII's solution was rejected. The king, desperate to secure favorable legislation, effectively ignored and reversed two centuries of established legal precedent, guaranteeing the enactment of the Statute of Uses (1536). The Statute was instrumental in the early formation of the doctrines of a trust and led immediately to the Pilgrimage of Grace, which resulted in the Statute of Wills (1540) and the right to flexible methods of devise.

David A. Dreier, Environmental Health Science

Bryan W. Brooks and Kristin A. Connors, mentors

Employing probabilistic hazard assessment approaches to compare ToxCast estrogen agonist assays

Environmental and human health implications of endocrine disrupting chemicals (EDCs), particularly xenoestrogens, have received extensive study. However, there are multiple model systems for estrogen agonists, which makes assay selection critical. In addition, it is difficult to predict the environmental and human health impacts of untested chemicals, as little to no toxicity data exist for a vast number of compounds. ToxCast is an effort launched by the U.S. Environmental Protection Agency (EPA) that seeks to prioritize chemicals requiring additional toxicity information through high throughput screening assays. As the Endocrine Disruptor Screening Program plans to use ToxCast for identifying potential EDCs, there are multiple assays for relevant endocrine-related endpoints, particularly estrogen agonists. Probabilistic Hazard Assessment (PHA) approaches, such as chemical toxicity distributions, can be used to measure the relative sensitivities of these assays by predicting of the likelihood of chemical classes eliciting specific toxicities at or above environmentally relevant concentrations. The PHA in this study examined the comparative sensitivity of 19 *in vitro* assays for estrogen agonists representing a diverse group of compounds from the U.S. EPA's ToxCast dataset and noted considerations for assay selection.

Bayless Drum, Biology

Tamarah Adair, mentor

*RNA-seq reveals changes in the *Staphylococcus aureus* transcriptome following blue light illumination*

Staphylococcus aureus infections are becoming a more serious human health concern as antibiotic resistance among *S. aureus* strains increases. As a result, alternatives to antibiotic treatments are being explored, including photodynamic therapies. It has been shown that blue light exposure will inhibit the growth of both Gram-positive and Gram-negative bacteria, including *S. aureus* growing in culture. However, the mechanism of this inhibition is

not well characterized. In an effort to better understand the mechanism of blue light inhibition, a whole transcriptome analysis of *S. aureus* strain BUSA 2288 was performed using RNA-seq to analyze the cells' response to blue light exposure. RNA was extracted from *S. aureus* cultures illuminated with blue light and control cultures grown in the dark, and cDNA was generated and sequenced using MiSeq RNA Library Building and Next Generation Sequencing technologies. Transcriptomic comparisons using a cutoff of 5 fold identified a total of 28 down-regulated genes and 6 up-regulated genes in the samples that were exposed to blue light. The differentially regulated genes fall into 9 functional categories with 4 genes of unknown function. These results indicate that blue light does have an effect on the transcriptome of *S. aureus*. Pathways involving reactive oxygen intermediates generated in the broth and excitation and damage to membrane proteins are proposed to explain the killing effect of blue light on *S. aureus*.

Julienne Pearl Dy, Psychology

Hugh Riley, mentor

Sibling Effects on Theory of Mind in Children with Autism Spectrum Disorders

Children, as well as older individuals, with autism spectrum disorders have classically been found to underperform at tests of theory of mind. Some researchers believe that social deficits in individuals with autism spectrum disorders are due to impaired theory of mind. This theory is known as the mindblindness theory. Research in typically developing children has found that having a sibling environment is related to improvements in theory of mind. Interactions in complex sibling environments provide opportunities, such as conflict and play, to exercise skills that can further theory of mind development. Sibling relationships could cause a similar effect in autistic children, or they could result in a different effect altogether. However, few studies have been conducted on this specific topic, and the only ones that have been done have produced contradictory findings. Further research will be needed in order to resolve these mixed findings, but for now, they remain as they are.

Emily Edmondson, Religion

Paul Martens, mentor

Education in the Thought and Theology of Jorge Mario Bergoglio

The election of Jorge Mario Bergoglio to the papacy was not expected either by those inside Catholic politics or by non-Catholic observers. Because of his former anonymity in the English-speaking world, there exists a paucity of resources available about his life and his thought. This thesis begins to examine his thought concerning education in Argentina, especially as it takes the form of a response to the excesses and corruption of Argentine populism and plays a role in defending his theological vision. This thesis provides a sketch of populism (as Bergoglio conceives it) and the types of socio-cultural challenges that political neoliberalism and cultural modernity pose in the Latin American context as the background to Bergoglio's theological vision. Further, this thesis then considers three specific works by Bergoglio in order to explain his theological vision of the history and the human person which underlies his understanding of the relationship between education and the redemption of human beings by Christ.

Audrey Eichenberger, University Scholar

N. Bradley Keele, mentor

The Role of Prenatal Stress on the Number of GABA Receptors within Rat Amygdalae

Although anxiety disorders act as a prevalent source of American morbidity, as they affect as many as 40 million American adults over the age of 18 annually, the cellular mechanisms underlying the levels of heightened fearfulness are largely unknown. While the amygdala is understood to play a substantial role in the development of fear and, thus, the pathogenesis of anxiety disorders, additional research is necessary, in order to investigate the complexity of the specific neurobiological mechanisms involved. GABA, a primary inhibitory neurotransmitter, decreases the number of action potentials fired after stimulating its post-synaptic receptor within the brain. Therefore, low levels of GABA within the amygdala are linked to increased levels of anxiety. Previous studies have

shown that, during fear conditioning, the number of GABA receptors on the surfaces of neurons decreases, and, during subsequent periods without startle, the number of GABA receptors on the cell surface of amygdala neurons increases. Thus, I will test whether the number of GABA receptors on the surfaces of amygdala neurons within prenatally stressed rats differs from the number of GABA receptors within control rats. If the amygdalae from the prenatally stressed rats also express a decreased number of GABA receptors compared to the amygdalae of the controls, the number of GABA receptors and GABAergic activity on the cell surface of amygdala neurons will be increasingly attributed to the heightened neuronal excitability and levels of anxiety that the prenatally stressed rats experience.

Thom Elston, Neuroscience

Joquin Lugo, mentor

Aniracetam and Behavior

Aniracetam is a therapeutically useful cognition enhancer (nootropic) for alleviating anxiety and treating various neurodegenerative conditions. Aniracetam is shown to enhance both glutamatergic neurotransmission and long-term potentiation (LTP) formation. Previous studies of aniracetam have focused on acute administration in different models of disease and has demonstrated dramatic cognition-rescuing effects. We investigated if, given a daily oral regimen at a clinically established dose, cognitive performance could be elevated in healthy C57 Black 6 male mice. In a double-blind, placebo-control design, we investigated the performance-enhancing potential of aniracetam in a variety of aspects of cognitive behavior. Specifically, tests of learning (Morris water maze, classical conditioning, rotorod, odor discrimination), anxiety (open-field and elevated plus maze), and repetitive behavior (marble burying). Across all measures, we detected no significant difference between the naive, placebo, and experimental groups. Despite several studies demonstrating efficacy in impaired subjects, our results show that cognitive performance is not enhanced in healthy subjects. This study is timely considering the growing community of laypeople self-administering nootropics to themselves. Our findings suggest that aniracetam is clinically effective to reverse impairment but not useful as a cognitive enhancer in unimpaired populations.

Dylan S. Eustice, Electrical and Computer Engineering

Scott Koziol, mentor

A Model for SIFT Optimization Using FPAA Block Convolution

This research successfully demonstrates a model for optimizing the Scale Invariant Feature Transform (SIFT) using a Field Programmable Analog Array (FPAA). The FPAA will compute the block convolution of an image and a kernel which has been designed to be predictive of potential regions of interest. The performance of several different types of kernels will be compared, most of which were produced using an evolutionary search algorithm. The filtered image produced by the FPAA will be used to locate the potential regions of interest and mask regions that are unlikely to produce matches. This model will provide the groundwork for an optimized hardware implementation of SIFT in scenarios requiring low power and high speed, such as a robotic computer vision system. The advantage of the model lies in that the FPAA removes the necessity to search in areas of the image where a match is unlikely to be found, yielding a more efficient implementation of SIFT that also demonstrates the usefulness of new FPAA technology.

Samantha Evans, History

Marie Level, mentor

L'artiste créateur, L'homme aimable: A Survey of the Artistic and Commercial Success of Jean-Baptiste Isabey

Jean-Baptiste Isabey was one of the most successful French artists of the nineteenth century, yet his name is unfamiliar today. His popularity survived eight different regimes, from Louis XVI to Napoléon III. Known as the "portraitiste de l'Europe", Isabey painted every major historical personality from Marie-Antoinette to Hortense de Beauharnais. In the past few years, scholars have been intrigued by this man who has disappeared from the pages of

history. This thesis examines the painter's life and major works under each regime to discover why he achieved success in such variegated environments. This thesis argues that Isabey's popularity was due to both his personal and artistic merit. His ability to win patronage, artistic versatility, and family support allowed him to maintain a successful career throughout his lifetime.

Patrick Foss, University Scholar

N. Bradley Keele, mentor

The Effects of Prenatal Stress on Corticosterone Levels in Rats

Prenatal stress, or the exposure of a pregnant mother's body to stressful events which could affect the fetus, is a growing field of research with possible implications for human pregnancy. This thesis investigates the effects of prenatal stress on levels of corticosterone, an important stress hormone, in rat offspring. Pregnant female rats were exposed to a variation of a standard pseudorandom stressor schedule for the last week of gestation, after which their offspring matured and were exposed to a foot shock. Blood samples were collected at intervals after the shock and analyzed for corticosterone levels through ELISA. One-way ANOVA analysis was used to ultimately investigate the hypothesis that prenatally stressed rats would show increased corticosterone levels in response to an acute stressor in adulthood.

Jeanne Frisbie, Medical Humanities

Jason Whitt, mentor

An Examination of Disability Care: Contemporary Practices and Ways L'Arche Communities May Shape Them

L'Arche communities are Christian, faith-based communities where people with and without disabilities share life with one another. This international organization is a unique example of what it looks like to fully embrace differences between persons and practice life together. The purpose of this thesis is to examine the unique characteristics and practices of L'Arche communities, and to suggest ways in which these qualities can be adapted to contemporary practices of disability care in physical therapy. I first give a brief history of disability care in the United States, followed by a survey and analysis of contemporary models of disability in the United States, the anthropologies that support them, and how these models play out in disability care. Contemporary practices in disability care are largely shaped by the medical and social models of disability, but share a common anthropology of personhood and value. However, L'Arche challenges the account of personhood informing many of today's practices. By considering the characteristics and practices of L'Arche communities, disability care via physical therapy can be shaped and perhaps improved on.

Natasha Gambhir, Biology

Bryan Gibbon, mentor

Isolation of Juniper Mitochondria

The aim of this thesis is to conduct an experiment separating the organelles of the plant, *Juniperus virginiana*, in a gradient in order to isolate just the mitochondria. Separating and eventually extracting the mitochondria would allow sequencing of the genome of Juniper. The challenge of the experiment was to see if the mitochondria and the chloroplast could be separated into different layers in a gradient in order to extract simply the mitochondria. To analyze the organelles found in each layer and locate specific organelles, gel electrophoresis and a western blot with antibodies for mitochondria and chloroplast were used. Several trials with different gradients are conducted including a sucrose gradient, a percoll gradient and a combined sucrose and percoll gradient. Each trial alters the procedure in an attempt to further isolate the mitochondria.

Elysia A. Garcia, Statistics

Jeanne S. Hill, mentor

Frequentist, Bayesian, and Zero-One Inflated Beta Regression Models

The main objective of this paper is to introduce readers to the beta regression. The beta regression is unique in its ability to adapt to many data trends despite skewness and other factors. The beta regression is also unique in its use of proportions and percentiles as its dependent variable. The paper will look at the beta regression from different perspectives, consisting of frequentist and Bayesian, as well as adjusting for zero-one inflation. Finally, the paper will show the utilization of the beta regression in applications such as experimental studies concerning BMI percentiles and operational data on crude oil proportions after distillation. Statistical programs as R and WinBUGS will be used in this paper to give readers the tools needed to fit beta regression and interpret the output.

Reese Garcia, English

William McDonald, mentor

Unilever: a novel

Unilever is a novel that deals with commercials, commercialism, consumerism, and their roles in American culture. The tension in this story hinges on the attractions and allures of commodities versus the desire not to be made an object of advertising (or to be objectified in general). Two main characters include an advertising agent who feels disillusioned by his career, and a precocious middle-schooler who becomes more involved in his drug use while solving the dilemma of a heavy debt. Some of this novel's biggest influences include David Foster Wallace's Infinite Jest, Don DeLillo's White Noise, Dave Eggers's The Circle, and Jonathan Lethem's Chronic City.

Thomas H. Gibson, Mathematics, Russian

Ronald Morgan, mentor

Perturbed Arnoldi Method for Computing Multiple Eigenvalues

There are several known methods for computing eigenvalues of a large sparse nonsymmetric matrix. One of the most efficient methods is known as the Arnoldi method. The Arnoldi method is a Krylov subspace method that computes the eigenvalues of the projection of a matrix onto the Krylov subspace. In our investigation, we present both non-restarted and restarted Arnoldi methods and examine how round-off error helps find multiple eigenvalues. We introduce a new method that uses a diagonal matrix perturbation that separates multiple eigenvalues and improves performance. Our approach presents an alternative that avoids the need for a block method, or for relying on round-off error to introduce multiple copies of eigenvalues.

Ashtyn Gillie, English

Elizabeth Dell, mentor

The Death of Heroism: Revenge and Fate in the Novels of Kurt Vonnegut and Jonathan Safran Foer

The concept of heroism is a pervasive idea in literature. Figures such as Odysseus, Oedipus and Hamlet have shaped our perception of what it means to be a hero in the midst of hardship and tragedy; namely, these characters seek revenge in reaction to the overwhelming power of divine fate in the lives of humanity. However, in the postmodern age, brought on by the unprecedented widescale destruction of 20th century warfare, many writers have expressed the idea that traditional heroism is incompatible with the problems faced by a postmodern society. In this thesis, I explore the ways in which the theme of heroism is portrayed in three postmodern novels; *Slaughterhouse-Five* by Kurt Vonnegut, as well as *Everything is Illuminated* and *Extremely Loud and Incredibly Close* by Jonathan Safran Foer, which are all connected by their exploration of the most influential and destructive events of the 20th and 21st centuries-the Holocaust, the bombing of Dresden, and the terrorist attacks of September 11. I seek to illustrate that with these novels, the authors utilize traditional characteristics of heroism in order to demonstrate the ways in which they fail to provide meaning and validation for these intense acts of violence and devastation.

