



URSCA

Student Scholarship & Research

Spring 2020

2020 URSCA Abstracts

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Shannon Aguiar

Faculty Mentor: Sara Angevine

Artificial Intelligence and It's Potential to Aid Fair and Efficient Representation

In American political research, studies show an apparent link between the way humans rationalize moral dilemmas and the ability of artificial intelligence to aid humans in the decision-making process (Rhim, J., Lee, G., & Lee, J-H., 2020). Thus, one may expect that artificial intelligence can increase the ability of representatives to accurately represent their constituents in a fair representative democracy. However, scholars have not yet examined if artificial intelligence has the potential to improve fair democratic representation in the United States. Could a representation model aided by artificial intelligence help to improve fair democratic representation?

I hypothesize that the assistance of AI representatives will help to improve fair democratic representation with greater speed and accuracy. To test this theory, I compare the data from studies on autonomous vehicles and AI medical diagnostics to create a theoretical AI representative model. I compare the decisions made by individuals from the 2016 ANES data set and how they compare to theoretical AI outcomes. I also compare the voter turn-out to the results of a moral machine to evaluate the state of democratic representation with and without AI assistance. I find that AI has the potential to change the way representatives make decisions when they face moral dilemmas. These findings help us better understand the impact and importance of efficient and accurate democratic representation and how it can be improved using modern technology. With major global problems rapidly affecting the daily lives of individuals everywhere, representatives must act with greater accuracy and speed. With the untapped potential of

artificial intelligence and its integration into systems where legislation is slow, representatives may be able to take on some of the more daunting and time-sensitive issues humanity faces in this new decade.

Kyle Aguilar

Faculty Mentor: Roger White

A Crime Against Humanity: Analysis of Human Conflict on Child Welfare

Employing a multivariate regression model, we examine the impacts of civil conflict in Côte d'Ivoire on children's health. This objective is accomplished through the examination of data from household surveys that were collected before, during, and after the civil conflict known as the first Ivorian civil war. The surveys provide the location, dates of conflicts, and health scores of the children located in Côte d'Ivoire. These health scores, also known as z-scores, are a measure of a child's health relative to the health of the reference population, determined by the WHO. Merging the health service data (z-scores) with the conflict data shows the effects of both conflict intensity and conflict duration on child health. The results yield that children in areas or provinces that were highly affected by conflict have significantly lower health scores relative to comparable counterparts who were less exposed to conflict. This suggests that, all else held constant, violence and conflict have a large negative influence on child health.

Angel Alcantar

Faculty Mentor: Jonathan Burton

Challenging the Canon: Young Adult Fiction in the Classrooms

In the last decade there has been a substantial growth within the young adult fiction genre with increasing numbers of publications and changes in the

style of writing implemented. However, many don't see this genre as holding any literary merit to make it worthy of inclusion in schools or any efferent reading. It has been delineated to pleasure reading, commercial fiction. But contrary to these beliefs, the genre in fact holds significant literary merit by using new techniques to increase complexity without the need of increasing difficulty, techniques like formal experimentation, diverse experiences, and complex political narratives informed by literary theory, such as Marxism, Gender Studies, and Sexuality Studies. This project will use surveys of a range of young adult fiction novels out through literary analysis to demonstrate the literary merit within the genre that makes young adult literature be as equally worthy of inclusion in classrooms as canonical text, and sometimes offering more within a single novel to meet Common Core State Standards.

Megan Alvarez

Faculty Mentor: Nora Obregon

Social Anxiety Disorder: Effects on Adolescent Development

This literature review discusses the psychopathology of adolescence, specifically focusing on social anxiety disorder (SAD), otherwise known as social phobia (SP), and the effects it has on adolescents' development. The research studies explain the effects the mental health disorder has on the overall development in adolescence. This literature review intends to examine how social anxiety disorder affects adolescents (12 - 18 years of age) specifically their social, emotional, and cognitive development. This paper (a) analyzes the literature within the field of child development, focusing on adolescents that have social anxiety disorder and (b) pinpoints the areas of development that are affected by the mental disorder. This study is imperative because anxiety disorders are more common throughout the adolescent years, with a 10%-20% frequency, and the effects of having a

disorder at this age can be catastrophic. Research shows that social anxiety disorder and the hindrances in adolescence include but are not limited to restricted socialization among peers and victimization. Research also demonstrates that females have a higher frequency of anxiety and experience it differently than their male counterparts. Limitations of the research suggest that self-reporting could alter the results from the study and implications of the studies indicate there may be a correlation between adolescence and adult anxiety disorders. Furthermore, future research should consider studying the effects of anxiety in males as opposed to what is known about females.

Aidan Anderson

Faculty Mentor: Marie-Magdeleine Chirol Hill

Pour la Meillure et Pour le Pire (For Better and For Worse)

This presentation analyzes how Cannes Jury Prize winning, Senegalese Filmmaker, Mati Diop uses the main character, Ada, to exemplify how life decisions regarding marriage and love are similar among young women of similar economic backgrounds, and to show the struggles these women face when their families are pushing them one way, but their heart is pulling them another. First, I study the decisions faced by Ada and the way in which a choice of the heart and a choice of a good future combat one another. This comparison allows me to consider the use of duality (i.e., in society, in relationships, in the economy) through Ada and those around her. Finally, I explore how the idea of compromise resolved the conflicts due to Ada's decisions. All three of these aspects contribute to the reality of for better and for worse. This visual presentation will be conducted in French.

Diego Aranda

Faculty Mentor: Kateyn Zempel

Co-author: Ashley Garcia

A Comparison of Colored Antioxidants in Hibiscus Flowers to Common Fruits and Vegetables

Hibiscus flowers have been shown in previous studies to contain antioxidants that can aid in health and nutrition. Specifically, this study refers to the antioxidants known as anthocyanins. Anthocyanins provide the reddish-blue coloration that is found in flowers, such as hibiscus, and fruits and vegetables like cranberries and red cabbage. We hypothesize that the amount of anthocyanins we extract from hibiscus flowers will be similar to the anthocyanin content that can be found in colored fruits and vegetables. To determine the amount of anthocyanins present in hibiscus flowers, we have used controls of fruits and vegetables and a well-established analytical method for measuring anthocyanin content in fruit juices. Hibiscus flowers are a common ingredient in teas or used as colorants in our food. With increased anthocyanin content, hibiscus flower extracts or teas may not only taste good but provide important nutritional benefits.

