
ABSTRACTS OF THESIS PROJECTS
SPRING 2024

Honors Program & University Scholars



Baylor University
HONORS COLLEGE

ABSTRACTS OF THESIS PROJECTS
SPRING 2024

Ashley R. Adams, Choral Music

Michele Henry, mentor

Seeing the World Through Song: The Pedagogical Applications of World Folk Traditions in the Secondary Choral Classroom

In a choral program, the curriculum is comprised of the music selected for the ensemble. Directors must consider the needs of their students as musicians and learners when programming, which can often be a challenge. The purpose of this study is to provide a specific pedagogical lens of world folk traditions for implementation in choral music classrooms. In this study, three different musical traditions were analyzed through the lens of representative arrangements of traditional folk music. Methods drawn from the works of Kodály, Piaget, and Sheehan-Campbell were used to synthesize teaching sequences for these pieces that can transfer to other pieces of music, within and outside those cultures. Venezuelan, North Indian, and South African music were used as case studies in this collection of folk music, each for a specific pedagogical purpose that is applicable to a secondary choral classroom. The study of Venezuelan folk music, exemplified by the arrangement of Duerme Negrito by Emilio Sole, explores the applications of asymmetrical divisions of regular meters as well as the triple versus duple subdivision. North Indian characteristics are illustrated by TāReKiTa by Reena Esmail, by examining a variety of tonal colors, as well as harmonic and melodic systems that differ from the standard western scales and modes. Finally, through Thixo Onothando by Michael Barrett, South African music provides a new perspective on diction in the choral classroom through the use of language as the mechanism for teaching diction concepts.

Fizza Afreen, Astrophysics

Barbara Castanheira Endl, mentor

Asteroseismology of the Pulsating White Dwarf Stars in Cataclysmic Variables GW Lib and V386 Ser.

A total of 18 pulsating white dwarf (WD) stars in cataclysmic variables (CVs) have been discovered to date. WDs are the final stage of evolution for approximately 98 % of all stars in the universe. WDs are found both in isolation and in binary star systems called CVs. Pulsations in the WDs in the CVs GW Lib and V386 Ser have been detected since 1997 and 2004 respectively. Hence, these are the most well-studied pulsating WDs in CVs. I used the available data on the pulsation period history of these WDs to obtain their independent modes of pulsation for performing asteroseismology, a technique to probe the internal structure of a WD. Pulsation periods of these WDs were matched using a least-squares fitting routine to theoretical model periods calculated using the White Dwarf Evolution Code (WDEC) from a previous study. I used the known masses of the WDs in GW Lib and V386 Ser as constraints to reduce the model grid and obtain asteroseismic solutions that are representative of these WDs. Best-fit solutions for the structure of the WDs in GW Lib and V386 Ser provided information on the masses of their hydrogen and helium layers. Asteroseismic solutions for the WDs in GW Lib and V386 Ser were found to possess relatively thin hydrogen layers.

Sam S. Anliker, Chemistry

Kevin G. Pinney, mentor

A Spoonful of Sugar to Help the Prodrug Go Down: The Synthesis of Galactose Prodrugs as Novel Inhibitors of Tubulin Polymerization and Potential Cancer Therapeutics

Microtubules provide crucial structural support for endothelial cells lining the vascular network of both healthy tissue and tumors. While healthy tissue possesses highly ordered vasculature with uniformly oxygenated cells, tumor tissue is characterized by underdeveloped and disordered blood vessels, leading to hypoxic regions of tumor tissue. This weakness within tumor-associated vasculature provides potential for both selective targeting and efficient treatment using vascular disrupting agents (VDAs). The natural product combretastatin A-4 (CA4), derived from the African bush willow, *Combretum caffrum*, functions as both an antiproliferative agent (cytotoxin) and a promising VDA capable of selective and irreversible damage to tumor vasculature. CA4, administered as its corresponding water-soluble phosphate prodrug salt (CA4P), functions by binding to the colchicine site on the tubulin heterodimer resulting in morphological changes in the endothelial cells, shutdown of the vascular network, and overall inner-tumor necrosis. The Pinney Research Group (Baylor University) designed and synthesized an indole-based molecule, OXi8006, that bears structural similarities to both colchicine and CA4 and functions as a potent inhibitor of tubulin polymerization. OXi8006 and its phosphate prodrug salt (OXi8007) demonstrate inhibition of tubulin polymerization (OXi8006; IC₅₀ = 1.1 μM, OXi8007; IC₅₀ = 4.2 μM) and consistent cytotoxicity against human cancer cell lines [GI₅₀ values ranging from 3.5 to 38 nM against NCI-H460 (lung), DU-145 (prostate), and SK-OV-3 (ovarian)]. Cancer cells that have increased resistance to cell-cycle inhibitors are often characterized by cellular senescence, such that a healthy cell exhibits growth arrest while a cancerous cell takes on the resistant qualities of senescent cells. In a study by Wagner and associates, lysosomal-β-galactosidase (GLB1) was found to be the origin of senescence-associated β-galactose activity. Since GLB1 hydrolyzes β-galactose, the addition of a galactose onto select VDA drug candidates could provide a novel approach to selectively target cells with high resistance towards other treatment. To this end, we synthesized an OXi8006 analogue through a covalent linkage of a galactose sugar to the phenolic oxygen of OXi8006 as a proposed selective inhibitor of tubulin polymerization.

Bella Ball, Management Information Systems

Lee Grumbles, mentor

Artist Attachment Encouragement: Application of Parasocial Theory to Music Streaming Applications

In a model of a theoretical music streaming platform, integrated messaging capabilities allow independent musical artists to establish an audience-facing perception of similarity with their audience. This sense of similarity can develop and encourage the formation of parasocial relationships, one-sided perceived relationships an audience member has with an entertainer, brand, character, or other type of persona. Audience members with a level of parasocial relation to an artist are more likely to buy what an artist attempts to sell. This model would enable independent music artists to invest in the quality of their audience members, rather than only their quantity, when seeking to increase the profitability of audience engagement through their music streaming. This paper uses parasocial theory as a basis for developing a hypothetical tool that would enable independent musical artists to facilitate parasocial relationships through their streaming, increasing audience engagement and profitability.

Rachel A. Baud, Child and Family Studies

Mickey Langlais, mentor

Child and Parent Mobile Media Use and Child Development

The goal of this exploratory study is to determine how the amount of time parents and their children spend on technology, specifically smartphones and tablets, impacts a child's fine motor, gross motor, and social skills. This mixed-methods study collected quantitative data from parents and observational data from teachers in a childcare

center in the Southeastern United States ($N = 22$ parent-child dyads). Multilevel regression analyses illustrated that children's time spent watching television was negatively associated with children's gross motor skills. Additionally, percentage of time parents used mobile media independently (separate from their children), was associated with increased children's social skills. The results of this study illustrate varied effects on the type of technology that children and parents use for children's development.

Taylor Behrman, Psychology

Lenore Wright and Meredith Palm, mentor

The Weight of Womanhood: How Embodiment of Femininity Predisposes Women to Deficits in Nutrition and Mental Well-being

American culture has shaped the standard for feminine ideals for decades, their main source of oppression therein being embodiment. By indoctrinating women from birth into identifying and functioning as bodies, they effectively subdue their minds and their agency. This state of mind is dangerous for women because it promotes restrictive eating, manic dieting, and other nutritional habits that create deficiencies in the body. This is compounded by the profound connections between the gut and mental processes. Thus, the effects of socially constructed feminism on diet subsequently affect mental health, poor diet promoting mood disorders and neurotransmitter malfunctions. With chapters leaning into existing literature on the gut microbiome as it affects mental processes, major works of feminist commentaries on embodiment and social construction of gender ideals, and descriptive data analysis on food-choice motivations as collected in the National Health and Nutrition Examination Survey (NHANES), I conclude that all of these components intertwine to entrap women in a biological cage. Wherein, they are disproportionately disadvantaged both psychologically, socially, and nutritionally. Because of the ways these components overlap and involve each other, women stuck in an embodied sense of self face long term and debilitating consequences.

Lucas Bell, Environmental Science

Matthew Whelan, mentor

The Ecology of the Sabbath: The Sabbath, How Christ Changed It, and How Modern Environmental Practices are Inherently Connected to It

There exists an ecology within the Sabbath. There is a series of relationships, made up of God, man, the land, the rest of creation, and time. This thesis dives into the Sabbath in the Jewish tradition (through the perspective of Abraham Joshua Heschel), and how the Sabbath changed with the coming of Christ. Furthermore, there is analysis of multiple modern environmental practices in the form of article review, and discussion on how these practices are inherently connected to the principles of the Sabbath. Understanding this connection can assist in a change in perspective, towards a more Biblical relationship with the environment around us.

Sarah Bentzin, Finance

Erik Davidson, mentor

The Impact of Social Media Upon Investment Decisions

With more and more people turning to social media platforms for news, social media now has a significant impact upon the decisions that people make when investing. Behavioral finance can provide important principles and clues to better understand why people make the investment decisions that they do. This paper begins with a review of the foundational principles of behavioral finance with great emphasis on those that will be studied in greater detail in this thesis and those that relate specifically to social media. This is followed by a literature review

of current research being done over the correlation between social media, social interaction and investment decisions. I conducted a study to further understand this correlation and determine how people perceive the stock market when using social media as their primary resource. Some of the topics studied include social media's influence on buy vs. sell decisions, whether or not investors fact check investment news, and how social media influences novice vs. sophisticated investors. Most of my results confirmed my hypothesis, current research, and significant behavioral finance principles.

Shea Berthelot, American Studies

Patrick J. Flavin, mentor

Rock the Vote or Block the Vote?

This thesis extends over seven chapters discussing the landscape of different kinds of election and voting laws that may result in election security/ integrity concerns, voter suppression effects, both, or neither. The introduction lays out the historical landscape of modern voting rights legislation and recent rulings and changes. This background echoed and expanded at the beginning of each substantive chapter focusing on a specific type of law. The chapters of research will include the topics of voter identification laws, voter purges or voter roll cleaning laws, voter registration laws, and laws that pertain to casting your physical ballot. There are many specifics in each topic. These specifics are defined, discussed, given examples, and evaluated to see if there are suppressive or integrity concerns. These research chapters and the conclusions drawn from the findings are followed by a conclusion summing up each chapter. Finally, chapter seven lays out a few policy recommendations that target the most glaring issues or politically feasible policy options.

Jeff Black, Biology

Erica D. Bruce, mentor

The neuroinflammatory effects of acrolein on the human microglial HMC3 cell line in relation to Alzheimer's Disease

Acrolein is a highly reactive compound that causes oxidative stress and inflammation. Excessive microglial M1 activation leads to production of pro-inflammatory factors; these pro-inflammatory factors, and subsequent neuroinflammation, have been associated with risk of developing AD pathology. The main exposure source of acrolein consists of smoking tobacco products. The daily dosage of acrolein due to cigarettes can range from 500 to 2,800 µg per day for a heavy smoker. The goal of this study was to, firstly, investigate the cytotoxicity of acrolein on the human microglial HMC3 cell line using MTT cytotoxicity & lactate dehydrogenase (LDH) assays. The second goal of this study was to determine the effect of acrolein on microglial production of neuroinflammatory cytokines and other related AD pathology proteins. These proteins were measured using immunocytochemistry (ICC) and proteomics protein multiplexing. Acrolein was proven to be cytotoxic at a much lower concentration (1-2 µg/mL) than the concentration that a heavy smoker is exposed to on a daily basis. Second, cell death and disruption, determined by LDH assay, was found to be significant at concentrations as low as 1 µg/mL. Furthermore, increased expression of CD86, measured through ICC, proved that the microglial samples being tested were M1 activated. Increased expression of RAGE, a suggested to be more potent biomarker of AD than amyloid-beta, is associated with a higher risk of developing AD. Decreased expression of P2Y12 is associated with unhealthy microglial cells. Increased IL-1B production is associated with progression of neuroinflammation, leading to development of AD through the neuroinflammatory pathway of AD pathology. Increased production of TNF-a at the concentration of 2 µg/mL, but not at the concentration of 1 µg/mL is interesting to note as production of TNF-a usually requires co-stimulation with another toxicant, such as LPS. TNF-a up-regulation leads to NF-kB pathway activation. Finally, increased production of pro-inflammatory cytokines and chemokines, such as IL-6 and IL-8, measured through proteomics protein multiplexing, shows that acrolein exposure has the potential to increase the risk of developing AD through the neuroinflammatory pathway of AD pathology.

Matthew Blankenship, Political Science

Benjamin Kleinerman, mentor

The Postliberal Caricature of James Madison: Liberal Prince or Civic Republican?

Postliberals such as Patrick Deneen decry liberal philosophy as one which prioritizes radically individualistic concerns and replaces communal institutions with the uniformity of the centralized state. Central to the thesis of Deneen's book, *Why Liberalism Failed*, is the idea of the great failure of the American Founding, which he sees as the first true expression of liberal political philosophy. One of Deneen's primary targets from this era is James Madison, but his critiques hinge mainly on a few lines from the tenth *Federalist* paper taken heavily out of context. Through an analysis of the entire corpus of Madison's work, as well as modern scholarship, it is clear that he was not the anti-majoritarian radical individualist painted by Deneen and others. Rather, Madison was a civic republican with a primary goal of instilling virtuous citizenship in people living under the new constitutional order.

Mark Bourgeois, University Scholar

Phillip Donnelly, mentor

Expository Sermons in Luke: Responding to Jesus in Light of Luke's Old Testament Allusions

My research was on three major subjects. First, I studied language and rhetorical devices that can be used to learn to read Scripture with an ear to hear God's voice. Second, I studied expository preaching and the methods used to write expository sermons. Third, I read books, scholarly articles, and commentaries on the book of Luke and Luke's use of Old Testament allusions. My only primary source is the Bible (the ESV translation and the *Novum Testamentum Graece* – an edition in the original Koine Greek), focusing on the book of Luke and various Old Testament chapters that Luke alludes to. My research and analysis were guided mainly by Haddon Robinson's *Biblical Preaching*, which teaches a Biblical strategy of preaching most commonly used in Protestant churches. The introduction explains my overall topic, methods, and format. The body of the thesis is four sermons on four passages from the Gospel of Luke. The coda is a reflection on my process and findings. My central argument that expository preaching can be an extremely effective method of sharing the voice of God with a congregation, and I provide evidence for this conclusion through demonstration.

Felise Jeanne Bressler, University Scholar

Annie T. Ginty, mentor

Stressor-Evoked Heart Rate Reactivity Predicts Perceived Stress During COVID-19

Stressor-evoked autonomic arousal is associated with emotional regulation and perceptions of stress (Schneider, 2007; Tyra et al., 2021). However, little research has explored how heart rate reactivity prospectively predicts perceived stress during a chronic stressor. COVID-19 presented a unique stressor with effects seen worldwide. In the present study, we investigated if heart rate reactivity during an acute psychological stress task can predict future perceived stress to a chronic stressor (COVID-19). The participant demographics (N=188) include: 67% female, 69.6% Caucasian, 81.2% not Hispanic, and a mean age of 19.33 years (SD = 0.79 years). At time point one (January 2019-2020), participants completed a ten-minute adaptation period, a ten-minute baseline, a four-minute version of the Paced Auditory Serial Addition Test (PASAT), and then a post-task stress questionnaire. Heart rate was taken during the baseline and PASAT. Reactivity was calculated as Stress – Baseline. Participants also completed the perceived stress scale at time point one and time point two (March 2021). Results indicate a significant association between heart rate reactivity at time point one and change in perceived stress at time point two ($\Delta R^2=.018$, $\beta=.137$, $p = .040$, CI = .005–.131) Results were adjusted for baseline heart rate, adverse life events, baseline perceived stress, and stress related to academic success. Moreover, results indicate that this correlation was not impacted by the appraisals of acute stress. Experimental research is needed to determine if altering heart rate reactivity through stress reappraisal affects perceived stress.

Rachel Brody, University Scholar

Gabrielle Miller, mentor

The Maternal Matrix: Patriarchal Representations of Motherhood in Contemporary Spanish Cultural Production

Since the beginning of the 20th century, the condition of Spanish women has undergone drastic and transcendental transformations. From the unprecedented sexual liberation and political emancipation during the Second Republic to the reimposition of hyper-traditional gender roles during Francisco Franco's regime to the radical redefinition of the contemporary maternal model, the conceptualizations of femininity and motherhood have been continuously written and rewritten. And yet, despite this radical evolution, motherhood remains entrenched within the patriarchal paradigm as the defining characteristic of what it means to be a woman. Within the institution of motherhood, it is assumed and expected that all women have a desire to be mothers, that maternal ability and unconditional love are innate, and that all mothers find complete fulfillment in motherhood. This thesis explores the portrayal of motherhood in Spanish literature, cinema, and media from the 20th to the 21st century. Chapter one presents a comprehensive exploration of the historical progression of motherhood in Spain and introduces key theories of motherhood that frame our understanding of maternal roles and dynamics within this context. Chapters two and three provide a detailed analysis of Mercè Rodoreda's novel "The Time of the Doves" and del Castillo's film "Techo y Comida," unveiling the enduring societal pressures, maternal guilt, and psychological trauma that is perpetuated by normative motherhood. In contrast to the exhibition of these traditional narratives, chapter four explores contemporary countercultural depictions of motherhood in mass media, such as the emergence of the "bad mom" image, which I argue is a symptomatic manifestation of the idealized mandates of the patriarchal institution. By contextualizing these narratives within Spain's historical and cultural context, this thesis illuminates the complexities of motherhood and underscores the need for nuanced representations that embrace diverse maternal experiences and challenge the imposition of patriarchal constructs.

Aaron Brown, Finance

Andrew Detzel, mentor

Ideal Portfolio Allocations Maximizing Sharpe Ratios

In finance, the main goal is finding the most appropriate use of funds for a given purpose to grow the value over time with the appropriate allocation of resources to achieve their specific goals most efficiently. What is essential to understand from this aspect for the people who manage personal funds, namely, money managers, is where to invest their client's money to maximize returns and lower risk. The portfolio manager is responsible for determining portfolio allocation that aligns with their clients' return and risk requirements. In this context, the optimal portfolio is the one that achieves maximum returns while adhering to the client's specified risk tolerance. A crucial aspect of financial management involves comprehending shifts in portfolio allocations and their underlying causes. Such insight not only enhances decision-making but also serves as a valuable predictor of potential future ideal portfolios, including the assets they comprise and their respective weights.

Alea Brummel, University Scholar & Mathematics

Leigh Greathouse, mentor

Comparison of Microbial Pathways in a Mouse Model with Cancer Cachexia and a Healthy Control

In the United States, colorectal cancer (CRC) is the third most diagnosed cancer in both men and women with over 106,000 new cases of colon and over 46,000 new cases of rectal cancer in 2023 alone. Due to increased screening and diagnostic methods for CRC, the overall incidence and mortality of CRC has been decreasing. However, CRC cases have significantly and alarmingly increased in people 50 years and younger, with a predicted increased incidence of CRC for people aged 20-34 years old by 90% for colon cancer and 124% for rectal cancer by 2030. The gut microbiome is known to have a direct link to CRC as well as other wasting disorders including cachexia and

Kwashiorkor. In a mouse model with cancer cachexia, the metabolic pathways between healthy mice and cachexic mice were compared. Metabolic pathways were analyzed using the software PICRUSt and significant differences in metabolic pathways were found between control and cachexic mice.