Savannah Gosnell, Neuroscience

Lea Steele, mentor

Structural Brain Tissue Abnormalities in Patients with Mild Cognitive Impairment as Assessed by Diffusion Tensor Imaging

The goal of this study was to provide new insights concerning neuroimaging measures that identify early indicators of amnesic mild cognitive impairment (a-MCI). Diffusion tensor imaging (DTI) scans from a previous study of adults age 58-78 were used to compare measures in the cingulum and 11 cortical structures in a-MCI cases (n=13) and age-matched controls (n=15). Fractional anisotropy (FA) and related measures of diffusivity were compared between a-MCI cases and controls using analyses of variance; correlations between DTI measures and measures of verbal memory were evaluated by regression. Results showed FA was significantly reduced in the right hemisphere of the cingulum and significantly increased in the sagittal stratum (SS) for a-MCI cases compared to controls. Increased FA for the SS and reduced FA for the anterior corona radiata were significantly correlated with poorer performance on tests of verbal memory for a-MCI cases. A number of study results were compromised by bias in the application of analysis methods. Overall, however, findings indicate that increases in degeneration were not consistently detectable in a-MCI cases as compared to controls.

Kristen Gould, Psychology

Thomas Fergus, mentor

Are allocentric social evaluative concerns culture-specific?

Prior research suggests that egocentric and allocentric social evaluative concerns are present in both Western and Eastern cultures, and that an individual's social evaluative concerns may reflect his or her self-construal more than his or her cultural orientation. In order to evaluate the extent to which allocentric social evaluative concerns are engendered by an interdependent self-construal, the present study experimentally manipulated self-construals with a cultural prime. Participants included 66 adult Amazon Mechanical Turk users who were located in the United States and who mostly identified themselves as white/Caucasian (72.7%). Participants were randomly assigned to one of two priming conditions, and two ANOVAs revealed significant main effects of the priming activity on participants' fears of self-embarrassment and discomforting others due to TKS symptoms. Participants who received the collectivism prime reported more allocentric social evaluative concerns than did participants who received the individualism prime. Thus, allocentric social evaluative concerns seem to be tied more closely to an interdependent self-construal than to membership in a collectivistic culture.

William Gregory, University Scholar

Lizbeth Souza-Fuertes, mentor

South American Consumptive Wildlife Tourism

In my paper, I would like to present an analysis of the impact of foreign hunters and fishermen in Bolivia, Brazil, and Argentina. Foreign tourism plays an important role in many Latin American countries, and this particular form addresses a key niche within the industry. Money from tourism largely flows into developed areas such as major cities or long-established destinations such as beaches or major landmarks. The advantage of the hunting and fishing industry, from a national perspective, stems from its ability to work within underdeveloped rural areas. This provides a steady flow of capital and jobs that can vitalize rural communities. Governments who can take advantage of this opportunity should do so at once, because the hunting and fishing industry provides jobs for local workers, attracts wealthy clients who are often willing to invest in development for the area, and helps to establish infrastructure such as roads and power lines that benefit the community.

Brett J. Hager, English

Mona Choucair, mentor

Home is Where the Haunt Is: History, Haunting, and the Contemporary African-American Community in Toni Morrison's Beloved

Toni Morrison's *Beloved*, hailed as one of the most important books of the twentieth century, challenges the contemporary reader to come to terms with the reality of slavery through the lens of a neo-slave narrative. Set around Cincinnati, Ohio, *Beloved* tells the story of ex-slave Sethe, who lives at the house 124 with her young daughter Denver. When a mysterious young woman named Beloved arrives to the house, Sethe is forced to confront not only her own troubled past as a former slave, but also the dark history of the people forcibly brought to the American landscape to work. This thesis analyzes the role of the literal and figurative ghosts accompanied by that history in the personal life of the protagonist as well as the public life of the African-American community around her. Through situating her text in the time of slavery, Morrison looks backward while addressing her present-day audiences, transcending temporal boundaries and propelling her work into the twentieth century. By making relevant to present-day readers the harsh reality of slavery, the author memorializes those whose lives were lost to enslavement and culturally unites those left behind.

Erika Hallak, Spanish

Allyson Irom, mentor

Improving Health Literacy and Health Care for Hispanic-Americans

At its simplest definition, health literacy is characterized as the basic reading and numerical skills necessary for a person to function in a health care environment. Unfortunately, approximately 77,000,000 adults in the United States of America have basic or below basic health literacy skills. Inadequate health literacy seems to be the single biggest cause of poor health outcomes, primarily by inhibiting self-advocacy on the part of the patient. Awareness of health literacy is an important issue that is necessary for proficient navigation through the health care sphere by both the patient and the provider. In a nation that is comprised of all races, ethnicities, and cultures, over 24,000,000 residents speak English less than very well. The largest minority in America is the Hispanic population, currently representing 16% of the U.S. population (more than 50,000,000 people). Of this group, 16,000,000 have limited English proficiency. By 2050, it is estimated that 30% of individuals living in the U.S. will be of Hispanic origin. This thesis explores the broad topic and importance of health literacy, describes the major challenges faced by Hispanic Americans in the health care setting, and identifies ways of improving health care for Hispanic patients.

Dresden Hasala-Shooks, Spanish and Political Science

Sung Joon Jang, mentor

Personal transformation and desistance from crime in the criminal justice system

Criminal punishment practices in the United States have varied greatly in severity and purpose throughout their history. Nonetheless, prison practices have retained their basis in the theories of retribution and deterrence, theories that emphasize an offender's rational choice to commit crime and to be punished legitimately for transgressions. This criminal corrections framework is designed mainly to address and punish criminal behavior. A purely castigatory approach, however, does not sufficiently address criminal identity. Using high recidivism rates as a springboard for the case that the American criminal justice system is not effectively reforming criminals, this thesis investigates desistance from criminal activity as a process that is heavily dependent on an individual criminal's will to change. The strength of this transformational impetus then amalgamates external factors such as accessibility of legitimate work and strength of social bonds and internal factors such as perception and identity as an offender or non-offender.

Cami Hebert, Baylor Business Fellows, Economics, and Biology

Joyce Nuner, mentor

Premature Birth and the Impact on the Family System

Premature birth is a phenomenon that is increasingly prevalent and affects not only the nuclear family, but also many others. The impact on those surrounding the nuclear family is not well addressed in the literature. This study uses a case study method to investigate a family's experience of having a child born prematurely and explores the impact of the premature birth in the ecological systems to which the family belongs. In-depth, personal, semi-structured interviews were conducted with parents, extended family members, a work colleague, and healthcare professionals about how the family and these groups were mutually influenced by the birth. A theoretical framework of Ecological Systems Theory was used to explore the complex interactions of different layers of the family system. The results indicate that the impact of premature birth is substantial, wide-spread, and possibly underestimated, particularly for extended family members and in the work environment of parents.

Tyler Heldreth, Biology

Eric Martin, mentor

Teaching a New Dog Old Tricks: Seeing Modern Bioethical Problems Through the Medical Ethics of Avicenna

Advancements in medical technology, for all their benefits, also give rise to ethical complications that we have never had to account for in the past. These new medical developments require us to reevaluate the philosophical assumptions underpinning medicine. Ethicists attempt to draw a hard line about what defines someone as being human, or whether the rights of fetuses outweigh the rights of the mothers, or in what order people receive life-saving treatment. More often than not, no single operative answer is produced for these questions, and there may never be. However, I propose that, by looking at the ethics of those who first founded medical knowledge, we may shed a new light on our present bioethical issues. This is not to say that these founders will provide us the answers we are looking for; rather, that they may aid us in searching out a useful solution to our problems. My thesis will specifically center the medical ethics of Avicenna, the foremost physician of the Islamic Golden age, within the context of several modern bioethical issues, and then apply his ideas to those problems.

Alexis Hitchcock, English

Lynne Hinojosa, mentor

A Dark Mirror: Duality and Reflections in Stephen King's Writers

Stephen King is well known for popular horror fiction but has recently been addressed more thoroughly by literary critics. While most studies focus on horror themes and the relationships between various characters, this thesis explores the importance of the author characters in three works by Stephen King: *Misery*, *The Dark Half*, and *The Shining*. The introduction gives a background of Stephen King as an author of popular horror fiction and discusses two themes that are connected to his author characters: doppelgangers and duality, and the idea of the death of the author. The death of the author is the idea that an author's biography should not affect the interpretation of a text.

Implicit in this idea is the notion that the separation of an author from his work makes the text more literary and serious. The second chapter on *Misery* explores the relationship between the author and the readership or fans and discusses Stephen King's divide caused by his split between his talent as an author of popular fiction and a desire to be a writer of literary fiction. The third chapter concerning *The Dark Half* explores Stephen King's use of the pseudonym Richard Bachman and the splitting this created within himself and the main character of his novel. The last chapter includes discussion of *The Shining* and the author character's split in personality caused by alcohol and supernatural sources. Studying the author characters and their doppelgangers reveals the unique stance King takes on the "death of the author" idea and shows how he represents the splitting of the self within his works.

Catherine Howard, Biology

Troy A. Baudino and Bill Neilson, mentors

Fibroblast-Endothelial Cell Interaction in the Heart

Angiogenesis in the heart requires cell-cell communication between fibroblasts and endothelial cells (ECs). We have demonstrated that fibroblast-EC interactions involve N-cadherin, as well as other cell surface molecules. In tube formation assays, co-culturing ECs with fibroblasts and blocking antibodies against N-cadherin decreased tube formation. Moreover, our studies have demonstrated that cell-cell interactions between fibroblasts and ECs results in altered gene and protein expression, specifically those factors involved in angiogenesis including IL-6 and monocyte chemoattractant protein-1 (MCP-1). These changes in IL-6 and MCP-1 expression require direct cell-cell interactions. We have previously shown that fibroblasts and ECs can exchange intracellular material through tight gap junctions. We hypothesize that small signaling proteins or microRNAs (miRNAs) can pass freely through these junctions. Our initial studies have focused on identifying miRNAs involved in angiogenesis that may pass between cells. Indeed, we have demonstrated that the miRNA, Let-7F, is able to pass between fibroblasts and ECs and may play a key role in vascular remodeling in the heart. We will continue to characterize the exchange of intracellular materials between cells and examine their roles in the vascular remodeling process following cardiac injury.

Collin Huse, University Scholar

JoJo Percy, mentor

Lighting Design of The Learned Ladies

Molière's *The Learned Ladies* is a comedy written and translated in verse, satirizing academic pretension and education. Baylor University Theatre's production set *The Learned Ladies* in the 1950's in the personal library of the well-to-do Chrysale. This thesis is comprised of the lighting design for Baylor University Theatre's production of *The Learned Ladies*; from the initial research and concept, to the implementation of that design, and a final reflection looking at its successes and failures. Special attention is given to the process by which the design was brought about and the motivation for its various elements. Also included is a look at the effect of the ETC ION's new magic sheets, their effect on cueing, and the creative process of the lighting design for this show.

Emily Johnson, Health Science Studies

Andrew Meyer, mentor

Active Catharsis: Unleashing an Athlete's Spiritual and Emotional Energies

It has been suggested that during strenuous physical activity athletes experience catharsis, have life mentality changes, and can reach a flow state (Scheff, 1979; Csikszentmihalyi, 1990; Nesti, 2007; Watson, 2007). Yet beyond these experiences, this thesis argues there is a spiritual element involved in strenuous physical activity that only some theorists have begun to acknowledge (Nesti 2007; Watson 2007). Termed *active catharsis*, this thesis explores and describes the positive, psychological, and most importantly, spiritual experience of extreme endurance athletes. For endurance athletes, the concept of catharsis is central to the examination of such powerful emotional experiences because "within a sporting context a more spiritual notion of catharsis can be detected in the lives of athletes" (Nesti, p. 166). Furthermore, *active catharsis* is only fully experienced when the athlete achieves a flow state in which they are "totally absorbed and feel in control" (Hunter and Csikszentmihalyi, 2000) in the endurance activity. Through this culmination of catharsis and flow, the athlete transcends the physical experience and describes a spiritual transformation. Data was collected at one such endurance event, The Great Brazos Relay, in an effort to ascertain data to support this new term, *active catharsis*. After the data was compared and analyzed using themes found in the literature regarding spiritual cathartic experiences and flow, the results indicate that participating in an endurance event provides feelings of overall life mentality change, emotional release, and flow. This thesis is the first to describe these themes central to the definition of *active catharsis*.

Joann M. Johnston, Environmental Science

Cole Matson, mentor

The reintroduction and recovery of the gray wolf in the Northern Rocky Mountain region

My thesis topic covers gray wolf recovery in the Northern Rocky Mountain region in the last decade. Gray wolves were reintroduced into Yellowstone National Park in 1995, by way of the Endangered Species Act, and significantly changed the ecology of the park, restoring aspen trees, healthy streams, and re-establishing a balance in the ecosystem. These changes were good, and healthy changes for the ecosystem, but causes significant stress for farmers and ranchers in the surrounding area. After about a decade and a half, the gray wolf population had grown exponentially and the process of removing them from the Endangered Species List began. After removal from the ESL, wolves were under state management for the first time ever. However, state management is not supportive of gray wolf recovery, and puts their population in danger of extirpation again. There were and are several political issues about gray wolf recovery, and my thesis seeks to understand the cultural attitude toward gray wolves, in order to work with stakeholders to create a state management plan that supports both stakeholders and wolves.

Calley Jones, Biology

Bryan Gibbon, mentor

Role of GCN2 in maize cold response

Wild type maize is deficient in several key amino acids necessary for proper human nutrition. The maize *opaque2* mutation gives the grain a more complete protein content, but it makes the endosperm fragile. Lines known as Quality Protein Maize (QPM) have been created to combine enhanced protein content with stronger endosperm, but they are difficult to produce because they require the introgression of several *opaque2* modifier genes. A better understanding of the mechanisms that control the *opaque2* gene could help in the improvement of QPM. Translation of Opaque2 is regulated by the protein kinase GCN2, which is activated by low amino acid levels. GCN2 activity has also been implicated in other environmental stresses, such as drought and extreme temperatures. This study aims to examine the role of GCN2 in the maize cold response pathway. The pathway is regulated by the transcription factor ICE1, which is in turn regulated by SIZ1-mediated sumoylation and HOS1-mediated ubiquitylation. ICE1 induces expression of CBF/DREB1 proteins that stimulate expression of several cold response genes. This study analyzed expression of SIZ1, ICE1, CBF3, and the cold response protein COR413 under conditions of cold stress in wild type and GCN2 mutant seedlings. Maize seedlings were grown in cold chambers, and leaf tissue samples were collected at several time points. RNA was extracted from samples and used to synthesize cDNA. Expression of cold response genes was evaluated using qPCR. All cold response genes showed increased expression in cold-treated seedlings compared to those grown at room temperature. Additionally, expression of all cold response genes was increased in GCN2 mutant seedlings as compared to wild type seedlings grown at cold temperatures. This is indicative of a link between GCN2 activity and maize cold response.