Audrey Armienta

Co-author: Kat Garrison

Faculty Mentor: Gary Gold

Law and Culture: Age Discrimination in Japan and United States

This research project undertakes a comparative assessment of the contours of workplace age discrimination in the United States and Japan. We will be exploring laws and procedures to compare the ways to which these countries promote and deal with inequalities in employment. The

exploration will have a limited focus on examining age discrimination through the legal framework set in the United States court of law and the standards that Japan holds that inherently promote or hinder age discrimination. We found it essential to investigate two fundamentally different countries to gain a broader sense of employment law and the improvements that can be made for future employment and social welfare. In the United States, there are protections against age discrimination for those over the age 40; whereas, in Japan, there are no regulations for age discrimination, making it difficult for those over 30 seeking to find employment. When dealing with an increasingly older workforce in the United States and Japan, it is important to understand the measure of which the law is able to protect older workers from being discriminated against and work towards social acceptance. We will be exploring each country's history of addressing inequalities through cultural norms, societal standards, and legal proceedings. The research was conducted through an empirical approach, using both qualitative and quantitative data. Statistical records, literary criticisms, and interviews will be used to gain a greater sense of the need for equal employment protections for older workers. Through the data, we were able to find that societal standards limited the progress in expanding legal protections. In conclusion, we found that the social conditions reaffirm international business theories, primarily Hofstede's Dimensions of National Culture and Social Structures, that help to define different social operations and explain the complications in establishing comprehensive legal protections. Our comparative study concludes with a final assessment summarizing some of the significant commonalities and dissimilarities between these two countries and identifying prospective age focused developments that might foster continuous improvements for employment equality.

Alyssa Ascencio

Faculty Mentor: Roger White

Price Disparity: Examining Gender-based Price Discrimination in the United States

Using the most recent data available, for the year 2018 from the Consumer Expenditure Survey (CES), we examine the effects of price discrimination in the consumer market of the United States and whether these differences provide a premium for a targeted male consumer base and a penalty to a targeted female consumer base, all else held equal. We employ statistical t-testing to examine whether there is price discrimination to such a degree that concluding a pink tax exists is warranted. To check the validity of the findings, robustness tests were performed on the outcomes of all nine product categories found to indicate significant differences in prices paid.

Lillian Ashby

Faculty Mentor: Rebecca Overmyer-Velázquez

The Vegan Movement: A Case Study of Activism

Through this study, I demonstrate why individuals become involved in activism by utilizing the vegan movement as a case study. My findings provide insight on what motivates people to become voices for a particular social movement and offer ways to increase rates of involvement – such as strengthening and promoting like-minded community spaces. This is a key part of what drives society forward and why activism is so important; it not only provides these individuals – who share common beliefs – with a place to flourish within society, it empowers them to inform the rest of the population about new or changing social issues. As vegan activism is a new social movement, it affords more insights on how movements gain traction in today's society than can examination of past movements. Previous

research on activism involvement has touched upon the importance of community values, but I argue that being around like-minded individuals is not the only driving force. Concerning my research on vegan activism, one major finding is that these individuals discuss their activism as something inherent – they are compelled to use their voices for those who cannot. In my literature review, I discuss variables already known to have an impact on rates of involvement in vegan activism, including perceived privilege and exclusion associated with the vegan movement, the community values it promotes, and the social stigma associated with joining it. My results were obtained by conducting interviews with individuals of varying ages and racial and ethnic backgrounds. These individuals follow a vegan lifestyle and promote it through attendance of activist-driven events, or other forms of demonstration--such as postings on their social media pages. I conducted observational data on social media outlets such as Instagram, and I also conducted field notes at several vigils--events aimed at bearing witness to the suffering of animals. Through the events and interviews, I talked with roughly 25 individuals to discern why they became activists. The data I have collected and analyzed will apply to the study of activism within other movements, and the results will help delineate ways to increase involvement within them.

Martha Avila-Zavala

Faculty Mentor: Sylvia Vetrone

Co-authors: Dr. Molly Jud and Dr. Bruce Bowerman

A Forward Genetic Screen to Identify Genes Required for Morphogenesis Using *Caenorhabditis elegans*

Morphogenesis is an aspect of development whereby cells change their shape and/or migrate to form tissues, essential for shaping organs and the body of all multicellular organisms. This process is important for proper

tissue function. However, the genetic mechanisms that regulate morphogenesis remain incompletely understood. To further investigate morphogenesis, a forward genetic screen was done to identify genes required for it using *Caenorhabditis elegans*. It has historically been difficult to study morphogenesis with tools available: (1) Null mutants and (2) RNAi. The Bowerman lab generated a collection of about 1,000 temperature-sensitive, embryonic lethal (TS-EL) mutants that can bypass earlier requirements for genes. From these TS-EL mutants, about 200 have normal early cell division and thus are more likely to have mid-embryonic morphogenesis defects. To identify morphogenesis defects during the process of body elongation, TS-EL mutant embryos are collected and upshifted from a permissive temperature (15°C) to a restrictive temperature (26°C) just before bean stage, right before elongation occurs, allowing for circumvention of earlier developmental requirements, including cell division and cell fate specification, to focus on morphogenesis requirements. Currently, we have identified 14 penetrant elongation-defective mutants ($\geq 70\%$ of embryos exhibit a single elongation arrest phenotype). To identify recessive, Mendelian inherited (single) mutants to study loss of function genes in isolation, we genetically characterize the penetrant mutants. The alleles *or1002*, *or1192*, *or1404*, and *or1766* are recessive, single mutants. To determine the causative mutations within genes, whole genome sequencing and complementation tests are done. Finally, we are characterizing the cell shape defects during elongation of the penetrant mutants using antibodies to an epidermal cell membrane marker, DLG-1. After upshift before the bean stage, the epidermal cells of the bean-stage mutant *or1002* are indistinguishable from wild-type, indicating the upshift is not causing defects in cell division or cell fate patterning. We hope to confirm the *or1002* mutant has direct morphogenesis defects during elongation by testing if the cells are misshapen or disorganized at later stages after an upshift before the bean stage. Our studies provide insight into human diseases, such as congenital birth defects, and help to model wound closure and cancer.