Rahel Burchardt, University Scholar & German

Jennifer Good, mentor

An Ethically Questionable Public Secret: International Patient Care Centers In Germany and the United States

In recent years, a novel healthcare business model has emerged as an increasing number of renowned medical institutions have opened international offices to provide concierge services to affluent patients. This paper provides an overview of the current practices, ethics and economics in a growing market for medical tourism. The medical tourism industry in Germany and in the United States is compared to the national system in both countries on a comparative basis. Several respective competitive advantages and disadvantages of the industry in the two countries are examined, e.g. the different regulations applying to compassionate use cases and controversial stem cell clinics. In addition, the differences between the concierge medical system within international centers and the national system are examined in regard to the offerings, incentives for provision of care, patient outcomes, and costs. The susceptibility of the international concierge medicine model to recent changes in the international political landscape and the shifting success of the offerings in Germany versus the United States will be demonstrated. Information was compiled from literature searches, by contacting medical institutions in Germany and in the United States, as well as conducting direct interviews with patients at international patient care centers. This research involving international patient care centers is unfortunately marked by intransparency and remains a “public secret.” Despite having reached out to nine German centers and five US centers, and utilizing personal contacts, I was unable to find a single executive who was willing to provide information, so I had to obtain information from foreign discussion boards and directly from patients who went through the international offices. The apparent ability to overcome political, ethical, and moral questions regarding medical treatment through what appear to be uncontrolled payments, raises concerns about international patient access to first class healthcare not available to unprivileged patients.

Warren J. Burrus, Computer Science

Richard L. Sneed, mentor

Be Intelligent About AI: Should We Create Artificially Intelligent Machines?

“Artificial intelligence” has become a popular term to describe an ever-growing array of technology, but what makes it intelligent? Philosopher John Searle analyzed artificial intelligence (AI) with his famous distinction between “weak” and “strong” AI, the former being data-driven tools we use daily while the latter has a mind and cognitive states of its own. However, this distinction does not fully address the equally pressing, moral question of whether we should develop or use such AI in the first place. By applying a range of both technical and fictional sources, we can define a new pair of categories, Algorithmic AI and Fictional AI, that answer not only what makes such AI intelligent, but whether we should even pursue it. Algorithmic AI is our present computer programs that merely follow advanced algorithms (Siri, Alexa, ChatGPT); creating Algorithmic AI as a tool is not itself immoral—but how we use it can be. Fictional AI, however, exhibits its own form of intelligence and, so far, only exists in fiction (*Bladerunner, I, Robot*); creating Fictional AI would be immoral altogether.

Jack Cantarella, Science Research Fellows

Robert Kane, mentor

Cardiac Perfusion Method for Chemically Modifying Kidney Vasculature with Fluorophores Attached to NHS Esters.

Surface and vascular modification of transplanted organs is a method which delivers immunosuppressive drugs directly to the transplanted organ, and slowly releases new drug over time to create a localized immunosuppressive effect, unlike current methods which target the entire body and cause adverse health effects. Drug linker synthesis is both financially and time consuming, therefore an optimized chemical modification procedure of a target organ is necessary to test newly synthesized drug linkers at reduced costs. We hypothesized that cardiac perfusions of fluorophore attached to N-Hydroxysuccinimide (NHS) ester would yield consistent perfusions and fully modified kidney vasculature. We perfused the entire animal through the aorta with fluorophore attached to NHS, an active chemical crosslinker, or to Dibenzocyclooctyne (DBCO), an inactive chemical crosslinker. Anatomically right kidneys were sectioned and imaged using a fluorescent microscope while anatomically left kidneys were macerated, lysed, and analyzed by a microplate reader for total fluorescent intensity. Results demonstrated successful chemical modification of kidney vasculature with NHS-attached fluorophore as images of tissue slides yielded fluorescent vessels post-perfusion and strong fluorescent intensity in lysate solutions.

Libby Carroll, University Scholar

Lenore Wright, mentor

Our Bodies, Ourselves: An Examination of Female & Disabled Embodiment

Popular and profitable internet and social media platforms have eased access to pornographic materials around the globe. Pornography is everywhere, all the time. One troubling outgrowth of internet pornography is a phenomenon known as inspiration porn. Coined by the late disability activist Stella Young, the term “inspiration porn” refers to any objectifying depiction of a disabled person that treats the person as a source and site of inspiration for nondisabled people. The operating force behind inspiration porn is a narrative of disabled people as stark figures of otherness, overcomers of broken bodies, or grateful recipients of charity. Inspiration porn thus reduces personhood from a complex web of essence and identities to a singular marker of selfhood: disability. By conflating human essence and identity—by equating what one is with who one is—inspiration porn effectively denies personhood to disabled people. In this paper, I argue that the philosophical and theological assumptions undergirding our cultural ideology, rhetoric, and practice toward women and disabled people leads to an objectification of both people groups, resulting in pornography. I analyze prominent images of inspiration porn to identify and illustrate the similar logic of objectification at work within both erotic and inspiration pornography. Finally, I explore alternative phenomenology and theology of embodiment that offers generative contradictions to pornography’s denigration of “extraordinary” bodies.

Kathryn Clewett, University Scholar, Statistics, & Political Science

Dave Bridge, mentor

Unintended Consequences of Overturning Roe v. Wade

The Republican Party should not be celebrating the reversal of Roe v. Wade. Instead, they should be planning ways to prevent a potential Democratic resurgence, which could employ a playbook that Republicans themselves crafted. In 1973, Roe afforded the Republican Party an issue in which the GOP could encourage social conservatives to start voting Republican. The GOP strategically used the issue of abortion to form the modern New Right and to win elections for the next 50 years. This can be explained through the framework of issue evolution, which allows political parties to capitalize on a salient issue with a cross-partisan majority. In 2022, the Supreme

Court overturned Roe in Dobbs v. Jackson Women’s Health. Does that ruling create a similar issue evolution possibility for the contemporary Democratic Party? Will the Democratic Party let the abortion issue fester in the states, promoting a crisis at the voting booth that may bring about historic voter shifts? If so, then Dobbs’ long-term effect, ironically, might be to expand the ability to obtain an abortion.

Sarah Cottick, Biology

Sarah Walden, mentor

Government Agency, Non-Governmental Organization and General User Twitter Accounts: A Rhetorical Analysis of the Dissemination of HPV Vaccine Information

In this experiment, public health information dissemination about the HPV vaccination is explored between two groups of Twitter accounts, government agencies and non-governmental organizations versus other interacting Twitter users. The usage of the rhetorical strategies personal narrative, word choice, and sentiment and post frequency was evaluated between the two groups, with the hypothesis in support of other interacting Twitter users having increased usage of rhetorical strategies and more frequent posting. To conclude, the two-week long experiment, it was found that the other interacting Twitter users demonstrated better rhetorical strategy usage in their posts, especially when it came to informational terms, and posted more frequently. At the end, government agencies and NGOs struggled with infrequent posting and lack of rhetorical strategies which could prevent accurate vaccine information from being disseminated on social media sites like Twitter and the ability of misinformation to be more easily spread by other users as well.

Piper Crandall, Great Texts & Communications

Kayla Rhidenour, mentor

Religion Versus Faith: The effects of religious oppression in contrast with the effects of liberation through faith, from the perspective of the formerly enslaved

In the 19th century, many churches and theologians in the South created practices of religious instruction meant to strengthen the system of chattel slavery. This manipulation of Christianity contributed to the image of Christ as an oppressor or as a figure in an exclusively majority religion. However, primary narratives written by enslaved peoples show that Christ was identified as a co-sufferer, provided a sense of freedom and autonomy, and that where true Christianity was instituted the system of chattel slavery became weaker. This thesis explores a variety of writings: firsthand accounts written by formerly enslaved people, scriptural defenses of slavery by Southern clergymen and missionaries, comprehensive histories of slave religion, and modern works exploring the legacy of slavery. In illustrating the pervasive nature of pro-slavery bias in 19th century Southern theology, the difference between true faith and manipulative religious education is clearly illuminated. Primary narratives and anti-slavery theological writings show that chattel slavery was not biblical, Christ operated on the side of the oppressed, and His agency was not determined by oppressors. Finally, this thesis discusses the lasting impact of chattel slavery on the Christian church in America and offers suggestions for approaching conversations around historical destruction committed in the name of Christianity.

Elise Crawford, University Scholar

Jon Singletary, mentor

Loving Well: Understanding Human Relationships Through the Language of the Enneagram

The Enneagram is a valuable framework for understanding human relationships. Every personality type experiences the world differently, and the language of the Enneagram offers a helpful tool for those who want to better understand and love the people around them. In this thesis, I focus on types Five, Seven, and Nine, drawing

on the dynamics between myself and my two younger sisters. Using this example, I show how to practically apply the Enneagram toward improving self-awareness and developing healthier relationships. This thesis also includes a creative component in a series of six digital photographs, in which I visually represent types Five, Seven, and Nine and the dynamics between them.

Cole Creech, History

Bracy V. Hill II, mentor

Large Mammal Hunting in Texas During the Early Decades of American Settlement: 1820-1880

The hunting of large mammals was a key aspect of the lives of Anglo-American settlers to Texas during the first sixty years of settlement between 1820 and 1880. This thesis identifies the three reasons why settlers primarily hunted, namely for subsistence, sport, and eradication. Subsistence hunting was practiced by the earliest settlers and the economic poor who hunted as a means of survival due to the difficulty they experienced in obtaining necessary goods from other means. Sport hunting, in comparison, was typically practiced by wealthier settlers who hunted as a pastime and was the byproduct of the cultural influences of the southern United States. Eradication hunting was not relegated to an economic class and involved settlers seeking to destroy certain animal populations due to the belief that the animal's existence was incompatible with Anglo-American civilization. This thesis, therefore, stresses the importance of hunting to the lives of early Anglo-American settlers by building on the writings of modern historians such as Daniel Herman, past historians such as Theodore Roosevelt, and contemporary writings from settlers such as newspapers and autobiographies.

Lauren Crowhurst, Science Research Fellows

Leigh Greathouse, mentor

An analysis of the effect of tryptophan metabolites on the programmed death ligand-1 in colorectal cancer cells

Colorectal cancer (CRC) is a major public health concern, with early onset CRC cases rapidly increasing annually. Early onset CRC is characterized by mismatch repair deficiency (dMMR) and influenced by the gut microbiome, two factors which may impact success of immunotherapy treatments. Specifically, immunotherapy targeting the immune evasion checkpoint, programmed death receptor PD-1/PD-L1, is more successful in patients with dMMR. In addition, the gut microbiome is a known contributor to PD-1/PD-L1 blockade success. PD-L1 expression may be impacted by the gut microbiome via microbial-derived tryptophan metabolites interacting with the aryl hydrocarbon receptor. This study explores the impact of metabolites that exist at higher levels in the CRC microenvironment, indole-3-aldehyde (I3A) and indole-3-carboxylic acid (I3CA), on PD-L1 expression. The hypothesis of this study is that these bacterial derived indoles change the expression of PD-L1 *in vitro*. This study found that PD-L1 expression was significantly lowered in colon cancer (HT29) cells treated with I3CA, but not other indole variants, suggesting that gut microbiome derived indole variants may impact immunotherapy responses in CRC.

Jia E. Cummings, University Scholar

Devan Stahl, mentor

Seeing God: The Compatibility of Gestational Surrogacy and Texas Baptist Belief

Surrogacy is an ancient practice that allows a woman to carry a child for another couple or individual to rear. Although traditional forms of surrogacy have been documented in biblically, the 1979 invention of in-vitro fertilization has revolutionized reproductive technology, making it possible for surrogate mothers to carry unrelated embryos as "gestational carriers." Concerns about the moral status of embryos, exploitation of women and their bodies, and the commodification of children have made Christians hesitant to permit these technologies.

While various denominations have taken position both in favor and against the use of reproductive technology, the Baptist General Convention of Texas (BGCT) has not, despite Texas's recognition as having some of the most restrictive reproductive laws in the nation. In this thesis, I demystify common Christian concerns about gestational surrogacy, responding with conditions for fertility treatment that are compatible with BGCT beliefs. In affirmation of the sanctity of human life and the commitment to reaching those hurt in their struggles with infertility, I argue that ethical practice of gestational surrogacy both agrees with and helps carry out the denominational objectives of the BGCT.

Allen Dao, University Scholar

Michelle L. Law, mentor

Pathogenesis of cancer-induced cachexia in aged mice

Cancer cachexia is a progressive weight loss and functional impairment syndrome that 30-90% of cancer patients experience. Although most cancers associated with cachexia occur in older individuals, mouse models of cachexia primarily rely on young male mice. Limited studies compare cachexia inclusive of age and sex. Even fewer studies also investigate heart muscle. Older individuals have higher heart disease risk, and cachexia weakens heart function. Therefore, this study compared cancer cachexia progression in eight groups of young and old mice of both sexes with colon-26 adenocarcinoma or sham injections. Cachectic atrophy of muscle and adipose tissue occurred in both sexes and ages, however, old mice and females had reduced losses compared to young mice and males. Tumors induced significant cardiac tissue atrophy, but there was a differential effect that sex had on atrophy with females having some protection. Preliminary cardiac PCR analysis revealed an increased inflammatory environment with decreased GDF-15 and increased IL-6 expression in tumor-bearing mice, giving insight into cardiac pathology. Older mice also had greater GDF-15 expression than young mice. In conclusion, preclinical models produced a similar wasting phenotype between sexes and ages, however, young mice have a more exacerbated and consistent phenotype. Utilizing cachexia mouse models that are representative of the human condition is important in future research and clinical care for patients with cancer cachexia.

Grace DeAlessandro, University Scholar

Rizalia Klausmeyer, mentor

An Analysis of the Knowledge and Social Determinants of Preventative Care Against HPV Among College Students

Despite the efficacious standard practices for prevention, human papillomavirus (HPV), one of the most common viral infections of the reproductive tract, is still a critical cause of concern regarding its exacerbated progression into cervical, anogenital, and oropharyngeal cancers, among others (Szymonowicz and Chen, 2020). Though the HPV vaccine is targeted towards adolescent age groups, college students are considered one of the most "high risk" demographics for HPV (Dempsey et al., 2011). Correspondingly, there is a substantial deficiency in research analyzing the levels of HPV awareness among the 18-24 age group, which stresses the need for more widespread and inclusive investigations of college students' knowledge of HPV throughout the nation (Yacobi et al., 1999; Dempsey et al., 2011). To address this insufficiency, we surveyed undergraduate students at Baylor University to assess this population's knowledge of HPV and identify the barriers preventing them from accessing the vaccine. The results of this study underscore the unfulfilled need for targeted approaches that improve sexual health education among young adults.

Diya D'Souza, Health Science Studies

Jeff Levin, mentor

The Global Response to the COVID-19 Pandemic: A Case Study of Six Countries

The purpose of this thesis project is to examine the national response to the COVID-19 pandemic in six countries, in order to determine the best approach for the next pandemic. The first chapter reviews several key communicable diseases of the last century and summarizes the origins of the SARS-CoV-2 virus. The second chapter consists of six national case studies, one from each continent, that showcase a variety of approaches to managing the pandemic. The third chapter analyzes the lessons to be learned from the COVID-19 pandemic and synthesizes the case studies in order to determine key factors crucial to a successful pandemic response in the future.

Brooke Eshbach, Biology

Elizabeth Pitts, mentor

The Role of Genetics and the Environment on a Dog's Behavior and its Application Toward Successfully Choosing a Dog for Service

This paper was intended to research the role of both genetics and the environment on a dog's behavioral profile and deduce whether there is a significant enough effect of the two on it to recommend the maintenance of breeding dogs for service or advocating for the use of shelter dogs. It was found that both factors play a significant role in the behavioral characteristics exhibited by the canine. Genetics were proven to undoubtedly influence behavior, although the effects are characterized by wide variations in gene expression and are extremely complex. The early environmental exposures of the puppy also have a profound effect on its behavior as an adult. For these reasons, it is concluded that potential service dogs should continue to be chosen from reputable breeders who can provide extensive background information on the puppy and more strictly control the surroundings they are exposed to in their early lives.

Jordan Estes, University Scholar

Jason Whitt, mentor

How the Catholic Faith has guided us through hospitality in welcoming celiacs to our table

Celiac disease is an autoimmune disorder that is triggered by consuming gluten, the only cure being to strictly maintain a gluten free diet. To anyone, this would seem to be a straightforward task; however, for the practicing Catholic who wishes to partake in the Eucharist, religious agitation ensues. With an in depth analysis on the topic of inclusion through the eyes of a Christian, this thesis will draw upon the necessary mannerisms and compassion that all individuals must value when looking to invite a stranger, whether that be a celiac or other person in need of accommodations, to one's table. The meaning and practice of table fellowship will also be evaluated in a discussion that ties in hospitality and welcoming all to sit down and dine together. Furthermore, this thesis will explore the traditions behind the ritual that has been practiced since Jesus' Last Supper, as well as the true meaning of the Body of Christ. First hand sources from priests and the Vatican's "Instruction *Redemptionis Sacramentum*," will help shed light on the controversial subject of offering and accepting a gluten free host.

Brighton Fan, University Scholar

Julie King, mentor

Unraveling Responsibility: Norfolk Southern Under Scrutiny After East Palestine Train Derailment

On February 3rd, 2023, a Norfolk Southern train traveling through East Palestine, Ohio derailed, releasing toxic chemicals into the nearby soil, waterways, and air. This prompted mass evacuations of East Palestine's residents

and left lingering questions of the environmental and health effects. This thesis seeks to examine the causes of the derailment and Norfolk Southern's steps towards accountability. While exploring the environmental, health, transportation, and legal aspects of the derailment, this thesis will also identify the various areas where Norfolk Southern is culpable. With adequate litigation and legislative action, East Palestine will set a precedent for improved rail safety and environmental justice in communities neighboring railways.

Hannah M. Fisher, Communication Sciences and Disorders

Hyunsoo Yoo, mentor

Comparison of Narrative Discourse Production Using Correct Information Units (CIUs) in Individuals with Unilateral Brain Damage

The aim of this study is to compare the narrative discourse production differences in adults with right hemisphere damage (RHD) and aphasia resulting from left hemisphere damage, using measures of CIUs (total # CIUs, CIUs/Minute, and %CIUs) to better understand the language difficulties experienced by individuals with unilateral brain damage on both the microlinguistic and macrolinguistic levels of discourse. We hypothesize that individuals with aphasia will perform lower on all measures of CIUs analyzed compared to individuals with RHD. To test this hypothesis, narrative discourse samples of 15 aphasic individuals and 15 individuals with RHD from the TalkBank Database were analyzed using CLAN. Results from this analysis show that individuals with aphasia performed lower on all measures of CIUs, indicating that their narrative discourse performance was poorer, less accurate, relevant, informative, and on topic, compared to the individuals with RHD.