Kirsten Kappelmann, University Scholar

Todd Buras, mentor

Proportioning Theistic Belief: Approaches to Faith, Reason, and Evidence

To what extent should belief that God exists be proportioned to the evidence for such a claim? Possible responses to this question range from positions in which theistic belief requires no evidence to be rational to positions in which it must meet the same evidential standards as a scientific theory. This thesis attempts to map the logical space of the proportionality question, offering an analysis of the main views one can take on the issue. After a discussion of the evidentialist objection to belief that God exists, recent treatments of fideism, evidentialism in several varieties, and pragmatism all receive consideration. I discuss the strengths and weaknesses of these different positions, drawing out their motivating philosophical assumptions and theological implications.

Heather King, Mechanical Engineering

Brian Garner, mentor

Developing a Method to Quantify Cyclic Motion Patterns Using Smart Phone Inertial Sensors

Cyclic motion patterns are those that repeat in a periodic sequence. Researchers have traditionally quantified cyclic patterns using high-quality optical or video motion capture systems that are often expensive and cumbersome. However, the modern emergence of accelerometers and gyroscopes embedded within common smart phones has inspired new research efforts to characterize motion patterns from these less expensive and more broadly-available tools. While many recent studies have focused on acceleration data, the present study seeks to derive the positional translation and orientation patterns from the smart phone data. A primary challenge with deriving positional data from accelerometer sensors is that the data must be integrated twice with respect to time, and data noise accumulates into substantial drift. For this study, the motion pattern of a mechanical horse was simultaneously recorded with a high-quality video motion capture system and with iPhone sensors. Positional data was derived from the iPhone data using an algorithm that capitalized on the known fact that the motion pattern was cyclic. Comparison of the motion-capture and iPhone-derived data sets revealed that the algorithm was very successful at reproducing the patterns of angular orientation, but not successful at completely eliminating drift from the positional translation pattern.

Morgan Knight, Nursing

Linda Plank, mentor

Effective Familial Coping with a Chronically or Terminally Ill Child

Due to a personal experience with chronic illness as a child and a passion for these children and their families, this thesis deals with effective and ineffective coping mechanisms of parents and siblings of a child with a chronic or terminal illness. A review of the literature is proposed and themes identified for these families such as uncertainty about the child's illness and its prognosis and increased psychological and financial stressors on the family throughout the child's illness. Many of the resources utilized for the research on this topic discussed the increased stress on the entire family during a child's illness, promoting the use of the family systems approach when applying the nursing process. When using the nursing process with this approach, the nurse, along with the family, assesses the health history and dynamics of the family, diagnoses the important issues at hand, plans ways to alleviate these issues, implements appropriate interventions, and evaluates whether the interventions worked to improve the family's issues noted in the nursing diagnosis. Finally, nursing implications regarding effective and ineffective methods of coping for mothers, fathers, and siblings are outlined. This thesis provides nurses with a knowledge base for implementing a family nursing technique and promoting positive coping mechanisms for the families of children with chronic or terminal illnesses.

Evangeline Mendenhall Kozitza, University Scholar

David L. Jeffrey, mentor

Hermeneutical Harmonic: The Four Canticles of Luke's Gospel as a Symphony of OT and NT Theological Themes

The four canticles in Luke's Gospel (Mary's Magnificat, Luke 1:46-55; Zachariah's Benedictus, 1:67-79; the angels' Gloria, 2:14; and Simeon's Nunc Dimittis, 2:29-32) hold a unique place both in the canon of Christian Scripture and in the life of the Christian Church. They are set at the heart of the Scriptures because of their literary proximity and unique poetic response to the event to which all of the Scriptures point – the Incarnation of Jesus Christ. In the Church, the canticles have been used from the early centuries of Christianity in liturgies, as Christians adopt the words of Mary, Zachariah, the angels, and Simeon as their own. This thesis project reflects upon the four canticles both textually and musically. In a written analysis, I argue that the canticles achieve for Luke's narrative a hermeneutical “harmonic,” in that they provide a synthesis of ancient Jewish and early Christian theological themes. They thus both recapitulate many theological themes from Hebrew poetry in the Old Testament, and serve as an exposition for theological themes that Luke develops in the rest of his Gospel and Acts. In a musical composition for violin, piano, alto, and bass, I aim to draw upon the ideas developed in the written analysis by putting several of the reflected upon Hebrew and Greek texts into the artistic form of the canticles themselves: a song to praise the Lord.

Jimmy Kuhn, University Scholar

Kevin Pinney, mentor

The Design and Synthesis of Antibody-Drug Conjugate Linker Molecules

A relatively recent addition to the arsenal of potential treatments for cancer involves the use of vascular disrupting agents (VDAs). Small-molecule VDAs target the blood supply of a tumor, starving it of nutrients and oxygen, leading to central tumor necrosis. The Pinney Group has recently synthesized a variety of unique anticancer agents that function with dual modality; as potent VDAs, and as profoundly cytotoxic anti-proliferative agents. Like many cancer treatments, at a sufficiently high concentration VDAs affect healthy cells as well as malignant cells. In an effort to efficiently target these agents, such as KGP18, towards tumors and the tumor microenvironment, they are being incorporated as payloads into appropriate antibody-drug conjugates (ADCs). These constructs feature a short amino acid sequence for further selectivity along with a self-immolative spacer. The design and synthesis of these linker constructs are presented here. Future studies will determine the efficacy of these ADCs.

Rachel F. Larrabee, University Scholar

Paul Marten, mentor

Baptism and Membership in the Baptist Tradition: A Study of the Relationship Between Church Practice and Community Life

Baptism and membership are two practices that have persisted within the Baptist tradition for years. Using the examples of Mission Hills Church (Littleton, CO) and DaySpring Baptist Church (Waco, TX), the purpose of this study is to explore how these two specific practices may be displayed in the Baptist tradition, how they may be connected, and what their connection may imply about church life. To these ends, the thesis first presents a broad overview of Baptist theology concerning baptism. Second, the analysis moves to a discussion concerning select membership styles in the Baptist tradition. The analysis concludes by examining two different attempts to integrate baptism and membership in the life of the church. Finally, the analysis critically evaluates and compares the practices of baptism and membership at Mission Hills Church and DaySpring Baptist Church.

Kate Lee, Spanish

Paul Larson, mentor

Abuse, Exposure, and Female Agency in the Short Stories of Emilia Pardo Bazán

The purpose of this thesis is to examine and analyze the short stories of Emilia Pardo Bazán. Pardo Bazán uses narratives, fables, and other notable writing elements to expose the controversies surrounding women in the 19th century of Spain. She confronts abuse, the lack of female agency, the problems with gender stereotypes and other inequalities women faced and continue to deal with today. Incorporating Pardo Bazán's short stories: "The Torn Lace," "The Red Stockings," "Memento," "First Love," and "Revolver" readers will understand the variety of styles Pardo Bazán employs, as well as her profound statement on the status of genders in Spain.

Daniel Lewis, University Scholar

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.

Robert Lewis, Choral Music

Robert Best, mentor

Fundamentals of Versatile Vocal Technique

In the twentieth and twenty-first centuries, the boundaries of vocal technique have been expanded into realms heretofore unexplored. The physical nature of singing has not changed; only the ends to which it is employed. Two distinct styles have emerged: classical and contemporary/musical theatre technique. Pedagogues from the two fields teach many of the same concepts, but differ in their emphasis on certain elements over others. This thesis discusses the elements of singing stressed roughly equally by both styles of singing, and describes certain techniques used to teach them.

Elizabeth R. Luper, Biochemistry

Sung-Joon Kim, mentor

The Effects of D-Amino Acids on Staphylococcus Aureus SA113 Biofilm Formation

Biofilms play a major role in the development of drug-resistant, persistent bacterial infections. D-amino acids have been proposed as biofilm inhibitors that prevent biofilm formation by incorporating into the peptidoglycan. We investigated this mechanism of inhibition using SA113, a *Staphylococcus aureus* clinical isolate that exhibits strong biofilm formation. The dispersive and inhibitory effects of D-tyrosine, D-phenylalanine, and D-proline were measured with a crystal violet biofilm assay. The addition of D-amino acids during or after biofilm formation did not disperse the biofilm or inhibit its formation. To study the proposed D-amino acid incorporation into peptidoglycan, SA113 cells were treated with mutanolysin and then analyzed with liquid chromatography-mass spectrometry (LC-MS). Our initial LC-MS analysis of SA113 grown in the presence and absence of D-amino acids suggested that peptidoglycan composition was not affected by the addition of D-amino acids.

Matthew J. Maass, Political Science

David Corey, mentor

Nonintervention as a Guidepost in International Relations

Nonintervention is the principle in international relations that prohibits states from interfering in the internal affairs of another. This norm faces challenges in the form of interventionist policies that seek to end civil wars and their human costs. I propose that nonintervention is the best default policy for the international system. Nonintervention serves to both respect states relationship with their citizens and to provide stability in the international state system. But, it is only a guide and in situations where it fails to provide for the end it was meant to, it may become more prudent to suspend the norm in favor of intervention. One of the goals of my thesis is to discern the situations in which to suspend the principle of nonintervention.

Jacob Maher, Biology

William G. Hoy, mentor

Physician-Assisted Dying: A new model for current clinical application

Physician-Assisted Dying is a practice that has become more prominent in medicine in the last two decades. In its long and varied history, it has affected multiple cultures and garnered diverse responses from the people of that time. Typically, the main two factors associated with physician-assisted dying include patient autonomy and sanctity of life. However, a new model is needed that combines these two factors along with “social value” to more accurately show the effects each has on both society and individuals with fatal diseases. As an added benefit, the model can be used to analyze both legal policies that have been enacted and individual patients who wish to utilize physician-assisted dying to avoid suffering. Finally, physician-assisted dying is a practice that will only grow in the coming years due to current medicine, and so current physicians and other healthcare providers must consider its clinical application in the future.

Richa Manglorkar, Biology

Myeongwoo Lee, mentor

The effects of the egl-13 transcription factor is linked to the pat-3 β integrin

The ability to properly reproduce is essential to any organism, including the hermaphroditic model organism *Caenorhabditis elegans*. In *C. elegans* development, the transcription factor egl-13, a homolog of human polycomb related transcription factor, is essential for early uterine cells to maintain their function. Studies have shown that the polycomb protein is involved in inducing pluripotent stem cells from contingent fate somatic cells in mice. The egl-13 transcription factor allows the uterine cells to attach to the inner muscle layer of the body wall and bind to the vulva. This process is essential because the uterus must be attached to the vulva in order for the nematode to lay eggs. In this study, we utilized RNAi to knock down the expression of egl-13. The worms displayed the Egl phenotype which includes a buildup of eggs within the uterus since the worm is unable to lay eggs and hatched progeny inside the worm abdominal cavity. The next step of the study involved coupling the egl-13 RNAi with a line of worm containing a pat-3 β integrin defect. Integrins are a family of transmembrane receptors that are involved in many cellular processes, including signal transduction. After performing egl-13 RNAi in a pat-3 β integrin mutant background, we noted a more severe egl-13 phenotype. Furthermore, the egl-13 RNAi coupled with the integrin defect led to fewer viable progeny, suggesting that synergistic event between egl-13 RNAi and pat-3 mutant defects caused lethality of animals. Therefore, I conclude that egl-13 transcription factor can be placed in or parallel to integrin signaling for uterus formation. This research is ongoing and will continue with egl-13 RNAi in several different worm lines and assays testing for motor function.

Victor Manon, Biology

Patrick Danley, mentor

Quantifying the Genetic Basis of Yellow Pigmentation in Lake Malawi Cichlid Fish

As a likely target of sexual selection via female mate choice, male nuptial patterns are thought to have played a role in the extraordinary diversification of Lake Malawi's rock-dwelling (*mbuna*) cichlids. The extent to which male coloration can explain the rapid evolution of the *mbuna* clade, however, is dependent on its underlying genetics. If male nuptial pattern is found to be mediated by few genes of large effect, then this genetic architecture could support rapid phenotypic evolution and offers a potential mechanism for explaining the extraordinary diversity of Lake Malawi cichlids. To this end, this study aims to quantify the number of genetic factors and the mode of gene action influencing male xanthophore pigmentation in two closely related sympatric *mbuna* species of Lake Malawi. We estimate that xanthophore pigmentation in both scales and pelvic fins is regulated by few genes of large effect in a model through genes with epistatic effects. While few genetic factors may regulate both phenotypes, an observed lack of correlation between fin and scale pigmentation suggests that these factors are not shared between both traits and allow for sexual selection to act on the different phenotypes independently. These results provide insight into the genetics of male nuptial coloration and add to a body of literature supporting pigmentation patterns' roles in cichlid diversification.

Janna Martindale, University Scholar

Jean Boyd, mentor

I'm a Christmas Unicorn: A Musicological and Theological Analysis of Sufjan Stevens's Song, "Christmas Unicorn"

The purpose of this thesis is to introduce the reader to Sufjan Stevens's 2012 fifty-eight track album *Silver & Gold*, and specifically the final song, "Christmas Unicorn," a twelve and half minute anti-epic pop song that starts off in a folk style and builds to an electronic, symphonic climax. The album presents many styles of Christmas songs, including Bach chorales, hymns, original songs, "Jingle Bells," and a Prince cover. I argue that this album is a post-modern presentation of how all the different expressions of Christmas are valid, no matter how commercial or humble. "Christmas Unicorn" synthesizes all these ideas throughout the album through the metaphor of the unicorn, which is a medieval symbol of Christ in His Incarnation and his Crucifixion. Stevens uses the symbol of the unicorn to represent Christ as well as all humans and all the different attributes of Christmas.

Beau Joshua Martinez, Biochemistry

Alden Smith, mentor

Death and Afterlife through Literature

A close examination on what it means to die by looking at the different works of Lucretius, Theodore Roethke, and Walt Whitman. Each author speaks about a differing perspectives that range from death of the body and soul to a victory over death through God. Despite these differences in beliefs, each author attempts to quell the fear of death.