Nicolas Bakken-French

Faculty Mentor: Cheryl Swift

How Plant Physiological Characteristics can be used to Better Manage Wildfires

Fires in California are becoming not only more severe, but also more frequent, and a vital tool will be models that better predict fuel flammability. Increasing annual temperatures and reduced annual precipitation result in plant stress, potentially decreasing water potential and relative water content, which in turn may increase fuel loads. Currently, fuel loads are estimated by taking the ratio of wet to dry mass; however, the relationship of physiological water stress to fuel loads is not well understood. Conventional fire management policy assumes that older stands of vegetation have increased fuel loads, but again, the role of plant water stress is not well understood. This study addresses questions: 1) To what extent are measures of plant moisture content correlated with water potential? 2) Does plant water stress increase with time since fire and does this in turn decrease plant moisture content? We sampled three different aged burns in the Angeles National Forest and Los Padres National Forest in southern California and three different aged burns in the Stanislaus National Forest and Sierra National Forest in the Sierra Nevada. We chose burns of similar age in each location and controlled for elevation. At each location in southern California, we marked individuals of scrub oak (*Quercus* sp) and manzanita (*Arctostaphylos* sp.) In the Sierra Nevada sites, we also marked individuals of *Ceanothus* sp. Mean Leaf Moisture Content, Relative Water Content, and Stem Water Content increased with increased pre-dawn water potential suggesting that water stress plays a factor in fuel moisture content. Surprisingly samples from more recent burns had lower pre-dawn and midday water potentials, and slightly lower measures of plant water content. Our results suggest that, at least in chaparral, plant water stress is

related to plant moisture content, but that time since fire did not increase water stress or reduce plant water content. There are several possible explanations for our results. First, ten years since the fire was our oldest burns, so perhaps more time is needed for post-fire water stress and accompanying fuel increases to develop. It is also possible that micro-climate unrelated to elevation plays an important role in water stress. Regardless, our results suggest that a focus on time since fire as a way of predicting fuel loads may not be an accurate way of predicting fire risk.

Isai Barocio

Faculty Mentor: Roger White

Mega-sporting Events: Are they Worth the Cost?

When it comes to hosting a mega-sporting event, countries will often invest billions of dollars in their infrastructure simply to be a candidate to host the event. Countries partake in this investment with the hope of boosting their economic prosperity and recognition. Though these countries do experience economic growth in the short run, in the long run, many host countries are negatively impacted by the aftermath of these mega-sporting events. I analyze several factors, such as a country's exports, its imports, the level of employment, and the size of its capital stock, to better understand the investment necessary to host a mega-sporting event that increases that country's GDP. A positive relationship is expected between investment and these factors in the short run for developing countries; however, there is also an expected negative impact for these developing countries in the long run. In analyzing multiple countries that have hosted or haven't hosted a mega-sporting event, we better understand which countries are more likely to be economically prosperous in the long run and whether hosting a mega-sporting event is worth the investment.

Taylor Beckwith

Faculty Mentor: Lori Camparo

HIV-Related Stigma: A Negative & Intersecting Life Experience

In 2016, the Human Immunodeficiency Virus (HIV) affected over 1.1 million people in the United States. Antiretroviral therapy (ART) medications have allowed HIV-positive individuals to live longer and better lives, but this has meant greater risk and exposure to HIV-related stigma that could affect their overall quality of life. This literature review examines how HIV exists as a chronic disease and how HIV-related stigma contributes to an overall negative life experience. The concept of intersectionality is used to analyze the overlapping identities of (a) gay, bisexual men, (b) women, (c) and youth and adolescents. Even though individuals may be managing their HIV diagnosis through ARTs or other treatments, added life stress, stigma, and maladaptive coping mechanisms can lead to further negative health outcomes. In gay or bisexual men, the combination of racism, homophobia, and HIV-related stigma contributed to problems with disclosure, societal rejection, increased sexual risk, and worse physical and mental health outcomes. Women, another stigmatized group, faced the fear of disclosure and negative mental health, while older HIV-positive women experienced more shame and self-isolation because of layered stigma. Youth and adolescents were found to have more internalized and psychological symptoms and some faced stigma by association because of their mother's HIV diagnosis. Specific identity and culturally tailored intervention and education programs through churches or other avenues are also explored. In summary, this literature review reveals the importance of understanding intersectional identities surrounding HIV-related stigma and individuals' experiences in the larger, macro societal environment.

Amelia Bell

Faculty Mentor: Rebecca Overmyer-Velázquez

Deconstructing the Anti-Vaccination Movement and Its Unseen Factors

Despite the success of vaccinations and the near eradication of several diseases, vaccinations are still met with resistance today. Why voluntary vaccinations succeed or fail, may be attributed to certain factors. Current research tells us that those factors are political identity, peer influence, mass media and psychological influences. All play a role in one's decision to vaccinate. Specifically, conservatives are found to have higher levels of mistrust towards the government and fear government regulation. Furthermore, certain forms of cognitive thinking are identified as contributing factors when one is deciding to vaccinate. However, this study examines how online communities strengthen the resistance to not vaccinate. A survey was distributed through a Facebook organization and over 200 international responses were collected. The examination of anti-vaccination networks on Facebook is important because of how accessible Facebook is. Simultaneously, Facebook fosters a "small world" mentality as strangers share personal experiences and videos regarding vaccinations. This mentality makes the movement more durable as it can heighten peer influence. Furthermore, Facebook currently stands as the most popular social networking site with the largest user base.

Sawyer Belville

Faculty Mentor: Alvin Alejandrino

Variation of Dissolved Oxygen Contents in Tide Pools Containing Predominantly Red (Rhodophyta) or Brown (Phaeophyta) Algae and Effects on Species Richness

Climate change and nutrient pollution considerably alter the structure of ecosystems, and primary producers, such as algae, are of the utmost importance to study since their production of oxygen supports the longevity, reproduction, and respiration of many organisms. The objective of this study is to determine the role of the dissolved oxygen content in respect to different macroalgae, red and brown, and their effect on the species inhabiting algal tide pools located in Cabrillo Beach, San Pedro, CA. With this objective and previous studies in mind, it was hypothesized that brown algae will produce more oxygen than red algae, making the dissolved oxygen contents of these tide pools higher and effectively increasing the species richness. The number of species and the dissolved oxygen content of tide pools containing these two macroalgae at Cabrillo Beach in San Pedro, California was measured. In the Fall of 2018, brown algae tide pools had a lower mean dissolved oxygen content (142%) than red algae (157%), yet was not significant as the p-value was 0.3. Brown algae also had a lower mean level of species richness (1.7) compared to red algae (1.8) and were not found to be statistically significant with a p-value of 0.7. In conclusion, the data collected in the Fall of 2018 suggests that red algae produced more oxygen, as seen by its higher means of species richness and dissolved oxygen concentrations, yet the data was not statistically significant. The same measurements have been taken three times within Spring 2020 to compare the results and see if there was any change in statistical significance.