Jenna Fitzgerald, University Scholar

Clark Baker, mentor

The Nonprofit heart of Waco: A Series of Documentary Photographs

This collection of documentary photographs explores the everyday practices, events, and reach of three local nonprofits: Urban REAP, Creative Waco, and Caritas of Waco. With inspiration from both widely renowned and lesser-known documentary photographers like Eugène Atget, Walker Evans, and Fred Gildersleeve, I seek to go beyond the “Baylor bubble” and immerse myself in a side of the city that is unknown to the majority of the student population. In these ways, this series serves not only as an account of the select nonprofits but also as an encouragement to members of the Baylor community to be more intentional about taking part in their city and its initiatives. Documentary photographs, when captured with care, offer a window into the soul of their subject, and this project takes advantage of that medium to demonstrate how nonprofits are the heart of the Waco community.

Lilly Flanders, University Scholar, English, & Political Science

Mona Choucair, mentor

The Motif of Motherhood: An Exploration of Maternity in American Women’s Storytelling

Though a prominent theme in many works of fiction, motherhood is often portrayed in a rather one-dimensional manner, resulting in many female characters who are entirely defined by their maternity. By diminishing these figures in such a way, readers can lose sight of the complexity and nuance of the female experience. That being said, Toni Morrison’s *Beloved*, Sylvia Plath’s *The Bell Jar*, and Greta Gerwig’s *Barbie* (2023) each provide a unique perspective on motherhood in conjunction with other aspects of one’s social identity. In *Beloved*, Morrison portrays motherhood as irrevocably incompatible with the institution of slavery and its atrocities. The symbol of milk, which can be traced throughout the work, serves to highlight motherhood and maternal nourishment, both

of which are debased by the gross exploitation of Sethe. In Sylvia Plath's *The Bell Jar*, Plath emphasizes Esther's ardent conviction that motherhood is incompatible with a fulfilling female existence. In doing so, Plath's novel serves as a sharp critique of restrictive models of femininity, and, more specifically, the confining societal expectation of motherhood. Unlike the previous two texts, Greta Gerwig's *Barbie* (2023) offers a more optimistic and modern perspective. Throughout the film, she emphasizes the beauty and dignity of motherhood despite its inherent difficulties, ultimately claiming that maternity can be a part of a diverse and fulfilling life. Through a close analysis of the mother figures in each of these works, readers can craft a comprehensive picture of the evolving perspectives of motherhood in American fiction.

David E. Folks, Instrumental Music & Greek

Jeffrey Fish, mentor

The Antithesis of ὕβρις and Humility in the Pursuit of Glory: A Christological Contour of Beauty

ὕβρις permeates ancient Greek literature and history. From epic to ancient kings, notions of self-exaltation are abundant. Men try to make themselves into gods and face the consequences. Comparatively, Jesus of Nazareth demonstrates humility, despite ἐν μορφῇ θεοῦ ὑπάρχων ("being in the form of God"). The antithesis between Jesus and the civilization of ὕβρις before him is worthy of aesthetic consideration. In this thesis, I provide a theological aesthetic through which to see the beauty of Christ's humility in the Carmen Christi (Philippians 2:6-11) against the ὕβρις identified through Greek history and literature. This takes place in three parts: 1) I establish a theological aesthetic by which to conduct my examination; 2) Through Homer, Solon, and ruler cults I examine the language of ὕβρις, its causes, and its consequences; 3) I elucidate the humility of Christ aesthetically in comparison to its Greek counterpart to contemplate its anthropological implications.

Seven Franklin, Political Science

Elizabeth Corey, mentor

James Baldwin: Creating Vs. Inventing Oneself

What does it mean to transcend racial identity? This thesis explores James Baldwin's answer to such a question by examining three topics: the black American's relationship to the Western tradition, the legitimacy of protest literature, and the role of artists in society. I argue that Baldwin did not want to be confined to and limited by race. I show his drive to go beyond identities, to get at the root of things, and to reveal greater truths about what it means to be human. This thesis captures Baldwin's desire to understand the complexities of life and death, pain and sorrow, love and hate, and to live by the Western Matra "know thyself."

Madeline French, Linguistics

Melisa Dracos, mentor

Music and Second-Language Acquisition: Examining the Connection Between Musical Aptitude and Japanese Pitch Accent Proficiency

Acquiring the prosody of a second language (L2) is a notoriously difficult feat. Researchers interested in exploring how this process might be made easier have looked to a potential relationship between musical and linguistic pitch processing in the brain, theorizing that L2 learners with elevated musicality might have an advantage in acquiring L2 prosody. While several research studies have successfully demonstrated a musicality advantage in L2 prosody acquisition, most of this research has been limited to the acquisition of tonal language prosody, which differs from other speech prosody types, like pitch accent, in its fundamental purpose and structure. To determine whether the

musicality advantage extends to L2 learners of pitch accent languages, the present study measured the musical aptitude and pitch accent proficiency (both productive and perceptive) of 28 late L2 learners of Standard Japanese. Data analyses demonstrated that musical aptitude scores, particularly in pitch-related musical sectors, had a strong and significant relationship with both productive and perceptive prosody scores. These results suggest that music may have a place in the development of pedagogical and learning strategies for L2 learners of pitch accent languages.

Aubrey Gilliam, University Scholar

Richard Jordan, mentor

Middle Power or Multipolar Player? Indian Grand Strategy and Partnership with the West

India has over two centuries of tumultuous history with China, due in part to the critical territory they share at Aksai Chin. Recent tensions along this border have prompted a significant shift in Indian foreign policy. Deviating from India's historical nonalignment, Prime Minister Narendra Modi has warmed to the West, taking advantage of their common concern over China's growing power. But while India may converge with Western security strategies where convenient, it will never form a major military alliance with the West. When countering China, India desires the flexibility to fight without the censure of a larger coalition. Such strategic autonomy is consistent with India's independent character and foreign policy outlook. Ultimately, India is not content to plateau as a Western middle power — it insists on becoming a multipolar player on its own terms.

Marly Ginn, Health Science Studies

Jason Aimone, mentor

Is teamwork or mentorship effective in combatting deficiencies in reasoning? Addressing willingness to pay for advice among different shift workers

This research proposal investigates the influence of sleep deprivation on decision-making skills among different shift workers. Building upon existing literature that underscores the correlation between sleepiness and cognitive function, we propose a comprehensive study to assess decision-making among shift workers, specifically focusing on differences in behavior. Utilizing a combination of surveys and objective evaluations, our research aims to discern the comparative effectiveness of decision-making across different shifts and stimulate discourse surrounding the importance of working hours. By filling a void in current scholarship, this study holds implications for enhancing teamwork quality through informed policy and practice recommendations.

Audree Goley, Political Science

Steve Block, mentor

Constitution as Bill of Rights and Bill of Rights as a Constitution: Popular Sovereignty and the Canadian Charter of Rights and Freedom

While the Canadian and American governments have many similarities in their origination and development, the government systems that resulted differ significantly in nature and practice. An interesting development in Canada would be the remarkably activist judiciary and development of a "Court Party". This politicization of the court system in Canada is recognized by many, but the question as to why it arose seems to vary greatly. This thesis introduces and explains the phenomenon of the Charter Revolution as being caused by the Charter itself in establishing a bill of rights as its constitution instead of creating a structure and declared powers for government

institutions. By providing an understanding of the origins of government and analyzing foundational documents of both the United States and Canada, I will explain how the text of the Charter, while seemingly representative of the people, has provided positive empowerment for political activity by the judiciary and in doing so, has allowed for the rejection of popular sovereignty.

Victoria Gonzalez, Biochemistry

LesLee Funderburk, mentor

Fruit of One's Labor: An Assessment of Community Gardening and Produce Rx for Hispanic Communities

By 2035, the United States population will be 25% Hispanic, making them the largest and fastest-growing ethnic group. They are also the demographic most affected by chronic disease, with many suffering from diabetes, obesity, and high cholesterol to name a few. Often, the prognosis of these diseases is associated with social determinants of health, such as education status, household income, and family size. Hispanics have among the lowest obtainment of higher education, lower household incomes, and larger family sizes due to cultural practices like multigenerational households. Because there is less income and more mouths to feed, it can become easy to trade off the quality of food for the quantity of food. Food insecurity is an issue that especially impacts vulnerable populations, as they are unable to purchase quality food that could potentially prevent chronic disease prognosis. The Food is Medicine movement has come about as a way to provide food to food insecure individuals and has made its way to Waco Family Medicine to serve especially vulnerable populations here. What started in 2017 as a prescription produce and community gardening intervention has now become an intervention that provides produce for individuals to utilize, as well as educational courses on how to prepare the produce and even grow it on their own. This is a beneficial intervention to help a large Hispanic community in Waco treat their diseases, prevent others from surfacing, and provide education for future generations to change health status outcomes.

Olivia C. Gray, University Scholar & International Studies

Patrick J. Flavin, mentor

To Proactively Combat Human Trafficking: Empirical Study on Nationwide Perpetrator Clearances and Human Trafficking Prevalence

Despite the national and international grievance of human trafficking, to date, no research exists to evaluate the relationship between perpetrator clearances and changes in human trafficking quantity counts. Additionally, most current data sets and analyses aggregate into nationwide conclusions rather than examine local and regional-level applicability. Presenting a new perspective, this research uses locally-provided data to generate accurate conclusions about human trafficking specific to the United States with a focus on community, socio-economic, and judicial contributions. While quantitative empirical methods conclude no connection between perpetrator clearance rates and a change in human trafficking victims, a qualitative interpretation suggests new perspectives and materials aimed to allow local, regional, and national-level stakeholders to combat human trafficking.

Gracie Grunkemeyer, University Scholar

Holly Collins, mentor

The Journey to Physician: French and American Medical Education Systems through a Comparative Lens

Medical school is notoriously challenging both academically and physically, and media sources often portray an inaccurate version of the journey a physician takes to become a doctor. This thesis is a bicultural examination of medical students' experience achieved through analysis of existing research and personal interviews. Following an overview of the medical education systems in France and the United States, the personal accounts of current

medical trainees add a nuanced perspective to the reality of medical school. Furthermore, the COVID19 pandemic has affected medical training due to quarantine and virtual education—noteworthy to the medical student experience. The thesis will finally investigate an aspect of the American medical school curriculum, osteopathy versus allopathy, revealing a distinguishing element that the French medical education system lacks.

AnnaGrace Hale, International Studies

Gabrielle Miller, mentor

Challenging the domestic expectation: An analysis of nineteenth-century Spanish women

In nineteenth-century Spain, the ideal woman was known as the *ángel del hogar* or the angel of the hearth. These women were described as devoted wives and mothers, who stayed within the domestic sphere. Nevertheless, this idealized image, although popular, did not represent the experience of all Spanish women. This thesis draws on newspapers, short stories, and paintings to explore how cultural producers inside and outside Spain directly or indirectly challenged the normalized perspective of femininity. The first chapter provides context on the nineteenth century, highlighting Spanish political movements and the effects of industrialization and modernization on Spain's middle-class society and pays special attention to the prescribed role of women. The second chapter conducts original archival research to analyze two women-authored newspapers written for a feminine public. I demonstrate that, despite their conservative messaging, these newspapers promote protofeminist arguments through their focus on women's education. The third chapter explores two short stories by realist author Emilia Pardo Bazán. I argue that both stories critique the institution of marriage in the bourgeois class, albeit in different ways. In the final chapter, I examine two paintings by American artist John Singer Sargent. I highlight how these works contradict the common exoticification of Spain, and Spanish women in particular, by portraying women dancers through a culturally-informed, foreign perspective. Through its analysis of nineteenth-century, Spanish cultural production, this thesis points to the complexity of a woman's experience in Spain amongst a seemingly central *ángel del hogar* narrative.

Jackson Hall, Biology

Annie T. Ginty, mentor

Exploring the relationship between Adverse Childhood Experiences, Stress Reactivity, and Academic Achievement

Adverse childhood experiences (ACEs) are associated with negative health outcomes into adulthood. This includes increased susceptibility to CVD, diabetes, cancer, and addictive behavior. Individuals who have experienced more ACEs have also been found to have blunted cardiovascular and cortisol reactivity to acute laboratory stressors, which is also indicative of negative health outcomes and susceptibility to addiction and depression. Moreover, blunted reactivity to acute stressors has been related to lower cognitive function and academic achievement. There is also research suggesting that ACEs contribute to worse academic achievement. The current study sought to further examine the relationship between ACEs, stress reactivity, and academic achievement. Cardiovascular activity was measured during rest and an acute psychological stress task. Stress reactivity was calculated as activity during stress minus activity during baseline for each cardiovascular variable. ACEs were measured using the ACE 10-item survey, along with academic achievement through undergraduate GPA in a follow-up survey four years after the reactivity measurements. The results showed a statistically significant relationship between cardiovascular reactivity and GPA and academic achievement, showing a direct and positive relationship. Unexpectedly, ACEs showed no statistically significant relationship with academic achievement or reactivity. This data could be indicative of stress reactivity as the moderating variable between ACEs and academic achievement. More research must be done, including different measures of stress reactivity and academic achievement, to explain the relationship between these variables.

Lauren Hardin, Biology

Jon Eckert, mentor

Education as Intervention: A Critical Examination of Drug Prevention Programs in U.S. Schools

This thesis explores the effectiveness of drug prevention programs in US schools, analyzing their outcomes and identifying successful and unsuccessful elements. Through a thorough examination of existing literature and empirical studies, this research consolidates our current knowledge of drug prevention efforts in educational settings. It looks at different types of programs and how they're delivered, focusing on their impact on reducing substance use. Additionally, it considers contextual factors like socio-economic status, cultural diversity, and community support that affect program effectiveness. The findings stress the importance of evidence-based approaches, integrating prevention into the curriculum, and maintaining consistency in program implementation for success. Furthermore, it highlights the drawbacks of certain strategies, such as scare tactics and short-term interventions, and advocates for tailored, age-appropriate interventions. By identifying effective practices and areas for improvement, this study aims to enhance drug prevention efforts in US schools.

Angelina Hartley, Neuroscience

Tara Foley, mentor

The Biopsychosocial Model Applied to mid-20th Century American Literature

The biopsychosocial model emphasizes that biological, psychological, and social factors should all be considered when treating illness instead of only focusing on eliminating physical symptoms. In mid-20th century American literature, the female protagonists from *Long Day's Journey Into Night* by Eugene O'Neil, *A Streetcar Named Desire* by Tennessee Williams, and *The Bell Jar* by Sylvia Plath are treated for their mental disorders by society solely to eliminate their physical symptoms. However, this treatment from their communities has the opposite effect and leads these women to more suffering. The only time the women experience relief is when a character comes along and tries to truly understand them. These empathetic characters are important because they show that the key to effectively treating psychiatric illness is to use the biopsychosocial model. Applying the biopsychosocial model to these works of American literature brings to light how the female protagonists and their communities perceived and responded to the protagonists' symptoms. It also demonstrates how their disorders were complex and easily stigmatized unless approached with a willingness to understand their afflictions. The application of the biopsychosocial model to the protagonists' stories demonstrate that compassion and holistic treatment are needed when treating mental illness because the people afflicted are more than their symptoms.

Emily Helm, University Scholar

James Marcum, mentor

Ethical Considerations For Pediatric Genetic Testing: Evaluating the Perspectives of Patients, Families, and Medical Professionals for Predisposition vs. Predictive Diagnosis

The field of genetics erupted after the completion of the Human Genome Project, resulting in the advent and spread of genetic testing for numerous conditions. Alongside this new technology comes a host of ethical considerations, including access to testing, clinical utility of results, and psychosocial implications of this knowledge. Huntington's Disease, a neurodegenerative disorder with no cure, and Lynch Syndrome, a cancer predisposition syndrome, are genetic conditions caused by a mutation in a single gene with onset in adulthood. Neither condition possesses clinical intervention or preventive measures during childhood, so is it ethical to test children at risk for these conditions before they can participate in the decision-making process? Utilizing a framework of principlism, I assess the perspectives of medical professionals, families, and pediatric patients to determine whether or not it is ethical to test children for HD and LS in childhood. Based on the principles of autonomy, beneficence, nonmaleficence, and justice, barring extenuating circumstances in which clinical utility

may arise, it is recommended that genetic testing ought to be delayed until the adolescent may participate in discussions about testing to minimize psychosocial burdens and preserve the child's future autonomy.

James K. Hill, Spanish

Jacob Abell, mentor

Caribbean Literature Reconsidered: Reading Contemporary Dominican Literature with Haitian Prose

In this thesis I analyze samples of literature from the island of Hispaniola to distinguish certain cultural tendencies found in the Dominican Republic and Haiti. The Haitian texts studied in this project include: *Compère Général Soleil* by Jacques Stephen Alexis (1950) and *Brother I'm Dying* by Edwidge Danticat (2007). The Dominican texts in this review consist of: *A Wedding in Haiti* by Julia Álvarez (2012) and multiple short stories and poems from the book *Ni de aquí, ni de allá* compiled by Ángela Abréu (2021). My arguments are organized into three chapters

Daniel Ho, Religion

Jonathan Tran, mentor

Unreasonable Experience: Understanding John Wesley's Theology of Experience in the Shadow of the Enlightenment

John Wesley's activity sat in the midst of the Enlightenment, which would turn out to be among the most intellectually impactful and contentious centuries in history. One of the more curious products of Wesley's actions was his so-called theology of "experience." I will begin by narrating the origin of Wesley's theological position as a failure of the existent "Anglican triad" to accommodate the authoritative experience of the individual within itself. This failure, caused by Enlightenment values, forces experience to take a distinctive authoritative position rather than being a subset of the triad. After establishing this, I will introduce what I will call "the experience paradox," which is derived from the historical narration of Wesley's theology of experience. This problem is created by the requirement that God must interact with humans on an individual level and the opposing reality that any intellectually honest assessment of human "experience" understands that it is anything but objective. I will conclude by tracing a connection between Wesley's situation and the situation of modern evangelicals.

Josh Holden, Astrophysics

Lorin Matthews, mentor

Testing Fine-grained Rim Formation Theories with Numerical Simulations

My research involved the development of numerical simulations used to test whether dust moving at a high speeds in protoplanetary disks leads to positive accretion onto a chondrule. I ran these simulations with different amounts of dust as well as different speeds for the dust impacting to chondrule. Results point towards some positive accretion for high-speed dust impacts, though not exactly as predicted by certain high-speed dust accretion theories.