Kathryn E. Mason, University Scholar

Elizabeth Corey, mentor

The Law in Extraordinary Times: U.S. Detention Policy and the Supreme Court

U.S. detention policy is an extremely complex and controversial topic. The policy was developed through dialogue between the judicial and legislative branches. As such, the policy was developed piecemeal over time and is not a comprehensive policy. This thesis analyzes the three major Supreme Court opinions regarding alien detainees at Guantanamo Bay—*Rasul v. Bush* (2004), *Hamdan v. Rumsfeld* (2006), and *Boumediene v. Bush* (2008)—and looks at the congressional response to each decision in order to trace the development of detention policy and the clarification of the rights of detainees. In a century where wars are taking on an increasingly asymmetric character and some of the main belligerents are non-state actors, the limits on U.S. detention policy and the rights of detainees articulated by the U.S. Supreme Court affect U.S. actions far beyond the current wars.

Cristina Mendez, University Scholar

Hugh Riley, mentor

Everything's Better In Texas? Analyzing Texas' Mental Health Care

As can be seen through numerous studies, Texas' mental health system is in crisis. Mental health services are often ineffective due to obstacles in accessibility, availability, and acceptability. In Texas, the vulnerable populations most affected by these obstacles are the rural, Hispanic, and youth populations. Considering the size of Texas and its growing population, delivery of mental health services must be strategic to ensure all citizens receive quality treatment. This thesis project demonstrates Texas' potential as a leader in mental health by analyzing deficits in care, discussing demographic forecasts, and examining historical policies. From this study, this thesis ultimately contends that by integrating data-driven solutions, educational policies, and furthering professional development in mental health care, the state will optimize its use of resources.

Melissa Ann Meyer, University Scholar

N. Bradley Keele, mentor

Prenatal Stress Increases Both Learned and Unlearned Fear in Adult Rats

The amygdala is critical in generating the emotion of fear. Exposure to stress during prenatal development is associated with changes in fear- and anxiety-like behavior. To examine the influence of prenatal stress on emotional behavior in adults, offspring of prenatally stressed (PNS) and unstressed control (USC) dams are evaluated on behavioral tests (one pup per litter on each), including fear potentiated startle, elevated plus maze, open field test, and a sociability test. The fear potentiated startle results indicated that the USCs had less conditioned fear on testing day to the conditioned stimulus than the PNS group, suggesting higher learned fear in the PNS group. The elevated plus maze results indicated that the USCs had a higher preference for the open arm than the PNS group, suggesting higher unlearned fear in the PNS group. The open field test showed a slightly higher preference of the USCs over the PNSs to venture into the center of the open field, which also suggested higher unlearned fear in the PNS group. This project shed light on the impact that early life experience has on adult behavior relevant to psychopathologies such as mood and anxiety disorders.

Mie Millard, University Scholar

D. E. Mungello, mentor

Revival in Henan: The Movement of the Holy Spirit among Missionaries and Chinese Christians

In spite of the great political, economic, and social upheavals that churned in China during the first half of the twentieth century, the 1920s to 1940s were a time of great revivals in the Christian communities throughout the nation. Led by indigenous Christians and characterized by manifestations of the Holy Spirit, these revivals often caused the Chinese to separate from the various missionaries and foreign organizations with which they had previously been affiliated. Yet when the Shandong Revival spread west, missionaries in the Henan province participated in this movement of the Holy Spirit along with the indigenous people. Southern Baptist missionaries Maudie Fielder and Katie Murray lived through this phenomenon, and the documents that they left behind give insight into their experiences. This thesis will examine these women's papers found in the Texas Collection in order to show the unique way that this Revival simultaneously empowered Chinese Christians and strengthened their unity of spirit with the missionaries.

Stuart Adam Miller, Baylor Business Fellow, Real Estate, History

George Gawrych, mentor

Iraqi Kurds: Road to Genocide

The Kurds of northern Iraq have long been an important and troublesome issue for Iraq's government. For much of the 20th century the Kurds rebelled against Iraq in efforts to gain autonomy. These rebellions were almost always met with harsh oppression by Iraq's army. Throughout the 1960s and 1970s the Kurdish rebellions were met with particular brutality. The Iran-Iraq War, which lasted from 1980-1988, served to bring the Kurdish issue to the forefront for Iraq and Saddam Hussein, as Iraq's Kurdish groups worked together and alongside Iranian troops in rebellion against Saddam. Iraq responded to this rebellion with a brutal counter-insurgency campaign, which continued Iraq's precedent for oppression. However, the magnitude and violence of this campaign were drastically increased, surpassing any previous oppression and leading to genocide. This genocide 1987-1988 left 200,000 Kurds dead, destroyed 4,000 villages, and displaced 2,000,000 Kurds from their homes.

Amanda Mintz, Language and Linguistics

Clay Butler, mentor

Who's got the power? Conversational dominance in same-gender discourse

In many interactions, one speaker will have a tendency to dominate the conversation. In linguistic theory, this notion is called "conversational dominance," and it describes one speaker's tendency to control other speakers' conversational actions during discourse. This thesis observes the conversations of two groups of university-aged friends in order to explore the reality of this conversational dominance, both how it comes into being in an interaction and how it plays out in conversation. Using the Conversation Analysis (CA) approach to linguistic research, this thesis will (1) describe the methodology involved in the CA approach, (2) discuss relevant literature and linguistic theories pertaining to the topics of gender, conversational dominance, alignment, and teasing, and (3) provide transcribed data of the recordings. This project observes existing research along with the recorded data to argue that conversational dominance is not only something that is claimed by a speaker, as prior research has defined, but that dominance is dialogically constructed between participants in conversation.

Matthew Mosley, Electrical and Computer Engineering

Ian Gravagne, mentor

Experimental Validation of a Time Scale Observer-Controller

In control theory, dynamic systems known as observers are used to estimate system states that cannot be directly measured with sensors. Observers typically use uniform sampling rates to estimate these states, which can be extremely costly since that rate is usually very high. A branch of mathematics known as time scales allows for powerful mathematical analysis on systems that do not use uniform intervals between samples. However, the problem with observers based on time scales is that they are non-causal, meaning that they require knowledge of the sampling rate in the future. This is not practical in a physical system. A theorem has been proposed that if the statistics of the time scale are known, then an observer can be designed that can reasonably predict the future intervals of the time scale. This allows the observer to refrain from wasting resources with a high sampling rate when a lower rate will suffice. The purpose of this thesis is to put this theorem to the test on a Quanser rotary inverted pendulum.

Derek R. Newberger, Biology

George P. Cobb, mentor

*Transition metal accumulation in caudal scutes of American crocodiles (*Crocodylus acutus*) from Belize*

Contamination of aquatic environments is a global concern that poses risks to wildlife and human health. Due to their high trophic status, broad diet, long life span, and occurrence in a variety of aquatic habitats, crocodylians (crocodiles, alligators, caiman, gharials) are susceptible to exposure and accumulation of numerous persistent environmental contaminants. American crocodiles and other reptiles bioaccumulate contaminants due to low metabolic rate, lower energy demands, lower dietary exposure, and poor enzymatic detoxification as compared to birds and mammals. Before this study, no data described transition metals in caudal (tail) scutes of crocodiles living in Belize on the offshore islands (cays). We examined transition metal concentrations in caudal scutes from American crocodiles (*Crocodylus acutus*) sampled from various localities on Ambergris Cay, Belize (n=37) and the Tárcoles River in west-central Costa Rica (n=7). Scutes samples (n=60) were digested using an acid digestion method (EPA 3050B). Inductively coupled plasma-mass spectrometry was utilized to determine transition metal concentrations for Pb, Zn, As, Cu, Ag, Be, Cd, Al, Cr, Ni, Co, Mo, Sb, Se, Tl, and Sn. For Costa Rica, adults from Belize, and juveniles from Belize the metals with the highest concentration were Al, Zn, and Cu; Al, Cu, and Zn; and Al, Sn, and Zn. Although not among the highest in concentrations, Pb, As, and Se data indicate the need for further evaluation of crocodile exposures to toxic metals. Adverse effects of these toxicants include: neurotoxicity, anemia, carcinogenesis, and teratogenesis. Five juveniles from Belize generally contained the highest metal concentrations within the data set. Two way ANOVA tests were performed for proximity and sex, sex and size, and proximity and size. Regressions of metal concentration in the scutes versus snout-to-vent length from the juveniles from Belize were highly correlated for Mo ($R^2=0.83$), followed by Pb ($R^2=0.71$), and Cd ($R^2=0.61$). Significant regressions for adults from Belize were limited to Ag ($R^2=0.36$), followed by Sn ($R^2=0.30$), and Co ($R^2=0.27$). Metals in scutes were also highly correlated to one another.

Angeline Nguyen, Biochemistry, Biology

Sung-Joon Kim, mentor

*Carbon Metabolism in Lipid-Producing, Nitrogen-Starved *Chlamydomonas reinhardtii**

In recent years, studies have shown that lipid bodies produced by nitrogen-starved green algae such as *Chlamydomonas reinhardtii* may serve as viable alternatives of fossil fuels. While there is no doubt that these organisms are capable of producing energy-packed lipids, the exact pathway of how carbon is incorporated into the cells to make energy-storage molecules has yet to be determined. In order to determine this, the mutant strains sta6 and cw15 were grown using acetate as their main carbon source. Although both strains lack cell walls, sta6 lacks a key starch-producing enzyme. Because of this, it is known that sta6 primarily incorporates the exogenous acetate into triacylglycerides (TAGs) while cw15 primarily produces starch under nitrogen-starvation. The acetate was labeled with $1-^{13}\text{C}$ acetate and tracked using nuclear magnetic resonance spectroscopy. It was found that the acetate

is not incorporated into lipids and starch directly through typical metabolic pathways but through a bicarbonate system.

Denise Nguyen, Biology

Alexandre Thiltges, mentor

The Price of Healthiness: The Role of Employers, Government, and Physicians in the Evolution of the Health Care Systems in France and the United States

The United States boasts one of the most expensive health care systems in the world, yet there are no comparable outcomes associated with access and quality of care. While other countries consider access to health care services a human right, the United States has maintained a system where too many people are uninsured and are, therefore, not readily able to gain access to these services. Rising costs and a growing vulnerable population led the United States to pass the Patient Protection and Affordable Care Act (ACA) in 2010. France, however, has had compulsory health insurance, fulfilled through *Sécurité Sociale*, for several decades. The current state of both health care systems offers an interesting comparison of how employers, government, and physicians exerted their influence on the eventual passing of compulsory health insurance. Important to this comparison is that even though France has succeeded in completely insuring all of its citizens, a current issue the country must address is the financial burden of keeping a program of such magnitude afloat. Entwined in their history, France and the United States share a commonality in problem and solution, which is ultimately connected to the continual evolution of what defines *healthiness*.

Vivian P. Nguyen, Neuroscience

Lisa Baker, mentor

Prevalence, Severity, and Potential Risk Factors for Fibromyalgia in Rural, Western Kenya

Past studies in the United States and Canada have found that the prevalence for fibromyalgia (FM) is approximately 2%, but there are very few studies of this condition in developing countries. With the organic basis unknown, the diagnosis of FM rests on the subjective report of chronic pain, sleep and cognitive disturbances, and mood alteration. Since these experiences are partially culturally conditioned, it is possible that the prevalence of FM in a setting of subsistence farming, generally high disease burden, and famine may be different both for physiological and cultural reasons than in a developed country. The prevalence, severity, and risk correlates of FM were investigated. A cross-sectional study of 128 Luo adults in rural Kenya consisted of interviews with patients presenting to an annual temporary clinic. A modified version of the 2010 American College of Rheumatology preliminary diagnostic criteria for FM was used to identify bodily points of pain and severity of symptoms in order to categorize subjects with FM. A Community Health Assessment Profile was used to record patient demographic and background information. The study yielded a prevalence of 22% for FM, and the primary risk factors that were identified included age and psychosocial stressors. The high prevalence of fibromyalgia calls into question the role of psychosocial stress in a developing country as a significant context in understanding the disease.

Michelle Nosrat, English

Greg Garrett, mentor

Looking For Alaska: Screenplay

Adapting a book into a screenplay is a very unique process. *Looking For Alaska* is an award winning novel by author John Green (*The Fault in Our Stars*). The story focuses on Miles "Pudge" Halter and his friends, The Colonel and Alaska Young and their time at Culver Creek Boarding School. Instead of being divided into chapters, the book follows a countdown of days to a life changing moment. This uncommon format presents a challenge in the screenwriting process. It is easy to write that days have passed or to describe what a character is thinking on a page, but doing it on screen is very different. In a script, the character's thoughts and feelings must come through in his dialogue and actions, which is a unique challenge that most fiction writers do not face. In preparation for writing, I read many adapted scripts and their novel counterparts, some of which were done well and others not so well. I also

focused on screenplays that were told in formats similar to *Looking For Alaska*. Stephen Chbosky's screenplay adaptation of his novel *The Perks of Being a Wallflower*, Scott Neustadter and Michael Weber's screenplay "500 Days of Summer" and William Goldman's script for *The Princess Bride* were all very influential in my writing and study of adaptation.

Flora Park, Biology

Lisa Baker, mentor

The Prevalence and Effect of Blood Lead Levels on Body Mass Index in Children in Rural Western Kenya

According to the World Health Organization (WHO), lead poisoning accounts for 0.6% of the global disease burden and has been described as the silent epidemic plaguing developing countries. The goal of this community-based research study was to investigate the prevalence of lead poisoning and the potential relationship between clinical and sub-clinical blood lead levels and body mass index (BMI) in a remote, rural location of western Kenya. Within a sample of 292 children 14 years of age and younger in Nyanza Province, the average blood lead level (BLL) was 3.601 µg/dL with a range of <3.3µg/dL to 35.7 µg/dL (SD=3.166 µg/dL). A level of 4.6 µg/dL was shown in as early as 1 month of age. This indicates exposure long before the child is able to play in or ingest contaminated soil. The results show that lead has a pseudo-protective effect that mitigates the weathering effect of age over time that contributes to less BMI decrease in younger children and an increase in BMI in older children exposed to lead. These results indicate a need to identify potential lead absorption pathways for further preventive intervention.