Sumitra Ariel Bernardo

Faculty Mentor: Sara Angevine

The Squad and Social Media: Utilizing Social Media as a Political Tool Among Freshman Congresswomen

During political campaigns, female candidates receive less media coverage than their male counterparts (McGregor, Mourão, 2016). Although the 2018 midterm election produced a record of 36 freshman Congresswomen, most of these women credit social media for their success. Within this, the rise of The Squad occurred, consisting of House Representatives Alexandria Ocasio-Cortez, Rashida Talib, Ayanna Pressley, and Ilhan Omar. These women have used social media continuously throughout their campaign cycles and the current term in Congress. Why is The Squad so effective on social media? How are they utilizing social media platforms differently from the other freshman Congresswomen? I hypothesize that The Squad is so effective due to the way that they frame their posts, which are more interpersonal. To test this theory, I compare these four freshman congresswomen to four of the remaining 32 other freshman congresswomen and measure their effectiveness by linking the framing of their posts and language used to their analytics of likes and views. The findings open a gateway and understanding that contributes to a new way of approaching political participation through social media. As time progresses, technology is ever-changing and there is hardly any research on the integration of social media within politics. By researching the effectiveness of social media usage among these Congresswomen, this study allows for a further understanding of the importance of a new style of political communication.

Eliza Bower

Faculty Mentor: Jason Carbine

Religious Identity within an Interfaith Community

The religious diversity of Southern California is deep and complex, even as highlighted in a visual way by my recent work on religious communities in the region (Bower et. al 2010-2020, REL student mapping project.) Situated against that backdrop, this study explores a part of that diversity. Through a participant-researcher role I have studied individuals with distinct religious identities who regularly participate in interfaith dialogue. I sought to look for interfaith efforts in a region of dense religious diversity. The study seeks to explain the relationship between religious identity and interfaith dialogue participation. Seven in-depth interviews and survey data from 38 respondents point to interfaith dialogue as an extension of religious identity that challenges the participants' view of the religious "other." The relationship between religious identity and interfaith dialogue weaves individual religious convictions with bridge-building conversation with others that create curiosity and respect towards the religious other. Findings show that the participants' experiences in interfaith dialogue grow knowledge about other religions through friendship, community building, and open conversations. Many of the participants were knowledgeable of Christianity prior to interfaith dialogue which then provided knowledge of Islam and Judaism, reflecting the high density of Christian establishments in Southern California compared to the number of Islamic and Jewish establishments. My research points to interfaith dialogue creating space for people of distinct religious identities to feel comfortable asking questions and thus becoming educated about other religions. Further, my research highlights the implications of interfaith dialogue in solving issues of Islamophobia and other religious ignorance that can be eased or prevented through interfaith practice.

Eliza Bower

Faculty Mentor: Rebecca Overmyer-Velázquez

Nones and Dones: Identifying the Causes of Religious Disaffiliation and Non-affiliation.

Research on religious disaffiliation highlights the significant social and political implications of religious disaffiliation in the US as individuals leave religious institutions, specifically Christianity, and become independent in practice or evade any sort of religious belief system. This study examines a sample of those who are either Christian or nonreligious in the attempt to elucidate the factors of Christian disaffiliation and non-affiliation. Eleven interviews and survey data from 124 respondents point to individual experience, upbringing, politics, and social reasons as factors affecting the decision one makes to leave Christianity or to not ever affiliate with it at any point in life. The issues of focus are why former members of Christianity are disaffiliating and why many choose to not affiliate at all while also examining reasons active Christians choose to remain in practice. I address this issue through mainly examining the factors pushing individuals from Christianity however, I also analyze the factors that pull individuals into remaining affiliated with Christianity. Preliminary findings show that most participants raised in Catholicism and Christianity left due to socio-political reasons such as the church's exclusion of LGBTQ members and issues of abortion. Participants were also pushed from church due to familial reasons such as feeling forced to attend weekly church services and Mass. Participants who were not raised in religion and chose not to ever affiliate cite faith in human goodness and the non-need for religious belief or religious community support as reasons for not participating in institutional religion. Participants who are active Christians continue to feel pulled towards affiliation through attending church, praying, and volunteering with their community. The study seeks to compare the push and pull factors in light of the participants' experiences.

Findings show that although many choose to not participate in the institutional aspects of Christianity such as attending church, they still have their own beliefs, faiths, and practices.

Kendall Brauer

Faculty Mentor: Marie-Magdeleine Chirol Hill

Les Produits de Beauté Yves Rocher aux Etats-Unis / Yves Rocher Beauty Expanding into the United States

As a French and Business Administration double major, I have a great passion for the international business world. A second great passion of mine is the beauty industry. As I was considering these two passions, I decided to research more into France's beauty industry and to delve into Yves Rocher, a French cosmetics brand, and their expansion into online selling in the United States. I focus on the possibility of an expansion into a brick-and-mortar store in the U.S., and I project the possibility of their success as well as how they might attempt such an expansion. I use other French cosmetic companies who have made this expansion as comparisons. This paper will be presented in French.

Daniel Brown

Faculty Mentor: Roger White

Observing the Determinants of Health Care Spending in OECD Economies

To understand price fluctuations in health care expenditures per capita, in nations that are members or possible candidates of the Organization for Economic Co-Cooperation and Development (OCED), theorists have proposed a set of factors that influence both consumer and producer spending on health care. Studies published between 1987 and 2014 find the

relationship between the private sector and public sector (total) coverage, burden of disease indicators, annual growth of household income, the share of the population accounted for by those 65 years old and older, the population share of those 15 years of age and below, hospital beds per capita, increased technological advances, crude death rates (per 100,000), life expectancy, and physicians per capita all contribute to OECD member's total health care expenditures per capita. The expectation is that these identified determinants have a linear relationship to OECD member's total health care expenditures per capita. This paper tests the theory from the literature regarding the empirical models that indicate the influencing factors of OECD spending fluctuations on health care. The existing literature suggests that the relationship between income and health care spending is positive. Certain groups are more prone to health care spending due to higher risk of disease among higher-risk populations. The population above 65 years of age tend to have increased expenditures due to declining health. The population under 15 years of age tend to have increased expenditures due to their weaker immune systems. The majority of health care expenditures in OECD countries come from insurance or government-funded health care coverage providers. Thus, a positive linear relationship is expected between health care coverage and increasing health care costs. In OECD countries, higher death rates may also correlate with increased spending because patients spend more on health care in their last stages of life. More physicians in OECD countries result in higher competition among physicians, which may lower the cost of health care. The increase in medical technology should result in higher health care costs due to the high costs of producing medical equipment. Like technology, necessary hospital equipment, such as beds, increase supply-side expenditures for both hospitals and consumers.