Victoria Holman, Geosciences

Elizabeth Petsios, mentor

Trends in Size Selectivity of Gastropod Prey by Naticid Predators: A Case Study from the Stone City Bluff Member

Predator-prey interactions often provide data on the health and complexity of an ecosystem. Looking back into the past allows us to understand how the trophic web changes over time. Naticids are a family of extant gastropods that prey upon other mollusks and exhibit size selectivity of prey. They create diagnostically shaped drill holes when attacking their prey to reach the soft-bodied organism inside the shell. We have gathered samples from the Whiskey Bridge and Little Brazos localities of the Stone City Bluff Member (Crockett Formation, Claiborne Group, Middle Eocene, central/southeast Texas) to study trends in size selectivity among naticids using drill holes. In this study, we examine the use of naticid drill holes on other gastropods as a proxy for predator size, calculate frequency of predation between the two locales, and determine what statistically significant differences in prey and predator size there are, if any, between the two locales. We used the Wilcox sum-rank test to determine if there are any statistically significant differences between the distribution of sizes of drilled specimens and undrilled specimens. Then, we used a linear correlation model to examine trends between prey size and predator size. There appears to be size selectivity of slightly larger prey present in the Whiskey Bridge locality and in the combined data from both localities. However, this trend is not present as apparently in the Little Brazos locality. Both localities appear to show a statistically significant correlation between drill hole size and drilled gastropod size indicating that larger naticids tend to target larger gastropod prey and smaller naticids tend to target smaller gastropod prey. To verify these findings, more work should be done by others to repeat this study and contextualize other biotic and abiotic factors influencing these observed trends.

Madelynn Howard, Biology

Yang Li, mentor

Valley Fever under a changing climate

This review summarizes studies on relationships between climate change and Valley Fever (VF), a potentially fatal respiratory fungal infection. Climate change could enhance the frequency and intensity of dust storms and droughts over the Southwest US, which facilitate the spread and increase the growth of *Coccidioides*. In California, cases of VF surged fivefold between 2001 and 2021, and are expected to further increase due to various climate factors promoting the spread of the disease. Annual deaths of VF in the US vary but are projected to rise due to increased infections, emphasizing a potential threat to public health. Our study also highlights the expansion of VF endemic regions in the US. This review underscores that additional studies on VF and its relationship with climate are imperative to inform environmental and medical interventions for safeguarding public health in the face of climate change.

Rachel Hulsey, Medical Humanities

Katelyn Jaynes, mentor

Investigating the Origin of Discrimination Toward Pregnant Transgender Men with Proposed Methods of Medical Education Reform

Throughout history, the LGBTQ+ community has faced monumental obstacles in its journey of seeking inclusion and acceptance. Those who identify as transgender have faced some of the hardest obstacles, such as gaining support and acceptance from family and peers and pursuing gender-affirming healthcare from their doctors. In recent years, this gender-affirming healthcare has come under fire and is at risk of being banned in multiple states, proving that the attack on transgender people has only increased despite ongoing increases in acceptance and support for the LGBTQ+ community. One barrier to healthcare access that female-to-male (FTM) transgender people face is the prospect of pregnancy. Pregnant transgender men often face discrimination and prejudice by

their healthcare providers when they seek obstetrics care, and in this thesis, I seek to understand and find the origin of this discrimination as well as address ways of improving undergraduate and graduate medical education to help facilitate better LGBTQ+ healthcare. I begin with an overview of LGBTQ+ history and then proceed into a detailed analysis of experiences of transgender discrimination in healthcare. From there, I investigate the origins of this discrimination and provide proposals to address and eliminate this discrimination.

Abigail I. Ingram, Political Science

Elizabeth Corey, mentor

On American Gastronomy and Public Diplomacy

In early 2023 the U.S. Department of State relaunched its Diplomatic Culinary Partnership in collaboration with the James Beard Foundation. This act signaled the nation's continued commitment to *gastrodiplomacy*, a form of diplomacy that uses food as a nation-branding tool. With the presence of American-born fast-food chains abroad, it is necessary to ensure that the nation's underrecognized culinary history is presented in the best way possible. This essay proposes two things: firstly, that American gastronomy is the sum of the culinary traditions from each of the nation's regions and secondly, that *An American Meal* showcasing both ingredients and culinary practices from each of these areas best allows American cuisine to be shared with global audiences.

Hannah James, Economics & Spanish

Rebecca Thornton, mentor

Differential Reporting on Divorce Filings Between Men and Women

This paper documents the differential reporting of divorce filings across men and women, using data from 7,937 respondents across nine countries. This data was collected through the Gender and Generations Survey (GGS). Comparing across men and women surveyed, I find that male respondents were 29 percentage points more likely to claim that their female spouse filed for their divorce than to claim that they started the legal process themselves. The results are consistent across countries and including controls for education, age, children, and parental/ familial background. Rather than study the rates of filing among men and women, which is already well-documented, this study instead explores how men and women are reporting on these filings differently. The findings have notable implications for future studies regarding autonomy in marital decisions, as well as the apparent ambiguity regarding individuals' recollections of their divorce decisions.

Geoffrey Jandrue, Biology

Daniel Romo, mentor

Computational Docking and Synthetic Studies on Fluorinated Derivatives of the Anti-Glioblastoma Natural Product, Agelastatin A

Agelastatin A (AglA) is a natural product isolated from the axinellid sea sponge *Agelas dendromorpha*. AglA's cytotoxicity against glioblastoma and ability to penetrate the blood-brain barrier are very promising. AglA functions by inhibiting the peptidyl-transferase center of the eukaryotic ribosome to prevent protein synthesis. We previously attempted to increase AglA's solubility by adding a hydroxyl group, leading to a pseudo-symmetric synthetic strategy. Truncated forms of 7-hydroxy AglA were synthesized but were favored in the keto-pyrrole form over the more biologically active hemiaminal form. Therefore, we attempted to dock derivatives of 7-hydroxy AglA with electron-withdrawing groups (EWG) on carbon-6 to increase the electrophilicity of the cyclopentanone and shift the equilibrium to

the hemiaminal form. Docking studies were conducted with Molecular Operating Environment (MOE) software to predict the binding affinity of these derivatives in AgIA's binding site. Among the derivatives studied a fluorinated AgIA derivative showed promise because the expected inductive effects would enforce the hemiaminal form and docking indicated no change in binding affinity. Our synthetic studies toward a truncated, simplified version of this eventual AgIA derivative are described in addition to an NMR study of the equilibrium between the hemiaminal and keto-pyrrole forms of this model compound.

Sydney Johns, Psychology

Karen Melton, mentor

The Impact of Teacher Engagement on Student Engagement in Dance Education

When academic teachers are highly engaged, students become more engaged in the learning process, leading to greater achievement outcomes. This study expands upon current research on the relationship between teacher and student engagement in the academic setting to explore this relationship in the extracurricular dance classroom. Among youth between the ages of eight and sixteen, 24 dancers were divided into two groups that each experienced high and low teacher engagement conditions while participating in dance instruction. Groups were counterbalanced so that each group experienced both conditions in reverse order. Neurophysiological and psychological engagement data were collected. In alignment with previous research on academic engagement, dancers' engagement levels were consistent with the teacher's when high teacher engagement techniques were employed. However, nuances emerged in the low teacher engagement conditions. Rather than dancers always also having low engagement scores, a sequencing effect occurred depending on when the low teacher engagement condition was experienced in relation to the high condition. After dancers first developed a relationship of care with the teacher in the high teacher engagement condition, the dancers then perceived the low teacher engagement as a challenge and were motivated to rise to the seemingly higher standards, resulting in significantly higher engagement scores than they had in the high condition. However, when experiencing the low condition first, dancers did not have a relationship of care with the teacher, so they perceived this low teacher engagement as tiredness and detachment, leading to dancers' engagement scores matching this energy. This study provides insight to dance teachers about the importance of first developing a foundational relationship of care and support within each class to then be able to progress into giving challenges and encouraging growth, producing high engagement and, in turn, maximizing achievement outcomes in dance.

John Junn, University Scholar

Mark Kelly, mentor

An Economic Analysis of Healthcare Price Control in the United States

The United States currently leads the world in health expenditures despite ranking below the median for health outcomes among countries from the Organization for Economic Cooperation and Development (OECD). Despite knowledge of the United States' overwhelming and exorbitant spending, the general public does not understand much of what contributes to this problem. In this thesis, we initially provide extensive literature that reveals that prices are the strongest factor associated with increasing health expenditures. We then compare the health systems and cost-containment strategies of Germany and the United Kingdom with that of the United States and compare the effects of such systems and policies on prices and health expenditure. Afterward, we develop an economic model that illustrates how the market structure of the United States' healthcare industry contributes to the relatively high price of health care services in the United States, which shows that increased levels of productivity from these health goods and services prompt higher prices for these same goods and services. Lastly, we suggest potential policy reforms incentivizing price controls and competition among insurers and health care providers, resulting in lower prices and increased efficiency.

Colton B. Kainer, Science Research Fellows

Lynne Walhout Hinojosa, mentor

A Historical Tracing of Teaching on Human Origins Within the Catholic Church's Response to Modernism for American Catholics (1864-1950)

In present times, one of the most pressing questions pertains to human origins: How did we get here? Recent studies have demonstrated American Catholics are split on beliefs regarding not only human origins but also the interpretation of scripture, and such splitting highlights the dynamic relationship between the interpretation of scripture and beliefs based upon such interpretation. In making sense of the mentioned splitting amongst American Catholics, this thesis historically traces magisterial and popular teaching on human origins within the Catholic Church's response to modernism both internationally and within the United States between 1864 and 1950. Through such an historical tracing, this thesis demonstrates teaching on human origins has developed to adopt an openness to theistic evolution through developments in the interpretation of scripture. This complex development traced both internationally and within the United States during the addressed timeframe—a relatively short one—may explain recent splitting amongst American Catholics on beliefs regarding both human origins and the interpretation of scripture.

Medhini Kapa, Neuroscience

Annie T. Ginty, mentor

The Impact of Self-Construal on Cardiovascular Reactivity

Previous studies showed differences in cardiovascular responses between individuals that have either inter or independent self-construal, there is a lack of research on this relationship within individualistic societies. We examined relationships between levels of personal interdependence and independence and physiological stress during two speech tasks. Participants (N = 289, 51.9% female, M = 19.05 years, SD = 1.15 years). Participants completed the self-construal scale, a 10-minute baseline period, and a 10-minute speech stress task (participants were randomly assigned to either an imagined scenario of cheating on an exam or to a real scenario of discussing failure/disappointment). Blood pressure and heart rate were assessed throughout the baseline and stress task. There was no significant difference in cardiovascular output between gender, type of speech task, and levels of interdependence. However, there was a significant negative correlation between levels of independence and diastolic blood pressure reactivity ($r = -.235, p = .004$).

Kristiana Li-En Kasper, Biochemistry

Daniel Romo, mentor

Asymmetric Giese additions employing chiral acylammonium salts & Curromycin A derivatization studies

The asymmetric synthesis of lactams continues to be an important endeavor, since active pharmaceutical ingredients (APIs) require absolute stereocontrol to bind to their cellular targets. Chiral isothioureas catalysts, such as benzotetramisole (BTM), react with α - β unsaturated acid chlorides and other activated esters to form unsaturated acylammonium salts, enabling a variety of subsequent anionic reactions. Various anionic nucleophiles including activated imines, enamides, aminothiols, azodicarboxylates, and aminomalonates can react with chiral acylammonium intermediates providing access to optically active lactams. In contrast, this study employs a diastereoselective radical (Giese) addition of amine-tethered carbon radicals to generalize the scope of accessible lactams. Importantly, in contrast to recent reports, the use of chemically generated radicals enables a subsequent facially selective α -radical trapping to generate a second stereogenic center. The scope of this methodology and applications are described. In a second project, synthetic studies toward the E,Z,E-triene fragment useful for the synthesis of curromycin A will be described.

Avery Kaye, Biology

Rich Sanker and Shannon Ronca, mentor

A Phylogenetic Analysis of Dengue Virus from El Salvador

Dengue virus (DENV) is a virus in the *Flaviviridae* family posing a major public health threat in the Western Hemisphere. In 2023, countries across Latin America reported approximately 3.6 million cases, surpassing the 2.8 million cases reported in 2022. Unprecedented population growth and resulting urbanization in tropical developing countries has fostered the ideal conditions for *Aedes* spp. mosquitoes to expand outwards from their historical geographic distributions. This increase in cases and broadening vector range emphasize the importance of real-time genomic surveillance to manage and prevent future DENV outbreaks. Rapid sequencing directly from clinical and field-collected samples will provide critical insight regarding viral evolution and identify conserved regions for vaccine development efforts. This work aims to adapt a DENV sequencing platform for use in low-resource settings. A significant challenge with whole genome sequencing is achieving representative coverage of the entire genome while avoiding unwanted primer interactions and non-targeted amplification. To this end, tiled PCR primers will be designed using *Olivar*, a tool that considers the genetic variability of evolving pathogens and avoids regions assigned a high-risk score at the nucleotide level. *Olivar* effectively minimizes non-specific amplicons by leveraging the BLAST database to prevent amplification of background sequences. We will develop and validate this DENV sequencing platform using Oxford Nanopore Technologies' MinION Mk1B sequencer and stock viruses. This strategy addresses the need for next-generation sequencing that is more practical in limited-resource contexts as a result of portability and inexpensive sample preparation methods. This approach will enable the application of more advanced phylodynamic and phylogeographic techniques that aid in global DENV surveillance. In the future, we will apply this sequencing platform to known positive clinical samples.

Madeline Klein, Biology

Gia Chevis, mentor

Addressing Healthcare-Related Bankruptcy: A Comparative Analysis of Healthcare Systems in the United States, United Kingdom, Germany, the Netherlands, Japan, Australia, and Canada

This thesis examines the United States healthcare system as the leading cause of personal bankruptcy, despite attempts to mitigate financial burdens. It investigates the system's financing mechanisms and evaluates the United States initiatives to address these challenges. By comparing the United States' system with those of the United Kingdom, Germany, the Netherlands, Japan, Australia, and Canada, this study identifies successful strategies these countries have implemented to alleviate financial burdens on their citizens. Drawing lessons from these comparisons, this thesis proposes potential solutions that could be adapted to enhance the U.S. healthcare system's affordability and accessibility. This research aims to provide insights into how the U.S. can address the issue of healthcare-related financial hardship, offering policy recommendations to enhance the affordability and accessibility of healthcare for all citizens.

Andrew Kondratieff, Biology

Annie T. Ginty, mentor

Are Anxiety Symptoms Better Predicted by Cardiorespiratory Fitness or Self-Reported Physical Activity?: Correlations with General Anxiety and Anxiety Sensitivity

In recent years, anxiety disorders have become the most prevalent mental health disorder in the United States. Symptoms of general anxiety can be debilitating, demanding solutions that decrease symptoms. One popular coping mechanism for anxiety is exercise. However, the best forms and frequencies of exercise to lower anxiety levels are unclear. Of particular interest to researchers is the ability of cardiorespiratory fitness (CRF) versus self-reported physical activity (SRPA) to predict anxiety symptoms. In this experiment, 168 healthy young adults were

administered a submaximal graded exercise test to determine CRF. Anxiety, anxiety sensitivity, and SRPA were measured via standardized questionnaires at a later time. Multiple regression analyses were performed using two factor analyses of variance (ANOVA) without repetition. Independent variables (CRF and SRPA) were compared with one another and with each dependent variable (anxiety and anxiety sensitivity) to determine which variable effectively predicted anxiety symptoms over and above the other. Out of four possible relationships, CRF and anxiety symptoms maintained three significant negative correlations, whereas SRPA and anxiety symptoms maintained zero significant correlations. Thus, the data contributes to the conclusion that CRF is a better predictor of anxiety symptoms than SRPA.

Jill Kraeger, Interior Design

Elise King, mentor

The Representation of Women in Architecture: Shedding a Light on the Contributions of Isabel Roberts and Marion Mahony Griffin

Historically, the information needed to accurately tell the stories and contributions of women within the field of architecture and design, is lacking. Women practiced architecture around the turn of the 20th century, despite numerous obstacles, however, their stories and contributions are often buried under those of their male counterparts or simply lost and forgotten. As a result, this study highlights two critical women in the field of architecture—Isabel Roberts and Marion Mahony Griffin—both employees of Frank Lloyd Wright, and two of the founding women in American architecture during the early 1900s. Wright is one of America’s best-known architects, and for the past century, has largely been described as a lone genius. Therefore, the primary aim of this study is to form a better understanding of two prominent women working for Wright during this informative period and acknowledge the inherent gaps and contradictions in their historical narratives. Additionally, by gaining a better understanding of Mahony and Roberts, a more complete view of Wright is achieved. In addition to the written portion of this thesis, there will also be a creative component that is intended to be an impactful visual representation of much of the information collected. Through the process of critical making, a rather novel methodology that emphasizes creating as a way to engage in fruitful research and analysis, the information surrounding these two women’s contributions and the inevitable gaps in information, will be told. Ultimately, readers will learn more about the stories of Roberts and Mahony, and the completed project will bring attention to the inherent gaps in their historical narratives and seek methods to bring their contributions to light.

Dani Kremer, Psychology

Jessica Akers, mentor

Sibling-Implemented Total Task Chaining for Children with Autism Spectrum Disorders

The majority of children with autism spectrum disorders (ASD) have a sibling. A sibling is a consistent peer within the home to help develop social skills, emotional regulation, delay tolerance, play skills, and impulse control for children with autism spectrum disorders. The sibling relationship with a child with ASD (CWA) is more strained due to negative and feelings toward the CWA than sibling relationships with typically developing siblings (TD-siblings) or siblings with intellectual and developmental disorders. We conducted a systematic literature review of behavioral interventions that incorporated both the CWA and the TD-sibling. The results of the literature review indicate that the TD-sibling can implement behavioral interventions and the intervention type depends on sibling birth order. The most frequently used interventions for sibling dyads were systematic prompting strategies and integrated play-based model. Next, we implemented a behavioral intervention that used nonconcurrent multiple baseline design and focused on the TD-sibling implementing a total task analysis to teach the CWA how to do an activity that the TD-sibling preferred. Our results indicate that the TD-sibling was able to implement a behavioral intervention with fidelity to effectively teach a skill to the CWA and increase the duration of sibling engagement.

Claire Elizabeth Law, Biochemistry

Jason Pitts, mentor

The impact of odor detection on mate recognition in the yellow fever mosquito, Aedes aegypti

Mating behaviors and mate recognition are crucial to the life histories of insects, including mosquitoes that act as vectors of human disease. Understanding the mechanisms behind mate recognition could allow for the development of novel population control methods and the reduction of vector-borne diseases. For many mosquito species, mating takes place in swarms formed by males. Female mosquitoes enter these swarms where mate recognition and copulation take place. Within the swarm, auditory and visual cues are thought to be the primary drivers of conspecific mate recognition. We have investigated whether chemical cues are also utilized in mate recognition in *Aedes aegypti*, a known vector of Dengue, Yellow fever, and Zika. Odorant Receptors (ORs), including the co-receptor *orco*, are required for volatile chemical detection in adult mosquito antennae. Genetic knockout of *orco* (*orco*⁻) disrupts OR function, resulting in general anosmia. In this study, we compared the mating success of wild-type and *orco*⁻ mutant *Aedes aegypti* adults in cage assays under controlled laboratory conditions. We observed a small but repeatable decrease in the mating success of *orco*⁻ mosquitoes. This outcome suggests that volatile or semi-volatile odorants produced by adult mosquitoes may contribute to the efficiency of mate recognition in *Aedes aegypti*.