Niharika Pereira, Psychology

Douglas Henry, mentor

Musical Expression: A Comparative Study on the Emotional Experience of Music

Music pervades our world like no other art form. Among the subtle powers of music is its connection to the emotions. The question of how music is able to express emotions has fascinated thinkers for centuries. Susanne Langer and Stephen Davies are two prominent philosophers who have intently pursued this question. Among her key insights, Langer argues that music is symbolic of the "forms" of feeling and gives us insight into what may be called "the life of feeling." In contrast, Davies reaches the conclusion that expressive properties are literally possessed by music, and that music expresses emotion through the "appearances of emotion characteristics." After critical evaluation of these two thinkers, I conclude that Davies' theory succeeds as the more compelling account. Moreover, I appropriate Davies' insights by using them in an examination of Gustav Mahler's *Symphony No. 5*, a twentieth-century work that in five movements takes its audience through a dynamic, emotional experience.

Marcie Persyn, Classics

Jeff Hunt, mentor

An Innovation in Mundanity: Theocritus and the Quotidian Woman

This thesis proposes to analyze the representation of women in the urban mimes of the Greek Hellenistic poet Theocritus. Best known for his bucolic poetry which incorporates aspects of mime into a country setting, Theocritus nevertheless also wrote more traditional mimes, known as the urban mimes, as a subset within his main work, the *Idylls*. Of these poems, *Idylls* 2 and 15 describe, respectively, a young woman's attempt to avenge her lost chastity with magic, and the participation of two housewives in a religious ceremony held at Alexandria. These *Idylls* reveal a striking development in the representation of female characters in literature, featuring women who no longer conform to the artificial paradigms inherited from myth and epic, but instead fall under a newly emergent archetype of the Hellenistic period: the quotidian woman. By implementing this new literary figure, which epitomizes the mundane and humanizes his poetry, as the chief voice of his urban mimes, Theocritus simultaneously draws upon and innovates the work of his forebears and contemporaries, enhancing the female figure into a relatable and realistic character, both comic and poignant, through whom he can more artfully relate the themes of his poetry.

Meagan V. Pike, Secondary Education: English, Language Arts, and Reading

Tony L. Talbert, mentor

The Perceptions of Teacher Status and Impact on the American Educational System

Teachers are important. Second to parents, teachers are the most influential people in students' lives and the quality of a child's teachers are a key determinant in that person's success long after they are finished with public schooling. Despite the proven importance of teachers, teacher status in America is ambiguous; while many have a nostalgic respect for teachers, current educational debates and reforms focus on holding teachers accountable, take away teacher autonomy, and deprofessionalize the career. Understanding teacher status is important, because a society's value of teachers indicates how much it values education. Therefore, this study focused on examining popular press and professional journals in order to be able to understand the status of American public school teachers and how that status affects the students and decisions made in the classroom. While both popular press and professional journals revealed concerns with teacher effectiveness and quality, professional journals overall took a more nuanced approach to the issues around teacher status, calling for teacher autonomy and teacher involvement in educational decisions and observing that current educational trends lead to dissatisfied teachers and a decrease in the quality of education students received, as teachers lack the freedom to make personalized decisions within their classrooms. Teacher status must be improved in order to create the quality education that the United States needs. Raising teacher status involves multiple components, but most important is that teachers themselves raise their voices beyond the walls of the teachers' lounge, to involve themselves in educational decisions and instigate change.

Krystal Pothier, Religion

Natalie Carnes, mentor

The True Myth: C.S. Lewis and Remythologization

The term *myth* often carries with it a negative connotation, especially when it is brought into conversation with widely held religious beliefs. The most common definition of *myth* pertains to outdated convictions held by primitive people. Popular Christian apologist C.S. Lewis, however, entertains a different idea of mythology. For Lewis, myth is used as a descriptive term to identify a genre of literature that is extra-literary. A work that contains mythological elements must draw a reader out of himself or herself and into something greater. In *An Experiment with Criticism*, Lewis explains that a reader, after entering into an experience with myth, may well say to himself or herself, "I shall never escape this. This will never escape me. These images have stuck roots far below the surface of my mind." I argue that Lewis' developing understanding of the concept of myth played a key role in three distinct facets of his life: his conversion, his development of Christian theology, and his apologetic fiction writings. In this thesis, I look in depth at the effects of myth on Lewis' conversion and theology; then, I use Lewis' novel *Till We Have Faces: A Myth Retold* as a case study in order to illustrate the effectiveness of mythological writing in presenting the gospel.

Morgan Raley, Anthropology

Lori Baker, mentor

Perceptions of Healthcare in Rural Guatemala: The K'iche Story of Modern Medicine

Among the K'iche Maya people of Momostenango, a rural city in highland Guatemala, the perceptions of healthcare are complicated, diverse, and very rarely investigated or assigned appropriate meaning. By interviewing both local medical professionals and Mayan priests in the summer of 2013, research was performed to see how these cultural perceptions affect the efficiency of healthcare in the region. By evaluating these interviews, it can be demonstrated that the K'iche people and modern medical professionals have many obstacles to overcome in order to achieve a unified healthcare system, which is both in line with the government's recommendations and is culturally applicable. While these solutions could not be resolved within the limits of the research, it is my hope that the gathered research can be accumulated for future endeavors toward these goals.

Eric Reihle, Economics

Scott Cunningham, mentor

The Effect of the 1993 Texas Prison Expansion on the Texas Labor Market

In 1993, the Texas Department of Criminal Justice began a prison expansion project. From 1993 to 1995, Texas prison capacity nearly doubled. The prison expansion led to a large, exogenous increase in Texas worker imprisonment, therefore making it possible to examine how prison growth altered the labor market opportunities for workers in Texas. Using the economic theory of labor market equilibrium for guidance and a natural experiment methodology for the research design, my thesis evaluates the causal effect of the 1993 Texas prison expansion on employment and real wages of Texas workers.

Meredith Rosenthal, Biology

Tamarah Adair, mentor

Heterogenous response to 470nm blue light among 25 Staphylococcus aureus isolates

Staphylococcus aureus infections are an increasing concern for the United States as it is currently the most prevalent cause of hospital acquired infections. The growing antibiotic resistance amongst these bacteria has called for new treatments, including photodynamic therapy, which uses light to kill microorganisms. We tested the variance of the response to blue light of 25 different isolates of *S. aureus*. Using 470 nm blue LEDs with an approximate forward power of 80 mW and an average luminance of 4.22 klux, we exposed 1 ml *S. aureus* cultures for 30 minutes and measured the optical density at 600 nm 18 hours after treatment. We compared the blue light treatment to a control group and found that there was a wide degree of variance with inhibition values ranging from 97% to an increased growth rate of 8%. Using flow cytometry, we measured cell counts at 4 hours after exposure to blue light for 3 strains identified as highly sensitive and 3 strains identified as highly resistant. There was a range of 80-99.9% inhibition when examining live cell counts. However, the discrepancy between the more and less sensitive strains was still apparent when examining live to dead cell ratios. A variation in susceptibility to blue light indicates a genetic trait may be responsible for this phenotype. Future studies will explore the genetic differences in these strains.

Taylor Roth, University Scholar

Christine Limbers, mentor

How Coping Styles Impact Emotional Eating in a College Population

The college experience for the typical American student has two major components: stress and eating, which tend to work in tandem. However, despite the prevalence and impact of this relationship, relatively few studies have been published exploring the manifestation of stress on eating habits in college students. More specifically, can specific coping styles predict emotional eating behavior? To assess this, approximately 200 undergraduate students were evaluated on dimensions of coping styles, eating habits, and height and weight. Through correlations and regression analyses, it was found that depressive and anxious states were associated with avoidance coping, a lower BMI suggested more self-controlling coping, and that negative states could be predicted with demographic variables.

Paul Schlaudraff, Baylor Business Fellow, Accounting, Russian

Adrienne Harris, mentor

Dostoevsky's View of the Russian Soul and Its Impact on the Russian Question in The Brothers Karamazov

Fyodor Dostoevsky, one of Russia's most renowned novelists, profoundly affected the way that Russia would think of itself in the years following his death. In order to see how, my research investigates Dostoevsky's view of the "Russian soul", which is the particular set of innate characteristics which distinguishes Russians from other

nationalities. Furthermore, it examines how Dostoevsky's view of the Russian soul affected his answer to the question of Russia's ultimate destiny. During the 19th century, socialism was an especially popular answer to that question. Dostoevsky, however, presented an entirely different solution. Through a thorough examination of Dostoevsky's final novel, *The Brothers Karamazov*, my thesis demonstrates this alternative solution and its significance in light of competing Russian theory during the 19th century.

Ellen Scott, Economics

Frieda Blackwell, mentor

Censorship and Repression in Sastre's La mordaza and Jardiel Poncela's Eloísa está debajo de un almendro

In the years directly following the Spanish civil war, Spain experienced widespread repression and censorship at the hands of Francisco Franco, the dictator who assumed power after the war. Evidence of the struggle that Spaniards faced as a result of this censorship is present in Sastre's 1954 drama *La mordaza* and Jardiel Poncela's 1942 drama *Eloísa está debajo de un almendro*. Both of these dramas were written during the time of Franco's repression and thus reflect the underlying social turmoil that Sastre and Jardiel Poncela carefully present while writing under a policy of strict literary censorship. Spain experienced great fear during the time of Franco's power which often resulted in executions, disappearances, and widespread starvation. Sastre and Jardiel Poncela portray the themes of fear and censorship through their respective dramas while staying underneath the censorship radar.

Taylor Scott, University Scholar

Bryan Gibbon, mentor

Identification of GCN4 homologues in maize using a bioinformatics approach

In yeast, GCN4 is a b-zip transcription factor responsible for controlling various amino acid biosynthesis pathways. Under amino acid starvation, GCN4 is derepressed and amino acid biosynthesis increases. This is known as general amino acid control. GCN4 regulation is influenced by the presence of small upstream open reading frames in the 5' untranslated region of the GCN4 mRNA transcript. Similar genes and regulation mechanisms have been found in other organisms. Experiments in our lab suggest that in maize *Opaque2* (a homolog of GCN4) is regulated in this manner; however it is not known whether other genes are regulated similarly. Here, we use a bioinformatics approach to identify maize genes which may be regulated similarly to GCN4. We reduce the set of all maize genes to a set of 129 genes which have 5' untranslated regions structurally similar to *Opaque2*.

Hillary Catherine Shellnut, University Scholar

Ken Jones, mentor

The Grotesque Versus The Heroic: An Examination of the Female Barbarian Warrior Motif in Ancient Greek and Latin Sources

This research examines how various ancient Greek and Roman authors used the motif of the female barbarian warrior to depict their barbarian enemies. Although the specific details vary from author to author, overall this motif is used to underscore the terrifying grotesqueness of the barbarian enemy and the heroism of those who dominate the barbarian in battle. In his *Histories*, Herodotus portrayed several of his characters as female barbarian warrior types: Queen Nitocris of Babylon, Queen Tomyris of the Massagetae, Pherecyte of Cyrene, the Sauromatae tribe, and Artemisia of Halicarnassus. Similarly, several of Herodotus' contemporaries in Classical Athens (such as Aeschylus, Euripides, and Aristophanes) also included the image of the Amazon or the fighting barbarian woman to emphasize the grotesqueness of the Eastern world. However, in the historical sources for the Hellenistic era, the fighting barbarian woman motif emerges as a more conflicted image. Depending upon the positive or negative bent of the source, the Amazon motif associates Alexander the Great either to Achilles, who dominates the barbarian enemy at Troy, or to Agamemnon, who was corrupted by the grotesque East. In closing, this research examines how the Romans, the inheritors of Alexander's Empire, use the same motif to discuss and imagine their own barbarian enemies.

Will Simmons, Neuroscience

Lisa Baker, mentor

The Relative Effects of Nutritional Status and Water Quality on Body Mass Index in Children of One to Nineteen Years in a Traditional Community in Rural Western Kenya

This research study elaborates upon the quality of water and food consumed by children aged one to nineteen years in a traditional community in rural western Kenya. Specific measurements taken during June 2013 include: Wehler's Community Childhood Hunger Identification Project (CCHIP) survey, a comprehensive daily nutritional analysis, various objective and subjective measures of water quality, and child-specific anthropometric tests (height, weight, mid-upper arm circumference, waist circumference). Results of the CCHIP indicate severe child hunger status, with more than half of the sample (N = 172) indicating the greatest amount of food insecurity. Nutritional survey results suggest severe dietary monotony. The majority of the children's macronutrients (proteins, carbohydrates, fats) are gained by consumption of low-nutrition food sources such as *ugali* and porridge, both of which are variations on ground maize products cooked in water. Children in this community regularly consume native leafy green vegetables; these may confer some vitamin- and mineral-related nutritional gain. Preliminary tests suggest that no food-derived measure of nutrient intake significantly predicts Body Mass Index (BMI) when controlling for the age and gender of a child.

Meka Sintim, Mechanical Engineering

Brian Garner, mentor

Utilizing quantitative measures for the assessment of a program of therapy involving the use of the mechanical horse simulator

Individuals with neuromuscular disabilities are commonly treated with therapies that involve repetitive motion of the body and limbs. Therapists have utilized this type of therapy with live horses for years and although it has many benefits there are factors that could potential hinder a patient from receiving equine-assisted therapy (EAT). Factors range from allergies, weather, and accessibility. The purpose of this thesis research was to quantitatively assess improvements in trunk posture and stability from riding on the MHS. Researchers at Baylor University have developed a mechanical horse-riding simulator (MHS) to address this need and to provide a platform to research the benefits of EAT. A multi-camera motion capture system was used to record markers on the back, neck, and shoulders of individuals treated on the MHS at a licensed therapy clinic. Results show that trunk angle variation observed after riding the MHS was less than baseline measures observed before riding.

Luke Smith, Baylor Business Fellow

Lisa Baker, mentor

Attitudes, Knowledge, and Behavior Concerning Reproductive Health and High-Risk Sexual Behavior among Males in Rural Western Kenya

Throughout Sub-Saharan Africa, the importance of male reproductive health has been overshadowed by an emphasis on maternal and child health. However, men also face a high prevalence of sexually-transmitted infections, unplanned pregnancies, and a lack of knowledge, while holding tremendous potential to influence their society. The purpose of this study was to examine the level of reproductive health knowledge held by Luo men in rural western Kenya and to determine whether knowledge has an effect on the behaviors and attitudes of men. Fifty Luo men aged 15-51 were interviewed from numerous villages on the Nyakach Plateau in rural western Kenya. The results showed that only 36% of men had adequate knowledge regarding reproductive health, and 84% said that the men of their village needed additional information in order to plan their families. Knowledge is low, but it is valued—an important piece of information for a sample in which two-thirds had had an STI and 25% said that the sexual partners they had had were too numerous to count. Additionally, although knowledge was associated with condom usage, no association was found between knowledge and unplanned pregnancies, the number of sexual partners, and the prevalence of sexually-transmitted infections. All the teenagers in the sample reported using condoms, though only two-thirds of the adults used condoms. These findings highlight the complexity of implementing change in sexual and reproductive health behavior among men in traditional communities based strongly on culture.