Hannah Brozowski

Faculty Mentor: Sylvia Vetrone

Vitamin B6 and Tryptophan's Effect on Discontinuation Symptoms in Zebrafish (*Danio Rerio*)

Depression is a worldwide disease that affects millions of individuals by inhibiting mood regulation. To restore the normal function of the mood-regulators, selective serotonin reuptake inhibitors (SSRIs), which increase the levels of the neurotransmitters serotonin, also known as antidepressants, are often prescribed; yet once the medication regime ends, so does a patient's relief. Many individuals experience debilitating discontinuation symptoms in physical and psychological forms and unfortunately a patient's susceptibility to these symptoms is hard to predict and mitigate. Further research is needed to understand the behavioral impacts caused by discontinuation symptoms and other alternatives to mood regulation may help to lower the anxiety formed after discontinuing antidepressants. Tryptophan and Vitamin B6 (VB6) aid in the regulation of serotonin and researchers believe VB6 may reduce discontinuation symptoms. This study investigates Tryptophan and VB6's ability to reduce the discontinuation symptoms associated with serotonin withdrawal in *Danio rerio* (zebrafish). 16 zebrafish were treated with 0.001mg/mL of the SSRI Sertraline daily for 28 days and stopped treatment for two weeks to reflect a withdrawal period. Three groups (n=4) were dosed with 0.001mg/mL of tryptophan, VB6, a combination of both, and the final group was the control. All groups were behaviorally assessed using the Novel Tank Dive and the Novel Lig.

Lauren Burney

Co-authors: Michelle Nguyen, Joshua Kotani, and Dillon Gutierrez

Faculty Mentor: Devin Imoto

Isolating Fibrolase from Cotton Mouth Venom

Multiple enzymes that can influence blood coagulation in the body can be found in snake venom. One fibrinolytic enzyme has been purified from the venom of *Agkistrodon piscivorus conanti*. Fibrolase is a zinc metalloproteinase that functions to degrade fibrin clots. In this project, we purify fibrolase from snake venom for possible uses in thrombolytic therapy. The goal is that this purified enzyme can then be used for the targeted treatment of thrombotic events. Initial purification was done via a HIC HPLC column. This gave us three peaks of activity which were pooled together: fractions 16 through 28, 38 through 54, and 72 through 94. These samples were further purified via a HAP HPLC column. A Bradford assay was performed to determine protein concentration in each fraction. Enzymatic activity was assessed on the fractions by a fibrin plate assay. We found fractions 7, 34, and 39 were able to degrade the fibrin clot. The purity of the samples that were shown to have fibrolase activity was assessed via SDS-PAGE. We found fractions 33 and 34 contained our protein of interest in a high level of purity. These bands were very light, though, indicating the protein was dilute. We can conclude that we were able to purify fibrolase from snake venom in small quantities. We plan to continue by developing a quantitative assay for this enzyme which would allow us to determine the concentration of fibrolase obtained. This will help us prepare the sample for testing in thrombolytic therapy.

Samantha Casanas

Faculty Mentor: Rebecca Overmyer-Velázquez

The Female Athlete Experience: A Multigenerational Examination

This study uses qualitative methods to conduct a multigenerational analysis of the female athlete experience. While the female athlete experience has been studied, this work offers a unique contribution in that it analyzes this experience from a multigenerational perspective. The research shows that the female athlete experience remains at a deficit in comparison to the male athlete experience. Although there are more women involved in sports today, female athletes face societal challenges associated with the male hegemony of sport including issues of identity, media coverage, fan support, and opportunities such as in the job market of coaching and broadcasting (Pacheco et al., 2012). The primary goal of this project is to discover whether or not resources for female athletes have improved since the incipient stages of women's inclusion in sports. This project brings awareness and highlights the extreme discrepancies between men's and women's sports. The research question this study is focused on is: "Has the female athlete experience improved in its accessibility of resources, across generations?" The research method employed for this study was interviewing. Ten interviews were conducted with women between the ages of 20-63 who have played a variety of sports, with a combination of face-to-face and email interviews. Respondents played a variety of sports, at a variety of competitive levels. Key findings show that although resources for female athletes have improved across generations, there are still many discrepancies between the multitude of resources provided for male athletes versus the lack of resources for female athletes. The findings also suggest that resources for female athletes have improved but have not become equal to male athlete resources. The study is limited in that it only includes the experience of ten women and does not account for the experiences of current and former female athletes from all over the world.

Isa Castillo

Faculty Mentor: Jose Flores

Generational Healing Through Poetry: Yesika Salgado's Writing as an Act of Decolonial Resistance

U.S. gender roles, racial stereotypes, and beauty standards have all contributed to the formation of a hegemonic idea and expectation of what the Latina body can and should look like. These expectations were accepted by mainstream culture and served as a tool of oppression meant to subdue Latinas into believing that their worth as humans rested solely upon what their bodies looked like and could provide to men. Over the years, Latina authors began to use their writing to reject these standards and reclaim authority over their bodies to create a space of healing for themselves and their readers. An example of a contemporary writer that is doing just that is the Salvadoran American poet Yesika Salgado. In my research, I assert that Yesika Salgado's body-positive discourse and sexuality challenge U.S. social constructs imposed onto the Latina body through her reclamation of the word fat, how she asserts her sexuality, and by her rejection of common expectations, such as motherhood, that have been imposed onto Latina bodies. I explain how American society has tokenized a specific image of how a Latina body should exist in terms of both aesthetics and functionality to highlight how Salgado is actively deviating from said expectations. Salgado's writing does not try to simply create a more inclusive idea of what the Latina body can look like, but rather her work ruptures the confinements associated with the Latina body to attest to the notion that embodying a Latina body is a personal and individual experience. Salgado is finding liberation by embracing her definition of what it means to navigate the world in her Latina body-or as she describes, in her "fat, fly, brown" body.

Esai Cervantes

Faculty Mentor: David Mborá

Co-authors: Brandon Mai and Jorge Orozco

Increased Onion Root Length Among Soil, Water, and Control Groups

One day, one of our research members came across an onion with grown roots and a stem on the floor. This raised several questions, such as how was the onion able to grow without any water or soil? We soon found that onions or *Allium cepa* are geophytes, thus its bulb is made up of stem tissue that contain plenty of carbohydrates and water. Thus, giving it the ability to grow under very scarce conditions. Previous studies found that environmental temperature is more responsible for onion growth in comparison to water and nutrients. What we do not know is the difference in primary growth between onions with favorable and unfavorable conditions (nutrients and water). A finding that can help us better understand its productivity is very important because our current agricultural practices has depleted available nutrient and water availability. Since most of the energy for primary growth comes from the onion's bulb, we hypothesize that the majority of an onion's growth, such as its roots reach a determinate length, regardless of substrates. We predicted that root length among onions in both abundant and scarce environments is similar. In our experiment, we measured the root length of our onion samples in three different environmental conditions, including control (by itself), water only, and soil with water. After measuring the root lengths over a two-week period, we ran a statistical Analysis of Variance (ANOVA) to determine a relationship among our three types of onions for both weeks. The p-value for the second week was 9×10^{-4} , which was much lower than the 0.05 range or is very statistically significant. Thus, our data did not support our hypothesis and was the opposite to our prediction. On the contrary, the roots grew more efficiently with water and they grew the most efficiently with soil and water. Despite not having our hypothesis supported we can observe how well this hardy geophyte took advantage of

plentiful resources to achieve optimal growth. Although measuring stem length was not included in our study due to limited time, a few from the control and water only group achieved significant growth in length. For future our goals, we would conduct a second experiment with more samples, more available time, and more different observations in onions, especially in stem growth. It is important continue this type of research to improve our effort in increasing the efficiency sufficient enough to support our growing population.