Shengshu (Aaron) Lin, University Scholar & Chemistry

Daniel Romo, mentor

Pharmacophore-Directed Synthesis Applied to Phainanoid F and Derivatives

The phainanoids were isolated from the plant *Phyllanthus hainanensis* and their potent bioactivities (e.g. inhibition of T-cell and B-cell proliferation) were also reported (J. Am. Chem. Soc. 2015, 137, 138–141.). We are applying a pharmacophore-directed retrosynthesis strategy (Nat. Chem. 2019, 11, 342-350) that was recently applied to rameswaralide (J. Am. Chem. Soc. 2022, 144, 18575–18585.) to the phainanoids and derivatives. While we predict that most of this natural product is required for potent bioactivity, our initial target is the C-D-E-F ring system to determine strategies for constructing this ring system while also providing simplified derivatives for initial biological testing. In collaboration with Prof. Jun Liu's group (Johns Hopkins), we will determine the immunosuppressive activity of simplified versions of the top right sector of the molecule to develop an SAR profile and ultimately the minimum structure required for potent bioactivity. In this thesis, we will describe synthetic strategies to construct the key C-C bond between the 5,5-spirolactone and the 5,6-bicyclic enone as well as preliminary studies toward the western portion.

Lorena Liu, Finance

Andrew Detzel, mentor

The Role of Financial Education in Enhancing Financial Literacy in the U.S.

This thesis explores the significance of financial education in the United States and its potential impact of increasing long-term financial literacy. With the recent economic burdens causing financial distress among a lot of the population, the need for knowledge in personal financial management continues to increase. This study analyzes the various factors impacting financial literacy across the states and the curriculum in schools labeled as financial education. Ultimately, this thesis works to empower people to learn more about personal financial management and how important it is to be knowledgeable about it.

Benjamin Lloyd, Religion

Joe Coker, mentor

What is the place of Marriage in the Soteriology of Martin Luther and John Calvin?

The Reformation transformed Christian soteriological doctrine for the generations to come. Martin Luther progressed to using marriage theologically as a key metaphor to illustrate the union between Christ and the Church. His theological shift on the topic of justification led to the functional change of how he used marriage. His own marriage to Katarina von Bora spread a warmth to his clipped theological tone that was not prevalent before. John Calvin, following Luther, used his *Institutes* and biblical commentaries to refine this definition. Using the Genevan political system, he established a new theology and law around the topic of marriage. Calvin's own marriage to Idelette provides a fruitful lens to examine his understanding of marriage, and its purpose to illustrate union with Christ.

Seamus Lowe, Mechanical Engineering

David Jack, mentor

Toward the Electrical Characterization of Carbon Fiber Reinforced Polymer Composites

As electrification and the development of renewable energy solutions continue, the demand for lightweight, high performance, and multifunctional materials will continue to rise. In recent years, carbon fiber reinforced polymer (CFRP) composites have seen an enormous increase in usage in countless applications and industries and have become a fundamental building block of a more sustainable society. Although the mechanical properties of CFRP composites have been extensively characterized, the electrical behavior of CFRP composites has been largely unexplored in existing literature. The electrical behavior of carbon fiber reinforced polymer (CFRP) determines whether it may be used for grounding or electromagnetic shielding. For example, how much damage will be sustained by a CFRP composite in the event of a lightning strike and the EMF blocking effectiveness of a CFRP composite battery casing in an electric vehicle pose two critical unknowns in highly relevant applications. The electrical characteristics of CFRP also make it possible to utilize eddy currents as a non-destructive evaluation method. However, due to material properties across multiple length scales, carbon fiber composites feature complex and anisotropic electrical conductivity. Toward more fully understanding the electrical behavior of CFRP composites, this study presents two independent experiments. The first of these develops techniques toward a standardized method of establishing electrical contact with CFRP composites and proposes two novel procedures. The latter experiment seeks to characterize the complex impedance response of unidirectional CFRP composites. Specifically, a bulk equivalent circuit model is proposed for single laminate composites and an equivalent capacitance model is proposed for multi-laminate composites.

Lucy Lusk, Sociology

Paul Froese, mentor

Make American Fascist Again: A Critical Examination of Fascism in an American Contemporary Context

Donald Trump's presidential victory in 2016 marked a significant shift in the political landscape of the United States. Since then, Trump's MAGA (Make America Great Again) movement has deeply polarized the country and sparked strong discourse about the presence of fascist ideologies in his campaign and presidency. Through analyzing the history of fascism and its observable tenets and patterns, this paper seeks to define fascism in an American context through the analysis of the MAGA movement. Ultimately, this study sheds light on contemporary fascism by exploring the political discourse, mobilization strategies, and culture of Trump's presidential campaign, as well as its implications for the future of democracy.

Isabel Markham, Neuroscience

Tres Bodet, mentor

Holistic Treatment of Bulimia Nervosa

Bulimia Nervosa (BN) is a condition “defined as eating a large amount of food in a short period of time associated with a sense of loss of control over what, or how much one is eating”. This condition is often seen in individuals who alternate binge-eating and purging behavior cycles. Those with BN can be of any weight and oftentimes their behavior is attempted to be kept hidden. Amongst the current research, there are a variety of cognitive and psychological treatment options that have been seen to be successful, but still need additional research.

Anneliese Martinez, Neuroscience

Stacy Ryan-Pettes, mentor

Associations Between Parental PTSD Cluster Symptoms and Child Behavior

A parent's mental health has a substantial impact on their child's well-being and behavioral conduct. Parental PTSD, for example, has been associated with elevations in both internalizing and externalizing problems in children. However, it is unclear whether distinct PTSD symptom clusters have unique impacts on the child's internalizing and externalizing outcomes. The objective of this study was to explore whether certain parental PTSD symptom clusters, as defined in the DSM 5-TR, are associated with the occurrence of child internalizing or externalizing behaviors. Multiple regression analysis was conducted using a sample of parents (n = 176) who have substance using adolescents (age 12-18). Consistent with our hypotheses, results found that higher levels of Negative Alterations in Cognitions and Mood (NACM) was uniquely associated with higher child internalizing behaviors, whereas higher levels of Alterations in Arousal and Reactivity (AR) was uniquely associated with higher child externalizing. The other symptom clusters of PTSD did not show significant correlations with either internalizing or externalizing outcomes. These findings may add to existing literature in understanding the impact of specific symptom clusters in parental PTSD on adolescent outcomes. Findings may also have clinical implications for family-based or parenting-based treatments for adolescent internalizing and externalizing problems.

Miranda Arelli Martinez, Health Science Studies

Karol Hardin, mentor

Drink Your Garlic Tea and Take Your ACE Inhibitors: Mexican-American Alternative Medicine and Texas Medical School Cultural Competency Programs

Current literature suggests that healthcare in the U.S. does not adequately address culture. This issue is important in border states such as Texas that have large populations of Spanish-speaking patients, yet Texas medical school training is insufficient for treating the growing Hispanic population. In particular, Texas medical schools are inadequately preparing students to provide culturally competent care to Hispanic patients. This lack of preparation often contributes to cultural and linguistic barriers between physicians and Hispanic patients. A physician's lack of understanding about a patient's cultural background can hinder the physician-patient relationship, thereby negatively affecting patient outcomes and adherence. Therefore, physicians should be taught common features of Hispanic cultures that impact healthcare, such as the use of complementary medicine, spiritual healing practices, undisclosed pharmaceutical use, and other cultural values pertaining to health. Through a review of sociological studies, medical school curricula, and historical records, this study argues that cultural competency holds a significant role in improving health equity for Hispanic patients. Recommendations are made for Texas medical school cultural competency programs to incorporate instruction on culture and require language components as an approach to more effectively teach students to provide culturally appropriate care.

Jacquelynn Matthews, Science Research Fellows

Michael Trakselis, mentor

RecA Utilization During Dysregulated Unwinding in the Prokaryotic Replisom

DNA replication is an essential process for the inheritance of genetic information between generations. Studying the replisome of *Escherichia coli* provides insights into DnaB helicase unwinding mechanisms and efficient coupling with DNA synthesis by Pol III. Uncoupling at the replisome results in an accumulation of labile and fragile ssDNA, leading to deletions, mutations, and chromosomal rearrangements. During ssDNA buildup, the RecA protein activates the transcriptional SOS response to restore genomic integrity, but this mechanistic process is not completely understood in relation to uncoupling and dysregulated unwinding. To determine the importance of RecA on mitigating uncoupling defects, we utilized dnaB:K180A and dnaB:R328/329A mutations that enforced a constricted, fast, and dysregulated unwinding in combination with an inducible system that inhibits RecA filamentation on ssDNA. When exposed to exogenous damage agents, the results of minimum inhibitory concentration (MIC) and genotoxin survival assays demonstrated that dnaB mutants utilize RecA activation of the SOS response to mitigate dysregulated unwinding and the consequences of ssDNA accumulation in vivo. Further studies can investigate the prevalence and importance of specific RecA mediated pathways for restart after replisome uncoupling is induced by various intrinsic and extrinsic factors.

Garrett A. McCall, University Scholar & Linguistics

Jonathan Reynolds, mentor

The Prometheus Project: an Exploration of Humanity, Agency, and Creativity in the Age of AI

The Prometheus Project is a full-length science fiction novel. Isaac Hale is a student in Elysium, the capital planet of the Sol Alliance. Humanity has long abandoned Earth, guided by Laplace, an artificial superintelligence that was given one single prerogative: the preservation of humankind. As Isaac investigates the disappearance of his father in a planet-wide disaster, he meets roadblock after roadblock, eroding his trust in the AI-led government who appear to be more involved in the calamity than they would like to admit. When he gains new power that allows him to fight for his answers, will he be able to stand against the paragon of all human technological achievement? This creative thesis seeks to approach issues arising in our lives today with the rise of AI technology, using the novel format to explore the value of human creative labor in light of AI tools that seek to brute-force their way to the same results.

Marigrace McDowell, Medical Humanities

James Marcum, mentor

An Interdisciplinary Analysis of Mental Health in the United States Incarceration System

Since the mid- to late 20th century, incarceration facilities in the US have served as de facto psychiatric institutions for many Americans. At the same time, the rise of mass incarceration overburdened the incarceration system, which has struggled to respond to the growing capacity and resource demands. This thesis explores the issues of identifying mental illness in the incarceration system, diverting individuals experiencing mental illness from the system, and offering sufficient resources to those already incarcerated. Through an interdisciplinary approach, including international, historical, legal, administrative, and policy analyses, the inconsistencies across political and administrative systems become apparent. Improved treatments, diversion mechanisms, and assessment measures serve as starting points for improvement. Most importantly, comprehensive reform requires a shared, public commitment to separate healthcare from the punitive conditions of incarceration systems. It necessitates a collective choice, in policies, programs, and public discourse, to providing health care which preserves patient dignity and well-being, especially in communities so often deprived of both.

Mackenna Sage McGraw, Medical Humanities

Ramon Lavado, mentor

Assessment of the toxic effects of parabens commonly used preservatives in cosmetics and their halogenated byproducts on human skin and endothelial cells

Parabens are commonly used preservatives in cosmetic and personal care products (Bledzka et al., 2014). Concerns have been raised about the potential health effects of parabens, due to their estrogen-mimicking effect. This study aimed to assess the toxic effects of parabens, their metabolite, and three halogenated paraben byproducts on human skin and endothelial cells using cytotoxicity and wound healing assays. It employed human epidermal keratinocytes (HEK001) and human dermal microvascular endothelial cells (HMEC-1) as models for evaluation. In keratinocytes, butylparaben (BuP) and benzylparaben (BeP) demonstrated the highest cytotoxicity, with EC50 values of $1.52 \pm 0.51 \mu\text{M}$ and $3.34 \pm 0.97 \mu\text{M}$, respectively. Similarly, halogenated parabens exhibited notable cytotoxicity, with methyl 3-chloro-4-hydroxybenzoate (CMeP) and methyl 3,5-dibromo-4-hydroxybenzoate (DBMeP) showing EC50 values of $2.20 \pm 0.76 \mu\text{M}$ and $1.49 \pm 0.37 \mu\text{M}$, respectively. Methylparaben (MeP), ethylparaben (EtP), and the primary metabolite 4-hydroxybenzoic acid (HBA) displayed the lowest toxicity in this cell line, with EC50 values ranging from $536 \pm 178 \mu\text{M}$ to $1,313 \pm 464 \mu\text{M}$. In human dermal microvascular endothelial cells, MeP, EtP, and HBA also exhibited reduced toxicity, and halogenated byproducts displayed comparatively lower toxicity, with EC50 values ranging from $788 \pm 140 \mu\text{M}$ to $>10 \text{ mM}$. In the wound healing assay, notable inhibitions were observed in both keratinocytes and endothelial cells when exposed to high concentrations ($100 \mu\text{M}$) of BuP, BeP, and all halogenated byproducts, which were not environmentally relevant. Particularly noteworthy was the significant inhibition of cell proliferation in keratinocytes by halogenated parabens at concentrations as low as $1 \mu\text{M}$, an effect not observed in endothelial cells. This study helps to understand how parabens affect wound healing processes, aiding in the assessment of their safety and potential risks in cosmetic and personal care product formulations, particularly given their widespread use and potential exposure through skin contact.

Madison Grace O. McNeece, Religion

Deirdre N. Fulton, mentor

Elite Feasting in the Hebrew Bible: An Examination in the Non-Israelite Royal Courts

Food in ancient Israel was important in both public and private settings. Just like food may unify or divide people in modern American life, food played the same function in ancient Israel and Judah. In several stories in the Hebrew Bible, there are several private meals and public feasting events which reveal the role that food could play in ancient Israelite and Non-Israelite societies. To better understand the power of food in ancient Israel and Judah—specifically, how food could unify or divide—my thesis will explore the role of eating in specific texts in the Hebrew Bible. Specifically, I will explore what kind of eating event is taking place in certain narratives, where these activities took place, and for what purpose. I will argue that the kind of eating event is set within the narrative at a specific point to highlight how food could serve to unify and divide certain groups within Israelite society.

Rachel Medina, History

Justin King, mentor

The Soul Remains: Egyptian Mummification and its Influence on Early Christian Thought

The mummies of Ancient Egypt have become famous in modern history for their unique burial styles and incredible preservation techniques inspired by their distinct and diverse religion. But how different are these ideas from our own modern view of religion and the body? The use of human remains as relics in the Catholic Church seems to suggest that some beliefs of Ancient Egypt regarding the dead are alive and well in select Christian traditions. This

thesis explores the motives behind the martyr relics of the Catholic Church through a comparative analysis with the view of the body and soul in Ancient Egypt. In doing so, this thesis aims to make a contribution regarding the scope of Ancient Egypt's influence on the Christian concept of the soul and its ethical reverence of the human body.

Mary Mersereau, Science Research Fellows

Christopher Kearney, mentor

Investigating the Production of Antimicrobial Peptides Using the SUMO Protein Expression System in E. coli

In an age of increasing antibiotic resistance, antimicrobial peptides (AMPs) are a promising alternative to antibiotics. While numerous publications have documented AMP expression, few have used the same production system to express a variety of different AMPs. In this study, eight AMPs were expressed in *Escherichia coli* using the SUMO carrier protein. Six of the eight AMPs were designed to target *Helicobacter pylori*, a gram-negative bacterium known for causing chronic gastritis and gastric cancer. The goal was to identify a universal AMP production system, assess the capabilities of the SUMO carrier protein, and identify AMPs likely to eliminate *H. pylori*. The two metrics used to assess expression success were yield and activity against the target bacteria. The remaining two AMPs targeted a gram-positive bacterium, *Staphylococcus aureus*, and showed excellent yield and activity. However, yield was poor for all six AMPs targeting *H. pylori*. Five of these had enough yield to conduct activity tests, but activity was low for all. Thus, we demonstrated that SUMO is an unreliable carrier protein for AMPs toxic to gram-negative bacteria. These results led the Kearney Lab to identify a superior production method, the Inclusion Body Method. Five of the AMPs targeting *H. pylori* were transferred to inclusion body vectors and have now been produced in good quantity. AMPs remain a promising and exciting alternative treatment to antibiotics and further exploration is needed.

Madison Messina, Neuroscience

Thomas Spitzer-Hanks, mentor

Enactivism, the Regression of Medicalized Rhetoric and Transdiagnostic Treatment Approaches in Psychological Care

Unfortunately, our contemporary understanding of science has condemned psychology for being a 'soft' discipline. This perception, in part, is rooted in the historical challenges experienced by psychology as a field of study, where explanations for human behavior were frequently attributed to experiences of divine intervention and demonic possession. Consequently, to build a respectable reputation, psychology has had to overcompensate through developments of flawed transdiagnostic and biomedical treatment approaches that rely on medicalized rhetoric, limiting a client's agency in treatment decisions, and baseline frameworks that operate under the inaccurate assumption of there being a normal and abnormal functioning human brain. However, through a unique integration of the physiological, experiential, sociocultural, and existential dimension, the methodology of enactivism serves as a representation for how future adaptations in psychological treatment can successfully possess the intricacies required to navigate the depth of complexity behind the human brain. Nevertheless, modern psychology along with its 'mental' health practices stands at a crucial junction today, begging the question: will psychology reset its narrative or continue optimizing the industry it has created?

Hailey Miller, Environmental Studies & Theatre Arts

Julie King and David Jortner, mentor

Ecological Dramaturgy: How Activism is Coupled with Art

This thesis explores the relationship between environmental activism and artistic displays. Performances, both formal and informal, have been used for centuries to catch attention and explain both struggle and celebration. In the movement of environmentalism this is too the case. Spanning from displays of oil in fountains to throwing soup on famous paintings, environmental activists have relied on performance to catch the attention of media, when science alone does not prove to be enough of an argument. The aim of this thesis to explore and understand the history of performance in the environmental movement and analyze plays written to inform audiences about environmental issues. In looking at these, there is a revealed structure.

Mark Mills, University Scholar

Richard Rankin Russell, mentor

Waiting for Good Health: Medical and Dramatic Perspectives Through the Irish Poor Law Medical System, 1890 – 1922

1890 to 1922 was a formative period in Irish history marked by dramatic cultural and political ferment. In this milieu, the Irish Poor Law medical system played an underappreciated role in eliciting passionate, contentious accounts of what Irish life was and should be. Debates about the Irish Poor Law medical system consistently reflected broader trends in Ireland, generating a spectrum of opinions reacting to and arguing for various reforms. These debates were multidisciplinary, with physicians and playwrights participating from correspondence pages and theatrical stages, respectively. One framework for identifying the diverse intersections of these conversations is the ideal of health. Because of how the Irish Poor Law medical system closely interacted with the lives most favored by the playwrights—the rural Irish poor—the medical and dramatic sources of this period reveal multiple dimensions of health operating on personal, communal, and national levels.