Rachel Allison Smith, University Scholar

Meghan DiLuzio, mentor

Vestals Remembered: An Examination of the Myths of Rhea Silvia, Tarpeia, and Tuccia

This thesis examines three legendary Vestal Virgins and analyzes how they functioned as symbols of the inviolability of Rome. I begin with a brief discussion on the cult of Vesta, describing the rites and regulations of the cult as well as the institution of the priestesses and their duties. The second chapter focuses on Rhea Silvia, the mother of Romulus and Remus. Despite breaking her vow of chastity, which was the highest duty of the Vestals, Rhea's story has a positive outcome: she became the mother of Rome by bearing the twin founders of the city. I then analyze a Vestal named Tarpeia, who betrayed Rome to the Sabines and was punished for her crime, but nonetheless played a necessary role in the transformation of Roman identity. In the final chapter, I examine the story of Tuccia, who proved her chastity by carrying water in a sieve and subsequently became a symbol of womanly virtue. These myths reveal that the Romans associated the Vestals with the prosperity and integrity of Rome. Through each of their tales, these women allow us further insight not only into the sacred nature of Roman religious duties, but also the character and purpose of individuals within the cult of Vesta.

Ryan Smith, Language and Linguistics

Melisa Dracos, mentor

Coordination: A View from Syntactic Theory and Second Language Acquisition

Coordination is a cross-linguistically universal construction that, in English, involves words like 'and' and 'or.' This thesis aims to fill the gaps in two distinct, but related, areas of linguistic theory with respect to coordination, the first in syntactic theory, and the second in second language acquisition. From the perspective of syntactic theory, it will be argued that all previous approaches to the syntactic structure of coordination fail to describe the universal properties of such constructions. To remedy this, a new structure will be proposed that will be demonstrated to be capable of deriving all of the universal properties of coordination. From the perspective of second language acquisition, the results of an experimental study, done by the author, investigating the coordinate structure prosody used by native English speakers when speaking Japanese will show that L2 Japanese speakers learn a crucial difference between Japanese and English coordinate structures earlier than initially expected and without explicit instruction, revealing that L2 learners do not transfer certain prosodic structures from their native language. Finally, it will be argued that the experimental study has implications for the syntactic analysis, specifically in that a theory that does not recognize the possibility of certain cross-linguistic differences in coordinate structures in the first place, let alone one that can be learned by speakers of different languages, is immediately falsified by the results of the study.

Jesus Sotelo, Biology

Lisa Baker, mentor

A Cross-Sectional Study of Co-Infection with Helminths and Malaria: The Effect on Hemoglobin Levels among Luo Children in Rural Western Kenya

Intestinal worms, also known as soil-transmitted helminths, are ubiquitous in Sub-Saharan Africa (SSA). In SSA, malaria accounts for 80-90% of all worldwide cases (WHO Malaria Report 2011), and there is significant geographical overlap between these parasites (Brooker et al 2004). In this study, the goal was to study the effect of co-infection of soil-transmitted helminths and malaria on hemoglobin concentrations, along with the modifying effects of acute inflammation and nutritional status among Luo children younger than 13 years. In a clinic sample of 227 children, 53% of the children were anemic. In addition, the majority of children had either malaria (49%) or a helminthic infection (42%) or both (21%). Malaria or helminths alone were not statistically related to hemoglobin levels; however, a multivariate regression analysis demonstrated that malarial-helminth co-infection was significantly related to hemoglobin levels (overall model $p=0.0001$, $r^2=0.2644$). Stratifying by gender and the presence of helminths, malarial infection was only statistically significant in boys with helminths ($p=0.0158$, $r^2=0.2012$). In boys without helminths, the variance increases to 0.4298 ($p=0.0001$), which is entirely accounted for by age (positive relationship) and acute inflammation (CRP is negatively related to hemoglobin levels).

Furthermore, acute inflammation played a significant role in the absence of a helminth infection ($p=0.0001$). Body-mass index, a surrogate measure of nutritional status, was negatively associated with anemia when tested alone ($p=0.005$), but was not significant in the multivariate regression models that explain the variance in hemoglobin. This cross sectional study portrays the complicated relationship of parasitic co-infections and the need for community research to address the long-term consequences on children.

Kelsey Stokes, Secondary Education: English, Language Arts, and Reading

Tony L. Talbert, mentor

The Impact of the Factory Model of Education in Central Texas

The purpose of this study is to explore the elements of Taylorism, or the factory model of education as proposed by Fredrick W. Taylor, and to show its implementation in schools today. The style of writing is narrative inquiry and offers both quantitative and qualitative data to support the claims of the thesis. This thesis outlines a brief and broad history of Taylorism in the first chapter and shows how it has adapted over time. The second chapter then narrows the focus and shows how Taylorism has remained in Texas and how it has affected schools and faculty alike. The third chapter then focuses on two sample schools in central Texas and shows the proponents of Taylorism and how they have been implemented. This chapter serves as specific evidence and examples of Taylorism in the educational system today. Finally, the fourth and final chapter is a synthesis of Taylorism and its impact as well as offers suggestions for future changes in the educational system.

Cameron Bradley Strong, Biochemistry

William G. Hoy, mentor

Death Criteria: What It Takes to Die

Advancing medical technology in the twentieth century has blurred the line between certain death and potential life. Patients who would face imminent death without support may now be maintained for a period of time. Efforts to define death according to criteria began in 1968 with arguments for neurological criteria for death. Since then, brain death has become a stage in bioethics for discussions of what constitutes life and what it takes to die. A declaration of death carries social, spiritual, and clinical importance, however defining death requires an examination of what criteria must be met in order to declare death in a clinical setting. A death criterion is a social construct created by people and informed by religion that demonstrates an attempted understanding of what death is and how it may be recognized. Clinicians benefit from a better understanding of death and how patients view death by providing more meaningful care and respectful treatment of such a delicate yet universal topic.

Talj Tatum, History

David Longfellow, mentor

Comparing Thomas Jefferson and Maximilien Robespierre and Their Involvement in Church State Issues in the United States and France

This thesis seeks to compare and contrast how Thomas Jefferson and Maximilien Robespierre encountered the issues of church and state during their lifetimes. Both figures were faced with revolution in an Age of Enlightenment and both were undoubtedly influential figures in their respective revolutions. In matters of church and state, both Jefferson and Robespierre argued that the basis of morality the freedom of conscience were essential matters to study. However, the two came to strikingly different conclusions about what role the state should play in religion. Jefferson concluded that there should be a separation of church and state. Robespierre, on the other hand, concluded that the state must be directly involved in religion. Though he praised religious freedom, Robespierre played a leading role in the creation of a state-lead religion. In order to understand these differences, this thesis explores the similarities and differences in their personal faith, geography, culture, and education.

Julia Teck, University Scholar

Bill Neilson, mentor

The Ethics of Medical Devices: The Rise of the da Vinci Robot and a New Model for Its Ethical Use

The da Vinci robot is a new surgical system for minimally invasive surgical procedures created by the private company Intuitive Surgical. Since its first appearance on the medical device market in 1999, the da Vinci robot has grown significantly in popularity and two newer versions of the operating platform have been developed. Despite the rapidly increasing use of the da Vinci, several medical studies completed in the past few years question the worth of its widespread utilization as well as the marketing techniques involved and the training system in place. A review of multiple studies illustrated that in many respects the robotic surgical platform does not provide additional benefits for the patient compared to laparoscopy, yet it costs significantly more. There do seem to be certain merits to this technology, but only in the correct circumstances. This paper uses four principles of biomedical ethics (beneficence, non-maleficence, autonomy, and justice) to evaluate when use of the da Vinci robot is ethical and when it would not be. Furthermore, an ethical model for surgical training and dissemination of this robotic surgical technology is proposed.

Victoria Tijerina, Spanish

Fred Loa, mentor

Lost in Translation: A Study of the Usage of the Spanish Language in Health Care

The Spanish language is now a commonality in the United States as a result of the great increase of the Spanish speaking population in recent years. Due to the rise in the use of the Spanish language, a cultural and language barrier has developed within the health care system potentially affecting the care provided to Spanish speaking patients. This study examines the usage and availability of the Spanish language provided via the Internet by health insurance companies. Ultimately this study intends to examine how language use could be a contributing factor to improper communication and address the importance of proper usage and availability of the Spanish language, therefore providing Hispanics with the best possible care.

Stephanie Ting, Baylor Business Fellow

Janya Martin, mentor

Gender Roles in German Fairy Tales

Wilhelm and Jakob Grimm first captivated the world with their collection of tales in *Kinder und Hausmärchen*. These stories have served as the basis for many of the stories we call fairy tales. They are told to countless children around the world, and have been transformed into the feature length films we know and love. Fairy tales also act as a form of didactic literature that has been used in classrooms since the nineteenth century. In this thesis, I attempt to define this unique genre of literature, while also examining the different roles played by male and female characters, and the ways that fairy tales have been utilized since the Grimm brothers.

Jonathan Tingle, University Scholar

Lisa Baker, mentor

Explaining Monthly Variation of Reported Malaria Prevalence in Rural Western Kenya

Responsible for more than 200 million cases and 600,000 deaths in 2012, the malaria epidemic continues to be a devastating international public health crisis. Although many current public health studies focus on the development and implementation of preventive measures to fight malaria, a growing body of research also emphasizes the importance of accurate, reliable, and cost-effective diagnostic measures to treat malaria, especially in the face of new, antimalarial-resistant strains of the parasite. This thesis examines outpatient malaria records from the Sigoti

health clinic in rural Western Kenya between May 2010 and June 2012. We find considerable monthly variation of reported malaria over this time interval, with a prevalence range of below 10% to above 70%, depending on the time of year and on individuals' demographics. The purpose of this study is to attribute this variance to true seasonal variation of malaria prevalence, to the inconsistent application of clinical diagnostic standards, to fluctuations in diagnostic supplies, or to some combination thereof. While using local rainfall data as a proxy to adjust for true seasonal variation of malaria prevalence, we also qualitatively explore several challenges to efficient diagnostic methods, especially those unique to a resource-limited health care setting.

Jarrold Tunnell, University Scholar

Phillip Donnelly, mentor

Revealing Harmony, Wisdom, and Providential Justice through Political Order in Milton's Paradise Lost

Through *Paradise Lost* and *The Roodie and Easie Way*, Milton presents a portrayal of Eden and life after the fall that has profound implications for the understanding of political order. My thesis involves a series of claims about political government before and after the fall that seek to demonstrate the harmony of political and domestic life before the fall, the legitimacy of political dissent due to the nature of the fall, and the way that God works through time after the fall to prepare the elect for his heavenly kingdom. With respect to prelapsarian Eden, Milton portrays Eden as the original source of both the *oikos* (household) and the *polis* (what Milton would call "Commonwealth").

The division between these two aspects of what was initially a single reality arises from the entrance of sin into human history. With respect to the fall, Adam and Eve's disobedience of God's commandment legitimizes ensuing political dissent because the faculty of right reason has been corrupted, a capacity which is necessary for perpetual covenants. The final two chapters focus on Milton's political tract, *The Roodie and Easie Way*, and the twelfth book of *Paradise Lost*. Milton reveals how typology, prophecy, and judgment are all functions of God's providence for his elect. His texts imply that the temporal unfolding of these three activities reveal Charity and prepare the elect to fear the Lord so that they can recognize Christ as King and participate in God's heavenly kingdom.

Beth Uhlig, University Scholar

Lisa Baker, mentor

Misunderstanding Medication Instructions: Assessment of a Picture-Based Intervention in Rural Western Kenya

Health care providers, particularly English-speaking professionals participating in the delivery of short-term medical care in developing countries, face the challenge of delivering crucial information in a culturally competent way to people who may rarely or never have encountered the complex and important details of written medication instructions. Taking into account language, education, and literacy barriers, this study tested the effectiveness of a picture-based medication instruction sheet with bilingual labels during the operation of a temporary clinic in rural western Kenya. This study was performed in the hope that medical treatment would be more effective and dangerous errors avoided if the patients could demonstrate effective patient recall of medication instructions immediately after they were given. In the sample of 248 patients, the pictograph was able to decrease the proportion of patients with multiple errors ($p = 0.019$). However, 35.8% of the sample still had one or more error. There was an unexpected lack of overlap in this sample among literacy, level of education, and ability to speak English. The pictograph was most successful in decreasing errors among uneducated patients ($p=0.026$), and the intervention had more of an impact among females ($p=0.002$) than among males. Future research will build on these findings to develop other interventions that can address these potentially life-threatening mistakes that occur even among educated, literate, and English-speaking patients. Future work will also further explore the social context that would cause males to do worse than females.

Charles Ulrich III, University Scholar

Rizalia Klausmeyer, mentor

Triptolide and Pancreatic Cancer

Pancreatic cancer is among the most lethal human malignancies with a survival frequency of <5% in all-stages. This adenocarcinoma is resistant to current chemotherapies, highlighting the need for more effective treatments. Recently, triptolide, a diterpenoid that has shown promise in other cancers, has been examined as a potential treatment for pancreatic cancer. The majority of triptolide study has focused on its pro-apoptotic effects through up-regulation of apoptotic pathways and down-regulation of inhibitory pathways. These studies have shown that triptolide is effective both in vitro and in vivo against pancreatic cancer cells. Also, triptolide has been shown to increase the effectiveness of chemotherapies pancreatic adenocarcinoma is usually resistant to when used in conjunction with them. The major reason that triptolide has not had much clinical testing is due to its poor water solubility. Minnelide, a water-soluble prodrug of triptolide, was created to hopefully harness the capabilities of triptolide for clinical use. It is my belief that Minnelide should be tested for the same pathway activation, inhibition, and synergy that triptolide possesses in vitro and vivo to determine which of its myriad of effects can be utilized clinically.

Brandon Walker, Philosophy

Robert Kruschwitz, mentor

What Makes Moral Claims True?: Korsgaard Versus Brewer on Meta-Ethics and Practical Unity

Among those philosophers who think that moral claims are sometimes true, there are two basic positions about what makes these claims true: realism and constructivism. Realists hold that moral claims are true because some thing (a moral fact, property, form, etc.) makes them true; constructivists hold that moral claims are true because they are binding on rational beings just as such, either because they are the product of certain of our activities in their ideal form or because of some feature of our nature. In this thesis, I present in detail the view of a leading thinker in each camp, then explore how each might incorporate, evaporate, or otherwise deal with some of the concerns that guide the other's project, focusing specifically on the issue of practical unity.