Esai Cervantes

Faculty Mentor: David Mborá

Co-author: Ricardo Mendoza

Studying Aquatic Insect Species Diversity in Still and Non-still Streams

Most natural disturbances that have been documented have been large forces like wildfires, storms and earthquakes, but there is lack of studies of disturbances on a smaller scale. This is why in our study we aim to focus on the effect of different current flows to aquatic insect species diversity in streams. From what is known, water flow influences the availability of nutrients in a stream. Algae levels are high in low currents and vice versa. Thus, our first hypothesis in this experiment is that streams of higher productivity support greater levels of biodiversity in comparison to environments of lower productivity. We predicted that streams with higher algae bloom will have a higher number of species of insects in comparison to streams with lower algae bloom because algae is an important source of nutrients to many organisms, including insects. However, the overabundance of algae leads to eutrophication or the excessive buildup of algae leads to the mass depletion of oxygen, resulting in the death of many organisms. That is why our second hypothesis is that median disturbed streams have the greatest capability to support optimal levels of species

diversity. We predicted that streams with medium levels of water flow will have highest levels of species diversity, which was supported through the intermediate disturbance hypothesis. In Dwarsberg, South Africa where we collected our samples from six different streams in a river. We collected algae samples, measurements for the steam power of stream flow, and we collected aquatic insects for each stream. We documented, graphed, and ran our statistical analyses of our data on excel. The scatter plot for testing our first hypothesis had an insignificant rise and its R value was 0.164 or is statistically insignificant. In the distribution curve to test our second hypothesis, there is a higher number of species in more inactive streams while species diversity was lower in more active streams. Surprisingly, the stream with the lowest species diversity is the stream with the median level of steam power. The R value for this figure was 0.557 or is slightly significant. Our data did not support our firsthand second hypothesis. On the contrary, our results ended up the opposite to what we originally predicted. More research would be necessary to further explain this surprise and if given the chance we would revisit this study with more time and samples.

Cooper Champagne

Poverty: A Longitudinal Analysis on Social, Emotional, and Cognitive Development

The purpose of this literature review is to analyze the effects that [growing up in] poverty has on child social, emotional, and cognitive development in order to determine common themes that carry over into the later phases of child development. In particular, this review seeks to answer this question: Why is it that poverty generally serves as a detriment to these specific spheres of development and why does this carry over into the later phases of growth? To achieve this specific purpose, this paper will examine the literature surrounding poverty and its effects on a) social/emotional development, b) cognitive development, and c) latent effects that may

transpire into middle childhood and adolescence from these disparities in overall development. In all literature, there was an inverse effect found in relation to children and poverty when it comes to development; poverty contributes to a harsher home environment in terms of parenting tactics and affection and causes this association between poverty and deficits in social and emotional development in the form of internalizing/ externalizing psychological issues, violence, depression, or anxiety. According to the national center for child poverty, 15 million children (or 21% of all children) live in families that are below the federal poverty line; however, it has been shown that this number (the federal poverty line) vastly underestimates the amount that income that is needed to make ends meet. Keeping this in mind, the actual percentage of children living in poverty in the United States is really somewhere around 43%. With just under half of the United States' children growing up and living in poverty, it is imperative that there is more research done in order to identify potential developmental issues that can come about as an effect of poverty and implement early intervention strategies at the federal level in order to ensure typical development of all children and not just those that have grown up with better means.

Vivian Chan

Faculty Mentor: Ralph Isovitsch

Co-author: Ralph Isovitsch

In-vitro Evaluation of Anti-inflammatory Activity and Membrane-stabilization of Medicinal Plants

Herbal alternatives have traditionally been used to treat inflammatory disorders and diseases. Inflammation is triggered by the release of chemical mediators that bind to specific receptors that prompt pain. Therefore, the healing process involved with inflammation is often painful, increases protein denaturation, and alters cell membrane structures. Protein

denaturation occurs when proteins fail to uphold their structures due to external causes. The structure of proteins correlates to their function and thus when the structure of proteins is altered, the function of the protein is no longer efficient. Previous studies have established that denatured proteins are a major cause of inflammation. The goal of this study is to use herbal medicine and evaluate anti-inflammatory activity in terms of protein denaturation and membrane stabilization as opposed to traditional anti-inflammatory drugs that may have adverse side effects. Herbs (*glycyrrhiza glabra*, *prunella vulgans*, and *Coriolus versicolor*) were chosen based on their anti-inflammatory and anti-oxidative properties. To test for effectiveness, the three herbs were ground, extracted, and isolated with solvents ethanol and methylcyclohexane. Ibuprofen was used as a control and stimulated with the same conditions as the three herbs listed. The herbs were then combined into an egg albumin sodium phosphate buffer to test protein denaturation. To stimulate protein denaturation, the herb mixtures were incubated at 37 degrees Celsius followed by 60 degree Celsius water bath. Then, the solutions were cooled and tested using ultraviolet-visible spectrophotometry (UV-Vis) at the wavelength of 660 nm to determine the percentage inhibition of protein denaturation. The absorbance was analyzed with the UV-Vis at 660 nm. With the data gathered, there was an inhibition of denaturation, which was tested by the use of egg albumin. The percent inhibition calculated portrayed an inhibitory effect in solutions with herbal extracts. After evaluation, the data gathered concludes that herbal medicine contains anti-inflammatory activity. A natural alternative with anti-inflammatory agents is of great importance because anti-inflammatory drugs may have side effects that limit the proficiency of healing in inflammatory disorders. Therefore, there is potential in finding and isolating desirable anti-inflammatory properties that may allow resistance to protein denaturation and stabilization of the cell membrane.