Sara Minkey, Political Science & Instrumental Music Performance

Elizabeth Corey, mentor

Duty-Bound: A Case for Religious Exemptionism's Broad Protections

In 1990, the United States Supreme Court revolutionized its interpretation of the Free Exercise Clause of the United States Constitution. For the nearly three and a half decades since, legal scholars have debated whether *Employment Division v. Smith* holds true to the Constitution. In *303 Creative v. Elenis* (2023), the Court had the opportunity to reconsider *Smith*. Lorie Smith solely owns and operates 303 Creative, a Colorado-based website design business. Although she does not discriminate against customers based on their sexual orientation, she cannot create a website for a same-sex wedding in accordance with her deeply held religious beliefs. Ms. Smith challenged the Colorado Anti-Discrimination Act under the Free Exercise Clause and Free Speech Clause. The US Supreme Court only granted certiorari on the free speech question. The Court should have also heard the free exercise issue to answer unresolved questions from the Tenth Circuit's decision, and the Supreme Court's decision in *Masterpiece Cakeshop*. *303 Creative* could have been a ripe vessel for the overrule of *Smith*. *Smith* is inconsistent with all major constitutional interpretations and does not pass stare decisis review. It must be overruled. This thesis proposes a clear constitutional standard to evaluate free exercise claims that more appropriately reflects the Court's free exercise precedent.

Emma Joy Moore, Medical Humanities

Charles Ramsey, mentor

The Influence of Spirituality on Muslim Physicians and their Care of the Patient

Medical ethics has become an increasingly necessitated field of study in the United States. The vast body of literature already available continues to expand to include more diverse perspectives such as Islamic bioethics. Leaders in Islamic bioethics have encouraged the pursuit of Muslim bioethics as an important subfield. This rapidly emerging subfield seeks to understand how Muslim practitioners utilize their faith in caring for the patient. This thesis will cover important work in the field of Muslim bioethics as it stands today, followed by the results of questionnaire-based research conducted with Muslim physicians in Texas. The interviews contribute to Muslim medical ethics by exploring how Texas-based Muslim physicians connect their spirituality to their practice. It will argue that these American Muslim physicians connect their spirituality to practice through a general set of convictions that gives them a sense of peace after outcomes, as well as provides a sense of duty to the patient which extends beyond the standard of care. This research provides new avenues for future study in demonstrating the connection between spirituality, duty, and empathy among Muslim physicians.

Fawziyah Nayaz, Health Science Studies

Christopher Pieper, mentor

Straight, White Teeth: How Social Media Has Impacted The Beauty Standard In Dentistry

Straight, white teeth have become ingrained in American society as an expected social norm regardless of age, class, or social status. Its position in society has transcended into an unspoken requirement, due to the efforts of social media, as it represents beauty, the upper echelon, and affluence. Although the rise of social media seems to be a recent phenomenon, the aesthetic standard in dentistry is a concept that has existed since the Stone Age of civilization. The global nature of social media allows for a collaborative environment for ideas such as having straight, white teeth to become the standard of beauty. My research includes interviewing general dentists and orthodontists on a range of questions pertaining to this topic and an in depth analysis of their responses. I identify how major underlying themes such as World War II, the rise of the middle class, cultural imperialism, and internet culture have allowed for social media to influence the aesthetic standard in dentistry.

August Noé, Classics & French

Jill Cornish, mentor

I Roll, Therefore I Am: A Philosophical Analysis of Identity, Escapism, and Community in Dungeons and Dragons

Every day, millions of people spend hours playing, plotting, and pondering Dungeons and Dragons (and other TTRP games). In the past, however, D&D has been viewed as a lesser pastime, and escapism, in general, is often looked down on as a less-than-preferable way of engaging with media. This paper argues that escapism, particularly into the simulated, fantastical realm of Dungeons and Dragons, can be an effective form of catharsis. Additionally, the immersive and communal narrative form that D&D employs, provides the perfect setting for self-reflection and identity exploration. From creating a character to learning how to navigate social interactions within the party to the ethical decisions that players are required to make while playing, D&D offers players the chance to figuratively walk a couple of miles and fight a few dragons in someone else's shoes. How do the choices that players make in-game (and out of game, during character creation) both affect and reflect their identity?

Annie O'Brien, Communication Sciences and Disorders

Brittany Perrine, mentor

Examining the Impact of Psychological Vulnerability on the Experiences of Females with Voice Problems

Vocal problems, particularly functional voice problems, disproportionately affect females more than males. The common etiology might be anatomical and physiologic differences or more connected to psychological tendencies. Our study sought to illuminate the relationship between vulnerability and resilience, two psychological tendencies, and vocal problems in women. The results of our study confirmed if a person has a self-perceived voice problem, then they are more likely to score high on a measure of psychological vulnerability. No differences in resilience were found between those with a self-perceived voice problem and those without. It is my intent that clinicians and field professionals in Communication Sciences and Disorders can use these results to provide themselves with a deeper level of understanding of the etiologies behind vocal health issues in women.

Emily O'Kief, University Scholar

Jacob Abell, mentor

Ancient Greek Echoes in French Feminist Conversations on the Female Body

The nature of "woman" has long been debated. Furthermore, the question of if, or how, her material form informs such a nature has also been heavily disputed. Various figures throughout history, in an attempt to define woman more broadly, have speculated upon how her unique anatomy shapes both her metaphysical existence and her social position. This thesis puts into conversation Hellenistic Philosophers and French Feminist Figures discussing the biological and symbolic interpretations of the female womb. Such conversations allow light to be shed on the historical transformation of what it means to be a woman but also push readers to question how we, in light of more modern interpretations of gender, are to situate her material form within her broader essence, if such an essence exists.

William Owens, Economics & Management

Elizabeth Corey, mentor

Disenfranchised by Design: Exploring the Growing Gender Gap in Education

The growing gender gap in education is a profoundly concerning problem. Contemporary metrics indicate that males are underrepresented in higher education and underperform in educational environments spanning all age groups. This problem is characterized by diminishing rates of enrollment, graduation, and academic struggles which disproportionately affect males. The worsening decline among males is an often overlooked and commonly ignored problem. This thesis aims to dissect the underlying problems exacerbating this trend in education, examine the gender gap as a facet of broader cultural disenfranchisement, and explore potential solutions to restore equilibrium in educational opportunities for both men and women. In this paper we explore the various complexities of this growing issue and advocate for new strategies which may mitigate the widening divide.

Annaleise Parsons, Biology

Sarah Walden, mentor

"Can You See Right Through Me?" Examining The Impact Of Taylor Swift's Discography On College-Aged Women Through TikTok

Women in college experience a variety of mental health concerns from eating disorders to maladaptive perfectionism to loneliness. Many college-aged women use artist Taylor Swift's songs to express their mental

health concerns and create a community with one another. I created a dataset from the social media platform, TikTok, using a methodology which allowed me to select TikToks based on hashtags, audio sounds, and trends, using the platform's "Search" feature. Through a process of thematic coding, I concluded the primary themes were fear of failure, rejection, perfectionism, the role of the eldest daughter, first-generation guilt, and paternal relationships. I argue that through Swift's rhetoric and melodies, college-aged women have created a social media community about a journey through identity reformation from internal and external pressures. In this thesis, I explore how each of the themes is important to college women and how they express the themes through social media.

Hannah E. Payne, University Scholar

Davide Zori, mentor

Imported Attic Ware at The San Giuliano Archaeological Research Site: An Analysis of Pottery Sherds Within a Looted Context

This thesis, entitled "Imported Attic Ware at The San Giuliano Archaeological Research Site: An Analysis of Pottery Sherds Within a Looted Context" serves a dual purpose. First, it seeks to synthesize the socio-political, economic, and technological conditions of the Mediterranean which led to the importation of Greek attic ware by the Etruscans during the Orientalizing and Archaic periods. Second, it uses the San Giuliano Archaeological Research Site as a case study in analyzing the excavated sherds of imported Greek vessels uncovered at the Etruscan Necropolis. The first chapter introduces this thesis, explaining the complexities of analyzing a site that has been heavily looted. The second chapter directly addresses the shifting relationships, technological advances, and economy across the Mediterranean which led to the importation and exportation of pottery between Greece and Etruria. The third chapter is a literary analysis, exploring the development of pottery production and technology across Etruria and Greece, establishing a basis of understanding regarding different pottery wares as well as their production and trade. Next follows a case study in which field reports, data sheets, and context notes of the past six field seasons are used to analyze the imported Greek sherds which were excavated. This fourth chapter navigates the complexities of analyzing archaeological material within looted, disturbed archaeological contexts. Lastly, the fifth chapter summarizes my findings and proposes the next steps for continuing this research as it may serve the San Giuliano archaeology research team.

Lydia Pehlman, History

Robert Elder, mentor

Though the Heavens May Fall: A Study of the Reality of Somerset v. Stewart in English and American Discourses

At Westminster on June 22nd, 1772, Chief Justice Lord Mansfield of the King's Bench delivered a succinct oral opinion concluding the landmark trial of *Somerset v. Stewart*. James Somerset, the runaway slave of Charles Stewart, had sought a writ of habeas corpus to prevent Stewart from seizing and detaining him in England, then putting him on a ship traveling to Jamaica where he would be sold. The enigmatic nature of Mansfield's opinion quickly thrust *Somerset* into the limelight and secured its place in legal history as a fascinating milestone in Anglo-American legal history for the impacts it had upon the legitimacy of slavery. This thesis seeks to analyze the context, outcome, and influences of *Somerset v. Stewart*. I look specifically at the philosophies and outlooks on slavery in England and America by analyzing historical scholarship and the variety of court cases that cited *Somerset*. The goal of this thesis is to achieve a greater understanding of how *Somerset* influenced the rising abolitionist movement and proslavery response, the American constitutional discourses, and the development of freedom claims as the courts became a key instrument of liberation.

Dylan Peli, Accounting

Jason MacGregor, mentor

ESGs, Fraud, and its effects on investor relations

ESGs are a complex topic in investing today due to their undefined nature as financial instruments. This research is about how investors are responding to company usage of ESGs when investing, the role of fraud in their decisions and their combined effects. Negative perceptions around their usage and the lack of clarity around reporting requirements leave companies in an unsure state regarding the information they wish to present to investors. The laws accompanying these filings are evolving at a rapid rate, leading to increased investor scrutiny about their usefulness and their impact on company practices.

Olivia Sheldazlo Persinger, Philosophy

Elizabeth Corey, mentor

“The New Buffalo”: Indian Gaming and Native American Rights

Native American tribes once found self-sufficiency through living off the land and killing buffalo. As time progressed, the tribes' capability of maintaining self-sufficiency changed to where most tribes now promote their economic development, sovereignty, and strong tribal governments through tribal gaming. Thus, tribes have cultivated their "new buffalo" through the Indian Gaming Association. While tribal gaming brings advantages such as increased job opportunities and revenue; it also brings disadvantages such as problem gambling and increased criminal activity. This thesis uses an economic and political focus on topics such as these, asking what the benefits and harms are to Native Americans from tribal gaming. The first step in approaching these questions is to understand the historical development intergovernmental relations since the beginning of Indian Gaming. Next, scholarly written sources, legal documents, and interviews with contemporary figures fill out a portrait of the current situation. The purpose of this thesis is to evaluate how tribal sovereignty is affected by the presence of the Indian Gaming. Additionally, this research seeks to evaluate how Indian gaming affects Native Americans in an economic and political sense. Although this research is ongoing, this thesis's theory is that tribal governments gain slight tribal sovereignty from tribal gaming; however, the U.S. government gains the most benefits from tribal gaming. This paper suggests the need for the U.S. Government to preserve and protect tribal sovereignty of Native Americans through tribal gaming instead of using them as political pawns.

Stephen Priest, University Scholar, Philosophy, Linguistics, & Mathematics

Thomas Hibbs, mentor

Traditions and Rationality: Ethics and Epistemology in Alasdair MacIntyre and C. S. Lewis

Deep disagreement—whether in ethics, science, or life—often arises when people view an issue from different, incommensurable perspectives. The widespread nature of such disagreements can make us question the power of reason and language, tempting us to relativism. Alasdair MacIntyre tries to rescue rationality and rebuff relativism with an account of how, even in a seemingly intractable conflict of theories, rational progress is possible. However, there are ways to problematize and expand MacIntyre's views, especially by comparison to other authors on a myriad of related questions: C. S. Lewis on traditions and natural law; Kuhn and Polanyi on philosophy of science; and Quine, Fodor, Cavell, and Lakoff & Johnson on philosophy of language.

Clare Pruss, University Scholar

Jon Harrison, mentor

Quantum Ergodicity on Circulant Graphs

Quantum ergodicity is a fundamental property of the quantum mechanics of systems where the corresponding classical dynamics is chaotic. These systems are described as exhibiting quantum chaos. In quantum mechanics, wave functions describe the probability of finding a particle in a region. Quantum ergodicity describes a situation where typical wave functions that are energy eigenfunctions (wave functions with a fixed value of energy) become evenly distributed as the energy of the wave function increases. Some quantized chaotic systems exhibit a stronger form of this behavior where all energy eigenfunctions become evenly distributed as the energy increases, rather than this being a feature of most of the eigenfunctions, a property known as quantum unique ergodicity. Recent work by Magee, Thomas, and Zhao introduced a notion of quantum unique ergodicity on graphs (networks). In this thesis, we describe quantum ergodicity and quantum unique ergodicity, explain this recent definition of a discrete quantum unique ergodicity for networks, and prove new results relating to quantum ergodicity and quantum unique ergodicity for families of circulant graphs (networks with a rotational symmetry). In particular, we find families of circulant graphs that do not display discrete quantum unique ergodicity. However, when the definition of discrete quantum ergodicity is relaxed to allow complex bases of eigenfunctions such circulant graph families are discrete quantum unique ergodic. This was not observed by Magee, Thomas, and Zhao, where discrete quantum unique ergodicity was proved for real or complex orthonormal bases of eigenfunctions for Cayley graphs of quasirandom groups.

Ella Pursley, Great Texts

William Weaver and Markus Schafer, mentor

“A House of Healing for the Soul”: Bibliotherapy and Book Clubs Within Geriatric Care

In a culture where healthcare and the humanities are increasingly alienated from one another, there is a great need to build bridges between hospitals and libraries. Bibliotherapy, defined in this thesis as the process of reading and discussing literature for the purpose of personal and communal development, acknowledges the potential of literature and poetry to heal personal and communal hurts. Inspired by past and current research concerning bibliotherapy, I led a book club for aging adults at a local independent living facility during the spring of 2023. Using the analytic strategy of humanistic inquiry to review the transcripts of our thirteen book club meetings, I argue that reading together has intra-personal, inter-personal, and communal benefits for those who participated. This case study shows that bibliotherapy within this small group was effective and proposes areas for future research into book club-style bibliotherapy groups among the elderly population.

Jaishnav Sai Reddy, Biology

Michael Wiggs, mentor

Markers of Bioenergetic Changes in Liver Tissue from Young and Old Tumor-Bearing

Cancer cachexia is a hypermetabolic wasting disorder where energy output exceeds energy input, leading to bioenergetic changes in whole-body metabolic regulation. The liver is highly understudied in cancer cachexia literature yet very significant in whole-body metabolism. In addition, aging is a factor that seems to not be significantly explored in cancer cachexia murine studies even though the highest prevalence of cancer diagnosis is in humans 60 and older. The purpose of this study was to examine changes in biomarkers of bioenergetics in the liver tissue of young and old cachectic mice. Young and old mice were divided into PBS control or LLC tumor-bearing mice. Tissues were collected after tumor development and underwent genetic analysis. Results indicate that there are differences in the differential expression of genes between the experimental and control groups.

Abigail Reed, University Scholar & Linguistics

Maria Monteiro, mentor

Bwana Yesu Asifiwe: An Examination of Worship and Culture in Rural Tanzania

This paper explores the interaction of the Christian faith with human culture by presenting a case study from a congregation in rural Tanzania. The conversation is grounded in larger discussions around language and culture, music-making, translatability, and what it means to be the Church in the world. This thesis pulls ideas from various fields, including ethnomusicology, church music, linguistics, World Christianity, theology, and history, specifically referencing thinkers such as Turino, Rommen, Whorf, and Sanneh. Bridging concepts from these different realms constructs an ideological foundation for the observation of worship at True Gospel Church, a Pentecostal-leaning congregation in Igoda Village, Tanzania. The typical Sunday service is described in detail and then analyzed using the Nairobi Statement as a framework, a report which proposes the influence of transcultural, contextual, counter-cultural, and cross-cultural elements in local Christian worship. Ultimately, this paper explores the complex ways that the Divine manifests in, interacts with, and transforms human culture. It celebrates the resulting exhibition of unique expressions of embodied worship around the world as a mosaic that displays the glory of God.

Elijah Robert, University Scholar

Jeffrey Fish, mentor

The Absent Immune System: Exploring Perceptions of Disease and Contagion in Ancient Greek Medical Theory

Almost every medical achievement of the modern day has its origins in the advancements made by the Greek medical theorists of Antiquity. Although unaided by modern instruments or techniques, Greek medical theorists developed a plausible theory for nearly every aspect of human physiology, with one glaring exception: contagion. Among the many surviving medical treatises from Greek authors, not one explicitly describes, explains, or predicts any aspect of contagion or the body's response to it. The purpose of this thesis is to gain a better understanding of how such a key component of medical theory was overlooked. Using both medical and non-medical sources from antiquity, this thesis proposes that the absence of contagion in Greek medical theory was driven by a range of social and geographical factors which, in various historical contexts, ultimately discouraged physicians from developing a working theory of infectious disease.

Trent Rothell, Baylor Business Fellows & Economics

Rebecca Thornton, mentor

The Effect of Rural Hospital Closure on the Local Clinician Population

In rural areas where access to health care is low and rates of chronic illness are high, hospitals are closing at an alarming rate. 148 rural hospitals have closed since 2010, which has recently prompted Congress to pass the Rural Hospital Closure Relief Act of 2023. As research has looked both at the community health and economic impacts of these closures, I direct my attention to the impact on health care providers. The primary goal of this study is to estimate the causal effect of rural hospital closures on the number of clinicians practicing in a given ZIP code. I examine a sample of 41 U.S. ZIP codes with a rural hospital closure between 2017 and 2019. ZIP codes after rural hospital closure have a reduction of 28.30 clinicians on average within the post-closure timeframe, reaching a maximum reduction of 50.53 clinicians on average at 2 years post-closure. In analyzing the differential effects of clinician specialty, the treatment effect for specialized care clinicians is 12.57 greater than primary care clinicians, suggesting that specialized providers may be more sensitive to migration push factors associated with rural hospital closure.