Amy Welch, University Scholar

Alden Smith, mentor

Weaver of Tales: Interconnected Imagery in the House of the Citharist

Traditional approaches to Roman wall paintings in ancient Pompeii tend to focus on stylistic categories or consider the content of a single painting. In their original setting, however, these paintings existed in a greater architectural and social-historical context. My thesis examines the frescoes and their greater context in one of the houses, the House of the Citharist, in Pompeii. In particular, this thesis concerns the program of wall paintings as they existed after the earthquake of A.D. 62 but before the eruption of Mount Vesuvius in A.D. 73. My thesis explores the history of both the city and house, in addition to the political climate at the time and affiliations of the owner of the House of the Citharist with the Roman emperor Nero, in relation to the frescoes that decorate the House of the Citharist.

Nikki Wells, History and Political Science

James SoRelle, mentor

American Exceptionalism Through Out American History

American Exceptionalism is a concept that is hard to define, and has been debated by scholars for quite a long time. In recent times, this topic has become a major issue in United States elections, in particular the 2008 presidential election. In general terms, American Exceptionalism is the idea that there is something inherently different about The United States of America that distinguishes it from the rest of the world. While the term American

Exceptionalism is a more recent term, the concepts it embodies have been around since the foundation of the United States. Each time period has an expression of this concept. Beginning with the 17th and 18th centuries, with the foundation of the colonies and later the foundation of a nation, there are two prime examples: John Winthrop's City Upon a Hill and Thomas Paine's Common Sense. This is followed by the 19th century, where the United States begins to expand beyond its colonial borders. Manifest Destiny and the Spanish-American War, and the rhetoric that comes out of these events/concepts, are a direct result of The United States belief in what it means to be an American and their role in the world. The 20th century is a different century for American Exceptionalism, rather than the focus being at home, the focus shifts more to events abroad. Henry Luce's American Century, World Wars I and II, and the perceived communist threat that happened as a result, are a result of the belief that the United States needs to spread and defend its unique views in the context of the wider world. Each time period of United States history has its own example of American Exceptionalism, whether or not the term is actually used.

Olivia West, General Studies

Janelle Walter, mentor

Knowledge and Attitudes Toward Organic Foods

The purpose of this project was to find out what knowledge college students have regarding myths concerning organically grown products. Since young adults are often consumers of organic products this study assesses a small sample of young adults enrolled at a private college in central Texas. Literature on organic products and related misconceptions were reviewed. An online survey was distributed in fall 2013 to Baylor students in two Panhellenic sororities. It included questions concerning the participant's history with purchasing organic products and their knowledge concerning common myths about organic products. The data collected from the survey was analyzed noting which questions were correctly answered. Students in the survey had a 67% misunderstanding about organic produce. The most blatant misconception was that conventionally grown foods use more pesticides than organically grown foods.

Holly Winters, Philosophy and Political Science

Robert Miner, mentor

Seneca's Of Anger

My thesis has explored Seneca's Of Anger. Anger, and the affections, are brought to discussion as they were considered by Seneca. What is anger? What causes anger? Is anger useful? What is revenge? What are the remedies to anger? These questions and more are considered and explored.

Lindsay C. Wright, Psychology

Thomas Fergus, mentor

The Effects of Internal and External Mindfulness-Based Interventions on the Symptoms of Anxiety

Mindfulness is a relatively novel cognitive-behavioral therapy that is gaining popularity due to its proven effectiveness and non-intrusive relaxation techniques. Practicing mindfulness challenges a patient suffering from anxiety symptoms to focus on their bodily sensations without acknowledging whether those sensations are negative or positive, but encourages or forces a patient to disengage from these sensations to change negative thought processes and decrease anxiety symptoms. Mindfulness can be separated into two different categories: internal and external mindfulness. Internal mindfulness (self-focused attention) has the patient focus on their internal bodily sensations, while external mindfulness (attention-training technique) outwardly focuses the patient's attention on things other than negative bodily sensations. Dr. Fergus and I tested the effects of internal and external mindfulness-based interventions to evaluate the effectiveness of each method in reducing the symptoms of anxiety. Baylor undergraduate students were randomly assigned to either the internal or external group. The data concluded that internal and external mindfulness activities had nearly the same effect on anxiety symptoms, and, from pre-to-post manipulation, they both work equally as well. These results were significant. Anxiety symptoms were less differentially affected when comparing the two techniques against each other. This leads to the conclusion that either form of mindfulness can effectively reduce the symptoms of anxiety.

Rebecca Young, University Scholar

Marie Smart, mentor

The Modern State of Being: Mystical Spirituality in American Abstract Expressionism

The single most misunderstood aspect of 20th century art is the advent of abstraction. In the aftermath of the first half of the 20th century, modern man felt that in order to regain his humanity, in order to find freedom again, he must break free from rational, scientific determinism that defined 20th century reality. Mysticism is the result of a reality in denial of natural laws, outside of rationality. This mystical reality manifested itself in the art of the 20th century. In *Concerning the Spiritual in Art* Wassily Kandinsky asserts that pure abstraction obtains sublime transcendence. Spirituality in 20th century art tends to attach itself to the modern artist's aspiration to achieve transcendent expression through the act of creation. In this thesis, I trace the progression of Kandinsky's tradition through the work of American Abstract Expressionists Georgia O'Keeffe, Jackson Pollock and Agnes Martin. These three artists believed abstraction was the most powerful means by which to convey spiritual concepts of renewal, wholeness, infinitude, perfection, sublimity and transcendence in their work. Through these artists, this thesis illustrates how the mystical spirituality of modern man manifests itself in the embrace of abstraction in American art of the 20th century.

OTHER MAY GRADUATES

Christopher Holcombe, Psychology

Charles Weaver, mentor

Maggie Holland, University Scholar

David Jeffrey, mentor

Rachel Johnson, Environmental Health Science

Bryan Brooks, mentor

Yuelin Angel Lu, Applied Mathematics

Jeanne Hill, mentor

Garner Richardson, Great Texts

AUGUST, DECEMBER, AND LATER GRADUATES

Hannah Adams, University Scholar

Alden Smith, mentor

Educational Philosophy and Classical Learning in the Works of Cicero and Other Classical Writers

Although widely recognized for his expertise as an orator and politician, Cicero also took a firm stance on his beliefs on the importance of education. In the defense of his teacher, the *Pro Archia*, Cicero clearly explains the significance of *Archias'* influence on his own development in the field of rhetoric, but also as a moral human being. Cicero also emphasizes the importance of learning and morality in the context of friendship in his *De Amicitia*. Extending beyond the writings of Cicero, references to education and pedagogy for the purpose of moral development can also be found in the works of C.S. Lewis, including *The Abolition of Man*, and in John Henry Newman's *Idea of a University*. These authors and others, persuasively argue that education, and the influence of a teacher, reaches far beyond a student's achievement in the classroom, but in effect alters the way in which the student perceives morality and the human experience.

Brandi Addison, Political Science

David Corey, mentor

The War on Terror and the Question of Justice

This thesis project uses the Just War Tradition to consider if the War on Terror qualifies as an ethical war. The question is difficult because the War on Terror differs so markedly from traditional wars that have been fought. Thus, I begin by establishing facts and background information about the war on terror. This reveals why its ethical dimension is difficult to analyze. I then turn to the just war tradition, examining some of the many different authors who have contributed to it, in order to see what different conditions authors have deemed necessary for a just war. I also consider the kinds of claims the tradition puts forward. Are the so-called "just war criteria" to be understood as legal claims, moral imperatives, ethical advice, or what? This turns out to be an important consideration, because it determines how the tradition should be applied to any particular case. Lastly, I analyze two specific claims of the just war tradition in reference to the War on Terror, whether or not there was a "legitimate authority" and the "likelihood of success."

Alexander Agent, Biology

Diane Hartman, mentor

Staphylococci and the Domesticated Equine of Central Texas

Humans and other mammals act as ecological hosts to various species of bacteria. Through zoonotic or reverse-zoonotic transmission, these species of bacteria can discover a new host of a different mammalian species, including domesticated animals such as equine. One such bacterium is Methicillin-resistant *Staphylococcus aureus* (MRSA). Samples were obtained from thirty-four horses at local, privately owned farms to determine whether or not there were any asymptomatic MRSA carriers. Bacterial swabs were taken from behind the ear, within the nostril, and at the left girth to test which site is most effective to swab when identifying local bacteria. Sites were chosen for accessibility and relatively high moisture levels that would most likely harbor bacteria. Strains were described through visual analysis, as well as biochemical, hemolysis, and antibiotic testing. Representative samples were identified using the Siemens MicroScan autoscan system, and the remaining data were classified relative to the representative samples based on visual, biochemical, and antibiotic testing similarities. *Staphylococcus species* are common inhabitants of mammalian skin. No samples have been identified as strains of MRSA; the most common equine isolates identified include *Staphylococcus xylosum*, *Staphylococcus cohnii cohnii*, and *Staphylococcus sciuri*.

Emily Bertram, University Scholar

William G. Hoy, mentor

A Parent's Role in Sibling Response to Intellectual Disability

Growing up with an intellectually disabled sibling has distinct effects on a typical child's development. Parenting these typical children while also parenting an intellectually disabled child is a uniquely stressful role. Using a grounded theory method, this research study explores the myriad of interconnected issues that affect a child's response to having an intellectually disabled sibling. Interviews were conducted with sixteen parents/parent couples to better understand their approach to parenting. In accordance with previous research, parental attitude toward disability is a key factor in sibling adjustment. Parent's choices regarding education, delegation of responsibility, siblings' community involvement, and parent-child relationship also were shown to play a role in sibling response. In spite of the unique stresses, parents interviewed indicated long-term positive impacts on their typical children from growing up with a disabled sibling. The study summarizes principles for clinical application for families living with disability.

Chelsea Bryant, Political Science

James Curry, mentor

The Problems with DNA Database Expansion

Since deoxyribonucleic acid, or DNA, was first used by police in Great Britain to apprehend a murder suspect in 1987, law enforcement agencies have continued to expand their usage of DNA fingerprinting technology. The more recent expansions of state and federal DNA databases present various Constitutional problems. In this thesis, I argue that new policies including collection of DNA from arrestees, familial searching of DNA profiles in databases, and phenotypic DNA profiling, are an intrusion on the American right to privacy.

Karen Durbin, Biology

Lisa Baker, mentor

Assessing the Impact of a School Garden on the Attitudes of Children Towards Agriculture in Rural Western Kenya

A school garden was established at the Bethlehem Home Academy by the Straw to Bread non-profit organization in rural western Kenya in 2012. This study uses a sample of 63 students and teachers at the school to assess the Straw to Bread program's attempt to improve knowledge and attitudes about farming and nutrition in the target community of children of the Nyakach Plateau. Descriptive information about the garden and participants was gathered, and a knowledge assessment was administered to the older students to assess knowledge about agriculture. Results indicate that the school garden was effective at improving the attitudes of the children about farming, at introducing new foods to the children and surrounding community, and at teaching the children about farming technique. Future innovations will be based on these findings.

Mariah Sky Franklin, Professional Writing

Michael-John DePalma, mentor

Praise Him with the Dance: Incarnation, Creation, and Reclaiming the Art of Movement

The art of dance, while central to various cultures and religions worldwide, has generally been neglected by the Christian community and its discussion of theology and the arts. Though there is clear biblical and historical precedent for the value of dance as a form of worship and community celebration, the beauty of this art has often been obscured by societal stigmas against embodied expression. In my thesis, I explore the history of dance within culture, discussing the concepts of the theology of the body, creativity as an essential aspect of our status as created beings, and dance as an act of communion. I focus on the justification and value of this art form from a Christian theological context, incorporating scholarship on the connection between theology and the arts as a whole. My research builds on the contributions of contemporary artists and organizations currently pursuing excellence in the arts, such as Makoto Fujimura and Spark and Echo Arts. It also highlights my own primary research based on interviews with individuals of the Christian faith who are advocates for dance in their communities, such as Andrew Nembr of the International Arts Movement (IAM).

Eric Goethe, Neuroscience

Lisa Baker, mentor

The Effects of Water Quality on Growth in Children on Kenya's Nyakach Plateau

Poor water quality is one of the multitude of problems that affect developing nations and contributes to the virtually inescapable cycle of poverty in which the world's impoverished are trapped. Straw to Bread, a 501(c)3 nonprofit organization based in the United States, has attempted to mitigate this issue among the Luo people of the Nyakach Plateau in Kenya's Nyanza Province by installing rainwater collection tanks in poor households. The present study was conducted to evaluate the efficacy of the use of these tanks in promoting growth among children on the Plateau. Measurements were taken on site from children with tanks and without tanks in May, 2013. Other data were collected via survey from the head of each household. Ultimately, it was demonstrated that, after adjusting for environmental factors, age, and sex, there was a positive dose-response relationship between water quality and growth in girls ($R^2=0.47$, $p<0.0001$) but not in boys ($R^2=0.10$, $p=0.4970$). While further investigation is needed to understand this discrepancy, the results of this study demonstrate the importance of clean water access in underserved populations and will guide the continued intervention of Straw to Bread in the area.

Ria Halder, Biology

Lisa Baker, mentor

Assessment of Knowledge, Attitudes, and Behaviors Associated with Human Intestinal Helminthes in a Traditional Community in Rural Western Kenya

Neglected Tropical Diseases (NTDs) constitute a broad category of illnesses that continue to plague those living in developing nations. 85% of NTD morbidity results from helminthic infections; collectively, infections due to parasites produce a disease burden that is equivalent to up to one-half of sub-Saharan Africa's malaria disease burden and more than double that caused by tuberculosis. Specifically, soil-transmitted helminthes represent the most common condition affecting the poorest 500 million people living in sub-Saharan Africa. This cross-sectional study evaluates the accuracy of knowledge, perceived importance, and behaviors related with helminthic infections within a sample of 199 people in a Luo population. Approximately one-half of the interviewees reported having a helminthic infection at the time of this study. A person in this community reported experiencing related symptoms for 9.43 months on average ($SD=14.41$). A knowledge score found that 59.30% of the population reported at least one correct answer in each category about the symptoms, causes, treatments and prevention methods. No difference was found between gender and age and the number of correct responses. Participants were also asked about knowledge concerning risk factors. Although 15.58% of participants recognized contaminated water as a source of infection, 67.0% continue to use ground water as their primary drinking water source. Participating in geophagia, or eating rocks and dirt, was reported by 16.58% of the population despite the fact that 35.18% viewed this practice as a risk factor. These results indicate that although the population may be aware of the main risk factors associated with helminthic infections, deeply rooted cultural beliefs and lack of access to clean, potable resources present limitations to decreasing the burden of helminthes. Such structural barriers must be addressed in conjunction with providing accurate knowledge and preventive chemotherapy of NTDs for sustainable control and reduction of morbidity.