Dynette Chavez

Faculty Mentor: Ann Kakaliouras

Repatriation Among Native Americans and the Revitalization of Spirituality within the Southwest

For centuries Native Americans have endured genocide, massacres, and misguided policies by the U.S. government. Throughout the historical battles and conflicts between the government and Native Americans, many objects of cultural patrimony were taken without consent. This project involves describing how repatriation reconstructs the identities of Native American people. Repatriation is the return of artifacts or human remains to different Native communities. The goal is how repatriation revitalizes spirituality within Native American communities. The project focuses specifically on the aspect of spirituality because the returning of an object may heal Native communities and allow the culture to flourish. The Native American Graves Protection Act enacted on November 16, 1990, assists in helping bring about the return of sacred and ceremonial objects to the tribes and nations. By using NAGPRA and repatriation cases from various Native American tribes throughout the Southwest, this research specifically centers on how spirituality contributes to the process of repatriation. This research will also highlight how important spiritual identity is to Native American people and how it impacts their communities.

Andrew Christopherson

Co-author: Chuck Hill

Faculty Mentor: Chuck Hill

Correlates of Intellectually & Physically Disabled College Students

Correlates of disability were explored using data from a Multiple Identities Questionnaire at an ethnically diverse small liberal arts college in a suburb

of Los Angeles. The questionnaire was completed for extra-credit by students in Introductory Psychology. Data for these analyses were available from 4273 women and 2501 men over eighteen years. Disability was measured using two eight-item scales, with responses ranging from not at all to completely, for physical and intellectual disabilities. The results suggest, men and women with physical or intellectual disabilities tended to have lower self-esteem, greater depression and anxiety, while also having lower levels of happiness and life satisfaction. They also tended to feel that they were less attractive, intelligent, and athletic while feeling less satisfied with themselves and having lower self-confidence, while feeling more lonely, pessimistic, and insecure. They also reported feeling that their parents were colder, more hostile, controlling, indifferent, rejecting, and less of a role model and tended to be threatened or intimidated and hit by males and females who were older, younger and age equivalent. They tended to be more likely to be sexually coerced into sexual activities with gifts, alcohol, threats, force, and reported feeling they were raped. They also tended to feel prejudiced and discriminated against for their athletic ability, academic ability, attractiveness, disability, height and weight. Overall, they felt more bullied, teased, disrespected, disliked and would change their disability if they could.

Daniel Cortez Jr.

Faculty Mentor: David Mbora

Influence of Urban Landscape on Arthropod Richness, Abundance, and Body Size

Urban landscapes consist of an urban gradient, which plays an important role in influencing arthropod richness, abundance, and body size. An urban gradient type refers to an environmental gradient with less developed natural or agricultural areas at one extreme and highly developed areas

dominated by anthropogenic structures and inputs at the other extreme. Further understanding of human-modified landscapes influence on arthropods is necessary to improve diversity and efficiency of existing arthropod communities. In this study, I investigated how an urban landscape has influenced the arthropod community within the Whittier College campus in Southern California. Specifically, five areas around the campus were sampled using pitfalls traps to be representative of the arthropod communities in these areas. The five areas sampled included a i) recreational grassy area, ii) coffee farm, iii) urban garden, iiiii) restored urban area, and iiiiii) native vegetation. The arthropods collected were then identified using a dichotomous key as well as online sources to identify down to the species level. The body size of Dipteran and Hymenopteran species were measured to determine variability between sampled areas. Statistical analysis consisted of an ANOVA that compared shannon-wiener index (H) values from sampled areas. The ANOVA concluded that there was no statistical difference between the sampled areas (p-value of 0.14). It was expected that within the five sampling areas an increased amount of arthropod communities and larger arthropods would be in areas that experience a minimal amount of human interaction. While areas that endure more human interaction would contain smaller arthropods and less arthropod communities. My study intends to demonstrate the influence that different types of landscapes have on arthropod size and communities.

Ryan Crawford

Faculty Mentor: Roger White

The Benefits of Being Raised by Biological Parents

With a decline in the percentage of children being raised by their biological parents from birth, it is important to test the effects this will have on various outcomes. We have conducted an econometric analysis to determine the

effect on income when a child is raised by their biological parents as opposed to another parental structure. Our research shows that being raised by biological parents does have a significant effect on increasing overall future income. Additionally, we found that the number of years living with biological parents has a positive effect on ASVAB scores representing vocational skill and the highest grade level completed (i.e., educational attainment). This means that each additional year a child lived with their biological parents, they are more likely to reach a higher grade level and more likely to get a better score on a vocational skills exam. Our research also shows that living in another parental structure has a slightly positive effect on ASVAB scores showing that another parental figure may be equal or more qualified to raise a child.

Dallas DeHart

Faculty Mentor: Casey Johnson

What is Monte Carlo?

Monte Carlo Methods attempt to make sense of random numbers that occur in computer generated systems and everyday life. With the assistance of Monte Carlo Methods, we can have a better understanding of the statistical significance of randomness. Monte Carlo has different applications from academia, industry, to engineering. These applications highlight the diversity of Monte Carlo, as well as its unique qualities that allow it to continue to be relevant. As a part of this research, we attempted to define these unique qualities. This was done by investigating different applications of Monte Carlo through defining the significance of random numbers, sampling methods, and how Monte Carlo is applied.

Elvira De La Torre

Faculty Mentor: Rebecca Overmyer-Velázquez

“This Hipsters Don't Seem to Understand”: How Gentrification Reduces Community Trust in Search of Safety

Before Echo Park became a tourist location and a home to various artists, it was a neighborhood that was inhabited by bodies labeled as deviant: low-income people of color. Gentrification in Echo Park has played a crucial role in not only transforming the physical space of the community by implementing urban renewal and increasing the cost of living, but it has also established new social relationships among young men of color and community members. This research aims to understand how gentrification changes community relationships as well as how definitions of crime change as the community's social context changes. Most literature on gentrification focuses on the visible and physical transformation of space but not on the impacts of gentrification on long time relationships community residents have with one another. To capture the perceptions of community residents, business owners, and gang members about gentrification, 12 interviews, 1 focus group with 3 people, and fieldnotes were conducted. Although residents recall having stronger collective efficacy, neighborhood trust that supports community cohesion, with their neighbors before gentrification commenced, they recognize the value that whiteness, which fixes social and economic values in communities, has in the displacement of folks who participate in the local gang thus making the community safer. They also call for an increase in police presence in the community even though the gang has become more private than in the earlier 2000s. For their part, gang members perceived a loss in community trust and unity since new upper and middle class residents avoid having any interaction with the men who take up public space. Future research should include interviews that can be conducted with incoming residents and business owners to grasp a holistic perspective about crime and the community.