Emily Saladino, Classics

Timothy Heckenlively, mentor

A Homeric Narnia: Xenia, Oikos, and Nostos in the Chronicles of Narnia

There are numerous allegories present in Lewis' *The Chronicles of Narnia*, both Christian and mythological. References to Homeric epic, however, have received less study. This thesis aims to examine the parallels between Homer's *Odyssey* and the *Chronicles of Narnia*, specifically through the themes of *xenia*, *oikos*, and *nostos*. An understanding of the location and function of these themes within the *Chronicles of Narnia* will lead to a deeper interpretation of the structure, narrative, and characters of the seven books. Chapter one will explore Homeric *xenia* and its placement within *The Lion, the Witch and the Wardrobe*. Chapter two will then discuss Homeric *oikos* and *nostos* throughout *LWW*, *The Horse and His Boy*, and *The Last Battle*. Through these two chapters, I hope to encourage a greater appreciation for the close relationship between ancient epic and Lewis' modern fiction.

Breanna Sanchez, Electrical and Computer Engineering

Scott Koziol, mentor

Classifying Simulated Event Cochlea Data using a Stochastic Artificial Neural Network

Neuromorphic engineering, a special field that takes design inspiration from the structure of the human brain, may prove useful in the future. Structural improvements have been needed to combat stagnation in processing speed as Moore's Law — which states that processor speeds double every two years — becomes less accurate as we approach the physical size minimum of chips. This field is promising because despite the more inefficient chemistry behind brains, they remain faster than any technology, suggesting an architectural advantage. Following in the footsteps of R. F. Lyon and C. A. Mead, an electronic cochlea — used to artificially simulate audio processing similarly to how a human ear does — has been selected for further exploration. While such technology already exists to some capacity, it leans towards inaccessibility due to hyper-specialized integrated circuits and high prices. The previous attempt observed achieved such functionality by cascading second order CMOS VLSI filters and using automatic gain control that amplifies signals adaptively. However, for accessibility and cost purposes, this one will be created in the programming and simulation language MATLAB. To do this, this project will first explore the base code used according to what already exists and describe any modifications or new scratch programs. Initial tests of audio frequency analysis were done via spectrograms with a brief consideration of spike conversion for analysis. Ultimately, this was instead completed by processing input signals through a cascade of simulated bandpass filters, where the magnitude going out of each filtered frequency range was plotted to represent different musical notes' ranges onto a pixel image grid. These image grids were then passed through a neural network algorithm that converts them to numbers corresponding to different patterns to train it to approximate and recognize musical chords.

Mallorie Saucedo, Biochemistry

Jacqueline Jones, mentor

Women in Literary Tradition: How Female Representation in Literature Reflects Societal Values

Humanity has been connected across centuries through the expression and preservation of literary traditions and figures as a means of communicating societal values. As time passes and societies change, so do their traditions and values; yet, while the details of the established literary traditions change, the subjects remain the same. This thesis will examine works from Roman Society, the Middle Ages, and the Contemporary Period, respectively, and discuss various authors such as Ovid, Chaucer, and Margaret Atwood. The works of these popular authors and others included in this thesis are all connected by their focus on and representation of these famous Greek women: Penelope, Sappho, Helen, Briseis, Medea, and Ariadne. Through the lens of Feminist Literary Criticism, this thesis examines how mythological and historical figures have been represented in literature across chronological periods and literary formats in response to popular societal expectations for women.

Eden Sauley, Neuroscience

Ben Schwartz, mentor

Epigenetic Modulation of Plasticity Following Traumatic Brain Injury

Research suggests that epigenetic mechanisms, now acknowledged for their role in DNA transcription, significantly contribute to functional and structural plasticity. Epigenetics influences DNA structure, altering levels of plasticity and subsequently affecting functional and structural alterations in post-traumatic brain injury (TBI). An academic literature review on epigenetics and TBI identified key findings and methodologies while pinpointing areas requiring further investigation. Epigenetic influences are central in mediating brain plasticity post-TBI, emphasizing the need for further, more comprehensive research to understand the underlying mechanisms fully. Ultimately, epigenetic factors should be the focus for elucidating neural plasticity mechanisms and guiding therapeutic approaches for TBI treatment and rehabilitation.

Matthew J. Schreiner, Economics & Philosophy

Luke Winslow, mentor

Stare Decisis and Originalism: A Comparative Analysis of Two Legal Appeals

The historical narratives and rhetorical frameworks behind constitutional interpretation have become distinctly divisive in recent history. This divergence is apparent through the development of two modes of thought: *stare decisis* and originalism. Much research has been done on the practical and jurisprudential value of these methods in developing legal decision-making. However, scholars rarely discuss the danger of the terms' legitimizing force and seldom tie *stare decisis* and originalism together. This gap in the conversation, along with developments in the wake of *Dobbs v. Jackson Women's Health Organization*, inspired the direction of this research— an attempt to characterize the relationship between the terms' actual historical significance and the communicative weight behind their invocation. The hope of this thesis is to refocus the conversation surrounding these modes of interpretation by scrutinizing the courts' decisions as a culmination of both structures of legal theory and political action.

Camilla Scott, International Studies

Victor Hinojosa, mentor

Organized Crime and State Capacity in Mexico

This thesis analyzes the relationship between state capacity and organized crime in Mexico. After first reviewing the leading causal models in literature today regarding the rise of organized crime, the definitions of both organized crime groups and state capacity are established in relation to this research. Then, a case study of two states in Mexico, Yucatan and Sinaloa, which have experienced different levels of cartel violence, reveals that low state capacity enables organized crime to increase in the region. While other causal factors may play a role in the rise of organized crime, the results of this case study suggest that state capacity reduces violence, even when other factors predicting violence are present.

Bridget Sexton, University Scholar

Walter "Sparky" Matthews, mentor

War Under the Microscope: Biological Weapons and the Just War Tradition

Though biological weapons have been used for thousands of years, advancements in science and technology have revolutionized the biological threat landscape. Scientists can manipulate and engineer pathogens in ways that were previously unimaginable, making bioweapons an attractive option for both state and non-state bad actors.

Despite the legal and ethical prohibitions against biological weapons, state-sponsored bioweapons programs have continued to proliferate, and the threat from lone-wolf bioterrorists continues to rise. In this thesis, I point to three primary reasons why the current prohibitions have failed to deter the development and use of bioweapons. First, the ethical and legal prohibitions against bioweapons are outdated because of recent technological and scientific advances. Second, there are virtually no means of verification which makes catching violations nearly impossible. Finally, there are no mechanisms to facilitate the enforcement of the prohibitions or to hold violators accountable. In light of the claim that the current frameworks are insufficient, I propose to turn to the just war tradition to guide future regulations and policies.

Grant A. Shrable, Biochemistry

Angie LeRoy, mentor

Attachment to God and Physical Health Outcomes in Spousal Bereavement

Spousal bereavement is often accompanied by large amounts of stress, greatly impacting an individual's health both mentally and physically. The degree of stress brought about by spousal bereavement varies from person to person, and an individual's attachment style likely affects their reaction. Since there is less literature to be found on the subject of physical health, rather than mental health, in spousal bereavement, this thesis examines existing scientific literature to determine the connection between various attachment styles with God as the attachment figure and physical health outcomes arising from spousal bereavement. A positive relationship between a secure attachment to God and lower stress in spousal bereavement is found, suggesting that a secure attachment to God may positively alter physical health outcomes resulting from the loss of a spouse.

Caleb Skinner, Statistics

Rodney Sturdivant, mentor

Is Momentum Real: On the Existence and Influences of Psychological Momentum in Professional Tennis

The existence and magnitude of momentum in sports has been fiercely debated in the last forty years. Professional tennis's repetitive and hierarchical structure has proved ideal for research, and recent studies have found evidence for momentum in professional tennis in a series of specific circumstances. Utilizing a holistic approach, this paper proposes a comprehensive definition for momentum as the derivative of the players' smoothed point margin curve. Using the backward approximation of the derivative, we find evidence that a player's momentum entering a point has a significant impact on his or her likelihood of winning the next point. Male players are more impacted by this effect than female players. From here, we use the forward approximation of the derivative to evaluate the impact that various characteristics have on momentum. Of note, we find strong evidence that hitting an ace, breaking serve, and winning a set tend to increase a player's future momentum. Conversely, an interruption in play tends to diminish momentum. In general, these associations are stronger for male players than female players. These results confirm and expand upon the conclusions of established peer-reviewed research.

Katie Steele, University Scholar

Elizabeth Corey, mentor

Worshipping the Workhorse: Questions I Wish I Would've Asked Myself Before Undergrad

This thesis examines various questions surrounding work and leisure which young adults ought to more seriously consider as they sign themselves up for their careers, family lives, and spiritual obligations. The first chapter considers the question "When Did I Stop Reading for Fun?", and is a call for the modern, technology-ridden culture

of the present to sit down and enjoy quality literature. The second chapter reflects on the question “Why am I Underworking?” and works to unmask common lies of the individual who avoids their workload, and considers valuable truths in combating those lies. The third chapter answers a similar, and yet entirely distinct question: “Why am I Overworking?”. This chapter works to encourage young adults who find themselves in oceans of overcommitments to develop freedom from perfectionism, and the confidence to reprioritize their involvements. The fourth chapter poses the final question of “Who is My Comparison Figure?” and invites readers to reflect on how a spirit of unproductive comparison can rob them of joy in all seasons of life – not just the present one.

Samantha R. Stubblefield, Statistics

Elizabeth Corey, mentor

Jewelry in the Hellenistic Period: A Modern Recreation

The Hellenistic period ranges from 320 B.C. to 31 B.C. During the Hellenistic period, the Greek and Egyptian cultures can be seen through many different artifacts, including jewelry. Through conquests and mutual assimilation, the Greeks and Egyptians found inspiration in each other’s work. This thesis looks at the jewelry as it was influenced by the two cultures and reflects the intertwining of their styles. In this thesis, I detail the historical background of the jewelry and recreate each piece using modern technology, such as 3D and laser printing, to build accurate recreations. This thesis walks you through the process of utilizing the different software to 3D model and print, as well as the hands-on building process. The thesis then reflects on each process and assembly, the difficulty levels, and the attributes and limitations of the creation process.

Alagu Subramanian, University Scholar

Joseph Taube, mentor

Targeting the Eukaryotic Initiation Factor eIF4A to Overcome PDCD4 Tumor Suppressor Downregulation Against Breast Cancer Progression and Stemness

Resistance to cancer therapeutics is common and requires novel approaches. Highly aggressive triple-negative breast cancers (TNBCs) lack effective targeted treatments. Deregulation of translation factors is associated with the increased proliferation of TNBC, heightened cancer stem cell (CSC) activity, the epithelial-to-mesenchymal transition (EMT) and poor patient outcomes. Targeting translation regulatory factors upregulated in TNBC is a promising approach to developing novel treatments. Patamine A (PatA), a natural marine macrodiolide product, inhibits RNA cap-dependent translation by sequestering the eukaryotic translation initiation factor eIF4A. eIF4A promotes the translation of polypurine-rich mRNA sequences, which are enriched within certain oncogenes. Here we report the anticancer efficacy of novel PatA analogs against breast cancer cell lines. The PatA analogs exhibited enhanced cytotoxicity to breast and colorectal cancers compared to non-cancerous cells measured by cell viability studies. Novel analogs show greater antiproliferative potency against models of TNBC than against human mammary epithelial cells (HMLE). We conducted analyses of patient tissues in the Cancer Genome Atlas (TCGA). Our analyses reveal the overexpression of eIF4A in tumors compared to normal tissues and gene correlation studies reveal the upregulation of key co-expressed tumor drivers including beta-catenin, fibronectin, and EMT markers such as SNAIL and SLUG. Further analyses show a downregulation of tumor suppressor protein PDCD4, an endogenous inhibitor of eIF4A, in tumors. We have generated eIF4A and PDCD4 shRNA knockdown cell lines to uncover the eIF4A-PDCD4 regulatory axis across breast adenocarcinoma cell types. We show that the loss of eIF4A attenuates the mesenchymal and stem-like phenotype of breast cancer stem cells revealed by phenotypic assays. Our results suggest that targeting eIF4A is an effective approach against highly proliferative and metastatic breast cancer types.

Michelle Tasaki, Public Health

Emmanuel Akowuah, mentor

Global Impact of COVID-19 on Tourism and Policy Recommendations for Hawaii's Tourism

Tourism is considered a social, cultural, and economic phenomenon which is heavily dependent on the movement of people to countries or places outside their usual environment for personal or business/professional purposes. With the onset of COVID-19 lockdowns and travel bans, the tourism industry faced several significant impacts globally. To understand the global impact of COVID-19 on tourism, an extensive literature review was conducted. Through the review, five main impacts were identified: (1) the effect on the hospitality industry; (2) changes in personal travel behavior (3) the impact on employment and workforce; (4) the impact on employees' mental health (5) the impact on tourism-dependence economies. Overwhelmingly, the literature points to the lack of economic diversity as a reason for the profound impact tourism destinations such as Hawaii suffered from the COVID-19 pandemic. Policies focusing on expanding economic diversification in Hawaii and other tourist destinations are warranted and explored through the discussion of this thesis.

Morgan Tate, Medical Humanities

Bill Hoy, mentor

Dying Well: A Classic Grounded Theory Study on Christian Opinions on Death and Dying

A classic Grounded Theory study to learn how followers of the Christian faith tradition in modern, Western society approach the subject of death and dying, with a particular emphasis on seeking to understand what values sustain Christian individuals through death, grief, and loss---as well as how healthcare providers can improve end of life care with these findings in mind. Participant interviews were conducted to assess this concept of "dying well," asking "what would you define as a good death" and "what would you define as a bad death." For a "good death," emergent themes included having closure, saying goodbyes, feeling no pain, at being at peace. For a "bad death," emergent themes included prolonged death, dying alone, being in pain, and feeling fearful. Three lenses arose from these emergent themes as crucial for understanding how individuals within the Christian faith tradition perceive and navigate the concept of "dying well": the importance of *Selfhood*, the function of *Relationships*, and the effects of the *Manner* of death. These three lenses (Selfhood, Relational, and Manner) can be used by individuals to assess what is important to them for "dying well," as well as for healthcare providers to improve quality of care by addressing the wellbeing of their patients in these areas.

Amanda Lynn Tegart, University Scholar & Geosciences Daniel J. Peppe, mentor

Paleoclimate and Paleoecology Reconstructions of the Early Paleogene Arctic Using Fossil Leaves

The early Paleogene was characterized by multiple short-lived warming events, called hyperthermals, which caused marked increases in temperature and changes in flora and fauna. In this study, we reconstruct climatic and ecological changes of the Arctic before and after the largest Paleogene hyperthermal event, the Paleocene-Eocene Thermal Maximum (PETM), using fossil leaves collected by the late L.J. Hickey from Stenkul Fjord on Ellesmere Island in the Canadian High Arctic. We digitally measured a variety of morphological characteristics to reconstruct mean annual temperature (MAT) and mean annual precipitation (MAP) using the leaf physiognomic methods Digital Leaf Physiognomy (DiLP), Leaf Margin Analysis (LMA), and Leaf Area Analysis (LAA). We also reconstructed leaf mass per area (Ma) to estimate leaf lifespan. Results indicate both the Paleocene and Eocene ecosystems were warm and wet, and plant communities were living within a temperate seasonal forest to temperate rainforest biome that was dominated by deciduous species. Although the climate and ecology was similar for the Paleocene and Eocene, a change in morphotype composition reflects a shift in the plant community on either side of the PETM. The results of this work help provide a better understanding of high latitude ecosystems, especially during warming events, which has important implications for the future given the current global climatic warming trends.

Isabelle Terry, Professional Writing and Rhetoric

Sara Dye, mentor

From Soil to Soul: A Narrative Exploration of Family, Place, and Identity

In this Creative Nonfiction thesis, I explore four family members' experiences in their hometowns to understand how their experience in a place contributed to their identity formation. The thesis begins by exploring identity and self, socialization, and creative nonfiction place stories, all of which serve as my work's theoretical underpinnings. I situate discussions of identity within Erik Erikson's model of psychosocial development. I then move to the story of my mother's life growing up in Hays, Kansas, my paternal grandmother's life growing up in Galesville, Wisconsin, my paternal grandfather's life growing up in Thomastown, Mississippi, and my father's life growing up in McAllen Texas. Each chapter begins by establishing a sense of what the place is like followed by the experiences of the individual. Each chapter ends with a reflection of how the person's experience in a place shaped an aspect of their identity. I end with a discussion of Erikson's theory of identity crises and why people may decide to leave or stay in the place they were raised.

Caroline Tichenor, Economics

Craig Gundersen, mentor

Food Insecurity and Mental Disability: The Successes and Failures of Federal Assistance Programs

Food insecurity, the inability to access sufficient food to meet nutritional needs, affected nearly 17 million households in the United States in 2022. The immensity of this issue has led to a significant dedication of resources into the research of the mechanisms of food insecurity and the development of federal assistance programs aimed at reducing food insecurity. Numerous studies have found a clear association between disability and food insecurity, finding that people with mental disabilities have an increased risk in experiencing food insecurity. However, gaps remain in understanding how this experience impacts those with serious mental illnesses and intellectual disabilities, contributing to the continued disadvantages faced by these populations. Utilizing relevant literature, I first seek to examine the current state of food insecurity in the United States and the efficacy of federal nutrition assistance programs. Then, I investigate the relationship between food insecurity and disability, focusing on households with members with a serious mental illness or mental disability. Finally, I utilize these findings to propose and analyze potential policy solutions to establish better equity and accessibility among federal assistance programs.

Anne Madison Trammell, Health Science Studies

Kelly Rossler, mentor

Fertility Awareness Knowledge Among College Students: A Review of Literature and Addressing this Knowledge Gap in Undergraduate Students at Baylor University

A review of published research studies demonstrates insufficient knowledge of college students on the topics of fertility and infertility awareness. Future implications of these knowledge deficits are extensive, from improper use of birth control to infertility due to a delayed attempt at conception. The purpose of this project was to assess the current literature on fertility awareness among college students, identify the main misunderstandings of fertility among undergraduate students at Baylor University, and propose an education protocol to supplement these misunderstandings. A non-experimental, descriptive research design informed the study. The Mu Fertility Knowledge Assessment Scale was used to assess knowledge among Baylor University undergraduate students aged 18-24 years. Data was analyzed using descriptive and inferential statistics. Findings showed knowledge deficits among the study subjects that align with previous research. Continuing education is suggested to ensure Baylor University students have sufficient knowledge to begin to make fertility-aware decisions in their adult lives.

David Tran, Science Research Fellows

Michael K. Scullin, mentor

Pulling an All-Nighter Impairs Organic Chemistry Learning: An At-Home, Zoom-Based Sleep Deprivation Experiment

Many college students willfully restrict their sleep to study, especially when taking notoriously difficult courses like organic chemistry. Such behaviors seem counterintuitive because experimental work consistently indicates that sleep deprivation causes detriments to attention, learning, memory consolidation, and overall health.