Joshua Lance Hitt, Political Science

Sam Perry, mentor

The Lost Cause, Race Riots, & The Civil War Amendments

The purpose of this thesis is to evaluate the rhetoric of lost cause mythology and its relation to the lack of execution of the Civil Rights Amendments with the focus being on pre Jim Crow era race riots and the causes thereof. The goal is to show that lost cause mythology was a major contributor to the race riots in both Memphis and New Orleans in 1886, which portray the tension in the South at the end of the Civil War and the beginning of Reconstruction.

Anju Kannappan, Biology

Lisa Baker, mentor

Markers of an Unhealthy Pregnancy: An Assessment of The Ingestion of Soft Rocks During Pregnancy and Blood Lead Levels in Luo Women of Rural Western Kenya

Geophagia, the consumption of soil or “soft rocks,” is a common practice in certain regions of the world. Although the composition of these non-food items varies regionally, multiple studies have found detrimental health effects, specifically lead toxicity. Trace amounts of lead have been found in the soft rocks that are typically consumed by Luo women living on the Nyakach Plateau in rural western Kenya, and a 1999 study conducted in this area found that 54% of the women admitted to consuming soft rocks during pregnancy. The purpose of this study was to determine the extent of soft rocks consumption during pregnancy and a potential correlation with blood lead levels of mothers living on the Plateau in the Nyanza Province. A 30-question survey about nutritional habits during pregnancy was given to 49 Luo mothers, and their anthropometric (height and weight) and blood (hemoglobin and lead) measurements were recorded. Over half of the women stated that they had eaten soft rocks during pregnancy, and the average blood lead level of this group was 5.89 µg/dL (range= 4.0-16.0, SD= 2.31). A significant relationship was found between the level of exposure (zero, medium, or high level of soft rocks consumption) and blood lead level ($F= 3.76$, $R^2= 0.165054$, $p= 0.0325$). When asked the reason for ingesting the soft rocks, 52% of the women stated their “craving” for the rocks as their primary reason, with the second most-frequent response being a cultural reason. Other alarming findings were that two-thirds stated they ate less during pregnancy, and half of them said they were in poor health during this time. A significant correlation between increased soft rocks consumption and increased lead levels in the bloodstream could indicate that the two are related, or the association may be a marker of general poor health and health behaviors. The findings of this analysis demonstrate high levels of geophagia among the women in this particular region, which may have negative effects on themselves and potentially on their children.

Jessica A. Korona, Biology

Lisa Baker, mentor

The Effect of Mother’s Health on Children’s Hemoglobin and Lead Levels in Rural Western Kenya

The Luo tribe of western Kenya have the highest infant mortality, maternal mortality, and HIV rate in Kenya. The health of a child is drastically impacted by mother’s health during pregnancy. After birth the child’s growth and development continue to be almost completely determined by the mother’s nutrition throughout the period of breast-feeding, and then subsequent growth is influenced by the family’s diet and risk of disease exposure. This study of 49 mother-child pairs was done in May 2013 in the context of an annual temporary clinic on the Nyakach Plateau of rural western Kenya. Mothers were questioned about their protein and calorie intake during pregnancy, their participation in the cultural practice of eating “soft rocks”, and their breast-feeding history with a designated child. The blood hemoglobin and lead levels were measured for each mother-child pair, and the child’s height and weight were taken. The child’s history of geophagia was also ascertained. 44.9% of mothers reported ingesting the local “soft rocks” during their pregnancy. 55.1% of mothers had no protein in their diet during pregnancy, and 65.3% reported eating less during their pregnancy. 40.8% reported poor health during their pregnancy as well. Abnormal lead levels were found in 75.6% of mothers and 86.84% of children. There was almost a significant relationship between mother’s and child’s lead levels where the mother had not been breastfeeding another child while pregnant with the designated child ($p=0.455$), The data showed that mothers’ geophagia was related to their own their own hemoglobin level (0.0252), and anemic mothers have anemic children ($p= 0.0073$). Children’s hemoglobin levels were also decreased with mothers who reported eating less than usual during their pregnancy, which also correlated with her decreased intake of dietary protein during pregnancy. Mothers with a poorer health status as indicated by a combination of these high-risk variables were more likely to have anemic children.

Siyao Li, University Scholar

David Corey, mentor

Sovereignty: Background, Origin, and Development of Associations with China

My thesis explores the background, origin and development of the Western concept of sovereignty based on canonical political philosophy texts on sovereignty and compares findings with the situation of sovereignty in China. Sovereignty emerges amid the background of Machiavelli's Discourses on Livy and Prince. While there are striking similarities between Machiavelli and the ancient Chinese legalism, there are also differences that suggest key differences in the context of sovereignty between the West and China. The idea of sovereignty in the West arose some time after Machiavelli and before Bodin. In On Sovereignty Bodin formulates a sovereign that is indivisible and has full legislative powers, while Hobbes initiates liberalism with his conception of sovereignty being completely subject to the law in Leviathan. Locke picks up the law theme and develops it by democratizing sovereignty. Rousseau, in Social Contract, further democratizes sovereignty by his concept of the general will. While the West has very much adopted ideas on law and democracy, China has never fully incorporated law and democracy into sovereignty. Legal reform is still in process, and the democratization process is further removed from the agenda. With its long tradition of central power, how does and will China's political power look like, and how far removed is it from sovereignty?

Vy K. Nguyen, Applied Mathematics

Johnny L. Henderson, mentor

Smoothness of Polynomials with Respect to Boundary Conditions as Solutions of Ordinary Differential Equations

In this paper, we investigate special polynomial solutions of linear ordinary differential equations as functions of certain boundary conditions. We first look at solutions of $y''=0$ and $y'''=0$, and then we generalize these solutions by considering $(n-1)$ degree polynomials as solutions of boundary value problems. In our generalization, we use a Peano Theorem and the Mean Value Theorem to establish the existence of partial derivatives of these solutions with respect to both boundary values and boundary points. And we characterize these partial derivatives according to their own respective boundary conditions. Then, we also establish some relationships among these partial derivatives. Finally, we discuss possible applications of the results of this paper through the modeling of hybrid phenomena with dynamic equations on time scales, and we mention extensions of the results to nonlinear differential equations.

Sarah Ji Soo Park, University Scholar

Sung-Kun Kim, mentor

*Overexpression and Characterization of Metallo- β -lactamase from *Klebsilla pneumoniae*: NDM-1*

Antibiotic resistance is a serious phenomenon in medicine, as pathogens are able to develop a resistance after exposure to antibiotics. This study focuses on overexpression and characterization of the New Delhi metallo- β -lactamase enzyme by conducting studies on the dependence of ionic strength, buffer concentration, and pH for the β -lactamase-catalyzed hydrolysis of Penicillin G. Results showed that NDM-1 was successfully purified. The effect of ionic strength on MOPS buffer showed an initial decrease and then an increase in the k_{cat}/K_m , while phosphate buffer showed an increase and then decrease in the k_{cat}/K_m value. In the case of buffer effect, MOPS and phosphate buffer showed a strong decrease in k_{cat}/K_m as buffer concentration increased. The pH studies showed some scattering data points, suggesting that the protein has inability to endure some acid/base conditions.

Rachel E. Petersen, Biochemistry

Robert Kane, mentor

Synthesis of Sulfur and Amino 8-Substituted Adenine Derivatives as TLR7 Agonists

Toll-like receptors (TLRs) are a class of pattern recognition receptor (PRR) proteins, which play a vital role in the innate immune response. Upon recognition of microbial pathogens, TLRs initiate pathways which lead to the production of cytokines. For the past few years, TLR agonists have been used as adjuvants for vaccines against cancer, allergies, and viral infections. TLR7 agonists are of particular interest, as they can induce the production of interferons in plasmacytoid dendritic cells without stimulating the release of inflammatory cytokines. In this experiment, several sulfur and amino 8-substituted adenine molecules were synthesized for use as potential TLR7 agonists.

Alexandra N. Reed, Biology

Eva Doyle, mentor

A study of children's health in urban Brazil

A primary global issue is children's health and health education. The purpose of this pilot study was to explore health-related issues among parents in two underserved communities in the state of Espirito Santo, Brazil. This study was conducted as part of a Baylor University partnership with Brazilian Baptist Churches whose leaders are interested in promoting health in their neighborhoods. Study participants (n=33) completed a written survey designed to measure age, education, number of children, and primary source for health information. The participants also engaged in one of three focus groups through which three basic questions were used to explore parental perceptions about health knowledge and future health education. Data analysis is currently in progress where survey response frequencies and percentages will be calculated and compared to focus group outcomes. Preliminary findings indicate that many parents are interested in learning more about nutrition and implementing this knowledge. However many parents displayed an interest in helping children with social issues, even when specifically asked about health.

Audrey Richardson, University Scholar

Jeannette Marsh, mentor

Code-Switching in Modern Indian Cinema

A multi-billion dollar industry based in Mumbai, Bollywood—the world-renowned Indian equivalent of Hollywood—is a force to be reckoned with. For decades its dramatic plotlines, colorful cinematography and intricately choreographed dance numbers have provided the Hindi-speaking population of India with its primary cinematic entertainment. In addition to stunning visual and musical elements, however, an increasingly common linguistic trend has been observed in many recent Bollywood films. Within the scripts of modern Indian cinema, code-switching, or the alternation between multiple language systems within discourse, showcases the fascinating present-day relationship between Hindi and English, providing insight into the unique cultural and linguistic positioning of millions of Indians in the twenty-first century. This thesis explores the phenomenon of code-switching by examining excerpts from the 2009 blockbuster *3 Idiots* in light of past research from the fields of syntax, pragmatics, and sociolinguistics.

Elizabeth Rosenthal, Biology

Darrell Vodopich, mentor

Morphology of Damselfly wings

Damselflies can hatch in the beginning months of the summer (April/May) through until the end of the summer (September/October). The damselflies born at the beginning of the summer have a longer amount of time spend in the as an egg than the damselflies that are hatched at the end of the summer. It has been previously documented that the Damselflies hatched at the beginning of the summer are larger and weigh more than the damselflies that hatch at

the end of the summer. The wing shape of the damselflies was studied to see there were differences in the shape of the forewings and hindwings of the damselflies born at the beginning and the end of the summer. Damselflies were collected from the Waco area, the wings were removed, then they were scanned in to the computer, landmarks were selected and put on each of the scanned wings, and the shape changes were looked at in a software called MorphoJ. In this experiment, morphometric software determined that there is a definite shape change of both the forewings and the hindwings of the damselflies that were collected.

Ivy J. Stejskal, Biology

Bill Neilson, mentor

Death with Dignity: The Texas Advance Directives Act of 1999 from a Catholic Perspective on Sanctity of Life

The Texas Advance Directives Act of 1999 is now becoming a model for how end of life issues should be handled in a medical facility in America. This act allows a health care facility to discontinue life-sustaining treatment if an ethics committee decides that the care of the patient is futile. Futile is termed as pointless or fruitless. The Catholic Church has very strict and set doctrine on how end of life issues should be handled as well as what makes up a human person. The Catholic Church also has set doctrine on how to preserve the sanctity of a person even in the hours of death. My thesis will assess both the laws in place in Texas as well as the teachings of the Catholic Church. Through this understanding, we will produce the future of Catholic Healthcare in Texas focusing on end of life issues. After discussing the relations between politics and religion and how this impacts the delivery of healthcare I will present the reason behind why an issue like this is important to me as well as my audience. There are faces and names behind all of the data and end of life care statistics. This thesis was designed to advocate for people in their last hours here on earth.

Rachel Wells, University Scholar

David Ryden, mentor

The theological implications of our mathematical notion of infinity

In my thesis, I explore how our theological understanding of God as infinite and the personal implications of this understanding are enhanced by mathematical knowledge. In particular, I will focus on the historical development of the notion of infinity and Cantor's reconfiguration of the distinction between God and creation in light of his claim that complete infinities are found in creation. I start by exploring the theological, philosophical, and mathematical understandings of infinity throughout history to create the backdrop of my work. Exploring how philosophers, theologians, and mathematicians of the past thought about infinity will help us understand the context of our understanding of infinity. Through an explanation of Cantor's infinite set continuum and other mathematical explanations for the sizes of infinity, I address what can be known about infinity through mathematics. Then, I move into the insight that the mathematics of infinity offers to theology. Finally, I give my perspective of how this modern mathematical notion of infinity can enhance our understanding of God by exploring and engaging the academic discussion of God's unity in light of the implications of Cantor's mathematics and distinguishing between divine essence and existence through analysis of the absolute infinity's meaning to our theological understandings of God.

Sarah Wilkins, Elementary Education

Kathy Whipple, mentor

Effectiveness of iPad/Ipod® Communication Applications Pertaining to Students with Communication Handicaps

In 2005, the American Speech-Language-Hearing Association reported that there were approximately two million people in the United States who can hear but who have limited or no skills in verbal communication (Wilkins & Ratajczak, 2009) Patients with these types of impairments often use Augmentative and alternative communication devices (AAC). Speech generating devices (SGD) allow the individual to speak through the use of an augmentative device. With the introduction of the iPad/Ipod® devices, individuals have greater accessibility to SGD's. The purpose of this paper was to evaluate the effectiveness of using the iPad/Ipod® as an SGD. This study evaluated the

results reported in ten studies that used the iPad/Ipod® with children or adults in need of augmentative communication. The results suggest that iPad/Ipod® usage as and SGD most often employing the Proloquo2go application. In addition, those children with a diagnosis of autism were most likely to show positive results from the use of these devices. There were 31 participants ranging in age from 4 to 28 years of age that were observed across the ten studies. Of the 31 children that were participants in the ten studies, 74% showed improvement. Eighteen of the twenty children diagnosed with autism were reported to have improved through the use of the iPad/Ipod® SGD's.. Those studies who followed the children for the most contact time tended to have the most positive results.

OTHER LATER GRADUATES

Andrew Gross, University Scholar

Lisa Baker, mentor

Erin McGowan, Environmental Science

Susan Bratton, mentor