Undergraduate students (N=77) completed a 5-day study. Actigraphy watch and Oura ring monitoring confirmed that participants in the normal sleep condition slept on the experimental night (actigraphy M=7.54 hours, ring M=7.65 hours), whereas participants in the sleep deprivation condition did not sleep [actigraphy M=0.04 hours, ring M=0.08 hours; $t = 23.0$, $p < .001$, $d = 5.93$]. Sleep deprivation significantly impaired morning organic chemistry learning (M=44.0%) compared to normal sleep [M=57.03%; $t(62) = 3.15$, $p = .002$, $d = .78$]. Impairments of academic performance were still observed at the two-day retention test but to a lesser extent (Sleep deprivation: 42.39%; Normal sleep: 52.27%, $p = .024$, $d = .57$). Pulling an all-nighter was sufficient to compromise complex academic learning. Sleep deprivation experiments can be feasibly conducted in participants' homes so long as they are video-monitored by research staff and wakefulness is confirmed by wearable sleep trackers.

Camellia Valencia, Art History

Katie Larson, mentor

An Analysis of Impressionist Landscapes by Latin American Artists in a Transatlantic Context

This thesis covers two artists from Latin America, Francisco Oller (1833-1917) and Eliseu Visconti (1866-1944), who worked with Impressionism and Neo-Impressionism during the late nineteenth and early twentieth centuries. The first chapter focuses on the Puerto Rican artist Francisco Oller, claiming he uses Impressionism to navigate his personal views of Puerto Rican identity during a time of a political shift by analyzing his lighting techniques and emphasis on indigenous Caribbean plants in his work. The second chapter focuses on the Brazilian artist Eliseu Visconti, claiming that the duality of his work replicates two different ideas surrounding Brazilian identity during the early twentieth century by analyzing the differences between his personal and governmental works. Both chapters look at artists who have previously been deemed imitators of European aesthetics and try to analyze their art within a transatlantic context instead. The goal of this thesis is to show how these artists are not creating art that is just European, but has a deep relationship and connection to their political and cultural identity.

Luis G. Vega, Biology

Elisabeth G. Vichaya, mentor

Exploring the relationship between Tissue, Cellular, and Cell-free mtDNA Content in a Murine Model of Cancer-related Fatigue

Cancer-related fatigue (CRF) impacts the daily activities and quality of life of cancer patients. While variability exists, the majority of studies report 30-60% prevalence of moderate to severe fatigue in patient populations. Inflammation has often been associated with CRF, but recent research indicates metabolic dysfunction may be a mediator between inflammation and CRF. The present study aims at using the murine Lewis lung carcinoma (LLC) model and cisplatin chemotherapy to investigate the long-term effects of cancer and cancer treatment on mitochondrial DNA content and explore its relationship to fatigue-like behavior. As anticipated, tumor-bearing and cisplatin treated mice showed fatigue-like behavior as assessed by decreased voluntary wheel running. Peripheral blood mononuclear cells (PBMCs) mtDNA content was decreased in tumor-bearing mice, which was positively correlated with their fatigue-like behavior. While cisplatin decreased liver mtDNA content, it did not correlate to

fatigue, but was correlated with hippocampal mtDNA levels. Furthermore, Kidney and PBMCs mtDNA levels were correlated. These results provide complementary evidence in support of a relationship between PBMC mtDNA content and fatigue.

Gabriela I. Vela, Political Science

Steve Block, mentor

Originalism to Common Good Constitutionalism: Post-liberalism's Emergence in American Legal Theory

The American legal right is fracturing. This thesis explores how America's legal history and philosophy impact Supreme Court jurisprudence by attempting to link contemporary liberalism to the constitutional interpretation of originalism. The discussion then turns to the current post-liberalism debates in American conservative politics and popular post-liberal theorists' answers to these conservations. At its core, this debate represents conflicting visions of liberty in the United States - a debate that has existed since the Founding and has emerged again in a new era as a method to combat contemporary progressive ideologies. An analysis of the ways that recent Supreme Court rulings have tended toward common good perspectives is offered at the conclusion of this thesis. Understanding the relationships between conservative values and constitutional interpretation provides a way for Americans to reevaluate Supreme Court jurisprudence in light of today's debates regarding individual liberty.

Kylie M. Vernon, History & Psychology

Mandy McMichael, mentor

Outrageous and Outdated: When Purity Culture Shapes Evangelical Beliefs about Women and Sexuality

Foundational to Western culture are both the Judeo-Christian tradition and Greek philosophy. From the outset, these ancient cultures have contained models of masculinity and femininity that have shaped ideas of maleness and femaleness that persist to this day. Ancient Greek scholars talked frequently of the female body's inferiority as well as its dangerous sexual propensity to not only men, but even to the state. In the modern era, furthermore, the taboos and strict regulation of the female body may be observed in methods of economic consumerism, medical principles, public policy, and of course, religious beliefs. Focusing on an apt and timely example of the often uneasy alliance between women and theological doctrine, my paper explores evangelical purity culture. Here, I discuss the rhetoric and transmission of purity and modesty, disclosing how evangelicals dichotomized male and female sexuality to the detriment of women. This strategy has served to create a male identity of sexual insatiability whereas women have been held responsible for gatekeeping sexual activity. Such beliefs promote ideas of female moral culpability in all sexuality leading to a system of blaming and shaming towards women that has persisted throughout a millennia to the detriment of men and women alike.

Gabriella von Dohlen, University Scholar

Leigh Greathouse, mentor

The Effect of Dietary Diversity on the Stability of the Gut Microbiome and their Methods of Measurement

The stability of the gut microbiome is thought to help provide immunity against diseases, serving as protection against disturbances to the microbiome. This thesis reviews the health benefits of a stable gut microbiome and explores the effect of diet in its stabilization. By organizing dietary items within a food tree, diet diversity is understood similarly to how microbiome diversity is measured. Hypothesized to see an increase in microbiome stability with an increase in diet diversity, several measurements of diversity are calculated and compared. Using the diet data from a vitamin D intervention pilot study, diet diversity, measured as the median Aitchison's distance between consecutive days, is seen to negatively correlate with microbiome stability, as measured by the median of

the inversed Aitchison's distances between consecutive time points. This data indicates that within subjects taking vitamin D supplements, a more diverse diet is related to a less stable microbiome.

Liana Vuu, Biochemistry

Christie Sayes, mentor

Utilizing rapid enzymatic activity model (REAM) to decipher potential toxicity mechanisms of herbicides-glyphosate and atrazine

Glyphosate and atrazine are widespread environmental contaminants, among the most commonly used herbicides globally. Humans are primarily exposed to these herbicides by consuming contaminated food and water. These herbicides elicit deleterious effects on multiple human body systems, including the respiratory, reproductive, endocrine, nervous, gastrointestinal, and urinary systems. Although these compounds are degradable, the process can take days, months, and sometimes even years. Despite the many toxic effects linked to exposure to these herbicides, the precise underlying toxicity mechanisms in humans still need to be well-established. In this study, we utilized our rapid enzymatic activity model to investigate the interactions between glyphosate and atrazine with enzymes involved in antioxidant defense (catalase and glutathione reductase) and cellular metabolism (lactate dehydrogenase and pyruvate dehydrogenase). The research aim is to contribute to a more comprehensive understanding of the potential toxicity mechanisms associated with human exposure to herbicides in the environment. Our results show that glyphosate induced a statistically significant decrease in pyruvate dehydrogenase and lactate dehydrogenase activity, resulting in up to a 10% and 13% reduction in enzyme activities, respectively at a concentration of 100 mM. Similarly, atrazine elicited statistically significant alterations in lactate dehydrogenase activity alongside a concentration-dependent decrease in catalase activity across all tested concentrations (0.1 mM to 100 mM), resulting in a notable decline of up to 60%. This research strongly emphasizes the significant contribution of cell-free assays in the early identification of potential harmful health effects and unveils the underlying toxicity mechanism of herbicides and other chemicals of environmental relevance.

Anna Louise Wages, University Scholar

William Weaver, mentor

Virtue in Epic Voyages: How Homer, Sir Edmund Spenser and C.S. Lewis Displayed the Significance of the Pursuit of Virtue Throughout the Treacherous Journeys of Their Heroes

This essay explores the profound influence of literature in cultivating virtue within its readers. By examining three timeless works, Homer's *The Odyssey*, book II of Sir Edmund Spenser's *The Faerie Queene*, and C.S. Lewis's *The Voyage of the 'Dawn Treader'*, collectively referred to throughout this essay as "epic voyages," we delve into the enduring power of storytelling to impart moral lessons. These narratives have withstood the test of time, testifying to their continued relevance as tools for virtue education. Throughout the essay, we analyze the virtues exemplified by the heroes in these tales: prudence, courage, temperance, hopefulness, and humility. We observe how these virtues guide and shape each hero's journey, offering readers fictional exemplars to inspire their own pursuit of virtue and illuminate the profound impact of literature in training individuals in the path of virtue. In the world of these epic voyages, readers embark on transformative journeys alongside their heroes, uncovering valuable insights into the human experience and the pursuit of moral excellence. Through our exploration of these timeless narratives, we uncover the enduring legacy of literature as a catalyst for virtue education, encouraging readers to navigate their own moral journeys with prudence, courage, temperance, hopefulness, and humility as their guides.

Katharine Walker, Finance

Shaun Eide, mentor

A Systematic Literature Review: Transferable In-Demand Soft Skills Related to Informal Life Experiences

The present study examines the relationship between transferable soft skills and unique life experiences. In the contemporary job market, hiring managers are increasingly placing greater emphasis on the soft skills candidates possess, taking a more holistic approach to the hiring process. However, especially in the post-pandemic aftermath, mismatch exists between employers' soft skill requirements and the actual proficiency levels of job applicants. Through a systematic literature review methodology, this study identifies five unique life experiences that may serve as indicators for transferable soft skill proficiencies: athletics, video gaming, previous employment, crises, and military service. When life experiences are recognized as a valuable domain of exploration, hiring managers may be better equipped to locate desirable job applicants. Additionally, job applicants may gain employment in desired positions through leveraging their unique life experiences throughout the hiring process. Thus, the recognition of life experiences as an indicator for soft skill proficiencies can widen the talent pool and address the skill mismatch problems between employers and job applicants. However, this study calls for consistent terminology and definitions to further clarify this field of research. Additionally, developing quantifiable tools to assess soft skill proficiencies may provide additional insight and validity to the relationship between life experiences and soft skills.

Krista Wichterman, University Scholar

George Yancey, mentor

Intergroup Dialogue, Race Relations, and Racial Reconciliation

Minority populations in America have experienced centuries of discrimination, oppression, and racism. This experience is shaped by longstanding institutions that disadvantage communities of color and by the racist ideologies that have trickled into modern-day structures and cultural beliefs. Although many efforts have been made toward racial reconciliation, cross-cultural collaboration, and racial justice, America's diverse culture remains steeped in racial tension, disparity, and division. Conversations of race have expansively evolved throughout American history, arriving at two prominent, yet antithetical philosophies called colorblindness and antiracism. Each of these frameworks recommends different solutions to combat disunity and injustice while promoting cultural cohesion. However, it seems that employed solutions have not resulted in the desired outcomes of healing, equity, and racial prejudice reduction and studies have differed about the effectiveness of these competing solutions. The tenets of Allport's theory of contact help to explain why certain implemented solutions are not leading to sustainable and widespread healing or collaboration. However, a conversation model called intergroup dialogue shows promising results, leading to changed minds and prejudice reduction. The Mutual Obligations approach, created by Sociology professors George Yancey and Michael Emerson, is a form of intergroup dialogue that, if widely utilized, could lead to widespread racial collaboration, cross-cultural problem-solving, and societal healing. This thesis will examine historical racism, current racial disparity, modern conversations about race, a review of the effectiveness of attempted solutions, and an examination of alternative approaches including intergroup dialogue and the Mutual Obligations Approach.

Anna Wickenhiser, Nursing

Elizabeth Perry Caldwell, mentor

EHealth Literacy in Spanish-Speaking Adolescents

While adolescents account for approximately 42 million people in the United States (U.S.), the lack of research on their health literacy is devastating (U.S. Census Bureau, 2020). Previous research shows that positive adolescent health behaviors can be promoted by influencing adolescent health literacy. However, there is limited research on

health literacy in Spanish-speaking adolescents. More specifically, there is very little research on eHealth literacy. Based on the framework for studying adolescent health literacy (Manganello, 2008), the purpose of this study was to evaluate the relationships among individual traits, health literacy and eHealth literacy of Spanish-speaking American adolescents. In this descriptive, correlational, cross-sectional study, data was collected from 121 American Spanish-speaking adolescents via Qualtrics. Significant correlations were found between age and current grade level ($r=.766, p<.001$) as well as health literacy and eHealth literacy ($r=.199, p<.05$). There were no other significant correlations. These findings encourage curiosity and beg for further research to be done in this field.

Evelyn Wilson, University Scholar & English

Timothy DeJong, mentor

Poetry: Hiddenness within a Mythic Context

This thesis discusses the poetry of Louise Glück within the context of Greek myths. By considering Glück's poetry within a mythic context, meaning surrounding the idea of hiddenness is observed. This idea of poetic hiddenness is presented originally by Jane Hirshfield. By utilizing the poetic idea of hiddenness, Glück is able to add meaning to her poetry in a manner that is unique and enlightening. This thesis will examine the hiddenness present within Glück's poems as well as present original poetry that attempts to display a similar relationship between hiddenness and meaning. The original poetry will contain multiple themes, most notably commenting on familial relationships and grief.

Sydney Withey, Interior Design

Debra Harris, mentor

Alzheimer's Residents and the Built Environment: A Spatial Analysis of Care Facilities

The purpose of this inquiry was to identify the contributing factors of the physical environment that residents with Alzheimer's disease are housed in by evaluating models of care facilities; further, projected results will aid in understanding their effects on health and resident experience to make recommendations for improvements. The facility an Alzheimer's resident is housed in contributes to their well-being and quality of life, especially as there is no pharmacological cure or prevention for Alzheimer's disease. Plan-EAT analysis is employed to analyze six long-term care facility types to understand the baseline for memory care layout planning. The results of analysis were used to develop a proposed facility plan, utilizing high-scoring characteristics, and rectifying low-scoring characteristics. The proposed facility plan demonstrates the ability to design a memory care facility that best supports the direct abilities and needs of Alzheimer's residents by prioritizing visual access, movement & engagement, and social interaction.

Scotty Wright, Economics

Scott Cunningham, mentor

Innovative Analysis: Using ChatGPT to Understand and Predict Dividend Payout Ratios

The introduction of Generative AI, specifically ChatGPT, has created a uniquely disruptive environment for testing experiments previously deemed out of reach. This project aims to build upon the existing literature, which has demonstrated ChatGPT's ability to explain and predict firm-level investment decisions. I hope to contribute to the burgeoning field of financial machine learning by leveraging ChatGPT's nuanced understanding of these investment decisions and applying it to the specific financial metric of the Dividend Payout Ratio. This application

will serve as a benchmark for the value added by text-based generative AI in financial markets. Initially, I seek to establish statistical significance between the Dividend Payout Ratio and Earnings Call Transcripts analyzed by ChatGPT. Subsequently, I will test out-of-sample Earnings Call Transcripts to determine the predictive power of ChatGPT.

Emma Wrona, University Scholar & International Studies

Joanne Cummings, mentor

The Quest for Geopolitical Influence: PRC Maneuvers to Increase Its Influence in the Pacific Islands

As the People's Republic of China (PRC) is emerging as a contemporary world power, it is working to influence other countries to achieve its various geopolitical goals. One region subject to greater PRC influence efforts is the Pacific Islands, a region rife with challenges due to internal cleavages, climate change, and colonial pasts. The PRC seeks to advance its geopolitical influence in the Pacific Islands to achieve its domestic goals, including political, economic, and military targets that can be attained using miscellaneous influence tactics that enhance the PRC's ability to exert control over another state's actions. Through case studies analyzing five different Pacific Island countries, this thesis identifies the PRC primary motive(s) for engaging in influence operations, discusses the tactics the PRC uses to attain influence, and analyzes the effectiveness of these tactics for generating, maintaining, and increasing the PRC's influence in different Pacific Island states.

Meredith Wyrick, Communications

Tracey Sulak, mentor

Women, ADHD, and their Comorbid Conditions: A Guide

This thesis handles women with ADHD and the comorbid conditions that coexist with ADHD. It discusses the biological mechanisms of ADHD and the differing symptoms that present in women as opposed to men. I argue that women show fundamentally different ADHD symptoms and have more subtle comorbidities which impact treatment and education. Each coexisting condition discussed gives both an overview of clinical presentation and how these symptoms may present themselves in the classroom. Conditions discussed are anxiety disorders, major depressive disorder, dyslexia and other learning disorders, autism spectrum disorder, and 2E, or twice-exceptional students. The thesis as a whole is meant to spread awareness and function as a resource for educators, especially those who specialize in middle and high school education. As a general rule, the best approach is a tailored one, using multidisciplinary learning whenever possible. With the correct tools and supports, these women can thrive in an educational setting and have a bright future.

Sage Yassa, University Scholar & Political Science

David Corey, mentor

Nietzsche on Greatness: Internal and External Characteristics in Three Late Works

In this thesis, I identify and examine the internal and external traits of the Nietzschean great man as seen in the late works *Beyond Good and Evil*, *The Gay Science*, and *On the Genealogy of Morals*. I find that we may identify many key characteristics of the great man that Nietzsche discusses throughout these three works. Further, I argue that the creation and acting of one's singular ideal is the necessary element of Nietzschean greatness. The internal traits I discuss are high feelings, singular ideal and amor fati, suffering, solitude, and pity, multiplicity and unity, perception of oneself, and asceticism. The external traits I discuss are the eternal recurrence viewpoint, action, relation to others, the great man's suffering, conditions and rarity, recognizability, and the difference between true and false greatness.

Josiah Zeigler, Arabic Middle East Studies & Political Science

Lisa Lacy, mentor

More than a Sandbox: Great Power Competition and the Middle State as seen in the Middle East

As China and the United States accelerate towards global great power competition the Middle East is becoming a critical region for either country. Straddling Europe and Asia, the Middle East's oil, global shipping lanes, and strategic positioning makes it a fault line in the struggle for global hegemony. Using G. John Ikenberry's dual hierarchy theory to frame the current competition and paired with historical analysis of prior great power competitions in the region, the thesis posits that success in the Middle East is contingent upon strong ties with critical middle states and primacy in the military sphere of hegemonic competition.

Brady S. Zimmerman, University Scholar, Music Performance, and Mathematics

Jameson Graber, mentor

A Finite Dimensional Approximation of a Density Dependent Mean Field Game

The goal of this thesis is to establish the existence and uniqueness of a Nash equilibrium of a density dependent mean field game and approximate the solution with numerical methods. We first briefly introduce both mean field game theory and measure theory. Next, we define a game in which the final cost is the density of the equilibrium measure. Then we prove a unique solution exists by using the Browder-Minty Theorem. After this, we will show how Newton's method can be used to approximate a solution and look at some specific examples of this approximation in action. To conclude, we will explore an application crowd behavior.