Felicia Delgadillo

Faculty Mentor: Christina Baeur

Co-authors: Rachel Lazerson, Yuliana Chavez, Helen Mendez, Alyjah Perez, and Omaia Olivas

Discovering Chemistry with Color

There is a lot more to color than what meets the eye, both figuratively and literally. How do scientists know so much about the atoms and molecules we study if we can't actually observe them? Well, in a way, we simply look at them, but not always directly. Our eyes don't tell us everything, so we use instrumentation to separate out the information for us to graphically 'see' the details of the colors that our eyes cannot perceive. This often involves using light microscopes and electron microscopes, as well as spectrometers. In particular, spectrometers separate out the light, whether it be visible colors, infrared, microwave, x-rays, etc. The light that hits molecules can be absorbed or reflected, and it can also be converted into different colors. 1.) First, we used self-discovery to determine the relationship between measured and observed color, beginning with simple food colors. Upon examining the absorption spectra from red dye, we saw green absorption; yellow dye absorbed violet; blue absorbed orange. However, green did not absorb red only; rather, every color but green was absorbed, meaning this was not a pure solution, but rather a mixture of blue and yellow dyes. 2.) We then extended this work to a selection and a selection of fruits and vegetables (lettuce, spinach, tomato, orange, strawberry). Yet, we did not always observe what we expected. For example, the extracted juice from an orange absorbed UV light only, not blue as expected. This was also dependent upon what solvent was used to extract the dye. Therefore, the environment around a molecule is particularly influential on color. Further, when molecules are close together, they can appear a different color than when separated. 3.) We

then used the difference in absorption intensity (i.e., absorbance) vs. concentration to discover how we cannot only identify, but also quantify the molecules present. 4.) Finally, we observed that a molecule called fluorescence appears green and absorbs green. This surprise led us to discover the phenomenon of fluorescence. In addition, we realized that chlorophyll emits a bright red light when exposed to UV light, which can be detected even when extremely dilute and nearly colorless, uncovering a new technique.

Felicia Delgadillo

Faculty Mentor: David Mborá

From Bed Bugs to Dead Bugs: Exploring Natural Alternatives to Eliminate Bed Bugs, *Cimex lectularius* with Essential Oils

Due to the countless unverified claims on natural bed bug remedies on the internet, the purpose of this research was to determine if four natural remedies - essential oil treatments of rosemary, lavender, eucalyptus, and an essential oil mixture of all three oils- would be effective in eliminating bed bugs, *Cimex lectularius*. I predicted that the essential oil mixture treatment would be the most efficient in eliminating the bed bugs because of its antimicrobial properties, and this was the most efficient treatment in eliminating bed bugs in my previous research. I tested my hypothesis by comparing the elimination efficiency on an equal number of bed bugs under five treatments: rosemary essential oil treatment, lavender essential oil treatment, eucalyptus essential oil treatment, essential oil mixture treatment, and a deionized water control. Each treatment had four replications of five separate jars, each containing 22 subjects. The males and females were mixed in this experiment. Before treatment started, the subjects were given 7 days to acclimate along with one blood meal. After acclimation, the bed bugs were sprayed three times with their respective treatment once a day until the

population was dead. The effectiveness of the treatments was then measured by counting the amount of bed bugs that were still alive every day of the experiment. The main findings were that all the natural remedies were effective in eliminating bed bugs. The eucalyptus essential oil proved to be the most efficient in eliminating bed bugs. After the first spraying session, three out of the four populations for the eucalyptus treatment were all eliminated with only six left alive in the remaining population. After a second spraying session, all the bed bugs for the eucalyptus treatment were eliminated while it took several spraying sessions to eliminate the bed bug populations for the remaining three treatments.

Carlos Espinoza

Faculty Mentor: Julie Collins-Dogrul

How has Public Policy on Homelessness Affected Homeless Outreach Services and Programs?

After our first visit to our community partners, we all discussed issues that have affected the community. As the discussion continued, we came to an agreement that homelessness has become one of the biggest issues today not only in the city of Whittier but in the county as a whole. There have been many policies that have hindered the homeless population, with the unintended consequence of not letting these individuals excel or have the same resources as others.

Evalyn Espitia

Faculty Mentor: Nora Obregon

Bullying and Victimization: The Social-Emotional Development of Middle School Children

The purpose of this literature review is to examine the effects that bullying and victimization have on the social-emotional development of children in grades 6 through 8. Specifically focusing on how bullying affects the day-to-day social life of victims, such as the inability to make positive peer relationships and the development of deviant behaviors. The ability for children to develop positive peer relationships is a crucial part of their development which is why it is important to study what happens when they are unable to do so. Studies show that about 80% of middle school students have reported some form of bullying or victimization at school. Some common trends in the literature include the need for prevention programs enforced in schools to make it a safe environment for the students. Peer victimization is a significant risk factor for a range of negative outcomes during middle childhood, including depression and anxiety. It is important to study this topic because bullying is very relevant in middle schools today and it can lead to many long term social and emotional effects on a child.

Michael Gislason

Faculty Mentor: David Claveau

Co-authors: Jake Householder

Human Rage Detection with an Interactive Robot

Human-robot interaction is an important area of research that makes it possible for humans and robots to work together. In this project, a small humanoid robot infers the emotional state of a human to guide its behavior in response to the human. The goal is for the robot to provide an appropriate

reaction to a human who is speaking and gesturing in the usual manner, but may be expressing extreme joy or extreme anger. The robot makes use of vision, hearing, and artificial intelligence-based techniques to infer the human's emotional state and map this to the appropriate actions by the robot. The project involves the use of artificial neural networks, machine learning, and humanoid robotics.

John Paul Gomez-Reed

Co-author: Jordan Hanson

Faculty Mentor: Jordan Hanson

Communications Between an Onboard FPGA and Microcontroller System for Antarctic Neutrino Research

The Antarctic Ross Ice Shelf Antenna Neutrino Array (ARIANNA) is an array of autonomous stations designed to detect ultra-high energy (UHE) neutrinos via radio frequency (RF) pulses. Each station utilizes a field-programmable gate array (FPGA) on the motherboard to both communicate between different motherboard components, and to define a digital logic trigger that initiates data readout from the RF channels. An MBED 32-bit Cortex-M3 microcontroller is used to process and save the data to an SD card, and to send the data out via a satellite modem. The winds and man-made activities in Antarctica affect the RF trigger rate of the stations both by creating RF pulses that resemble those of neutrinos and by changing the RF noise environment in general. Currently, the properties of the ARIANNA digital trigger are set manually and have to be reconfigured via satellite modem. Automating this process would maximize system efficiency and minimize false-positive triggers. We have developed an FPGA firmware component called the Multi-Mode Frequency Counter (MMFC) designed to calculate the RF trigger rate at the motherboard layer before the microcontroller saves the data to the SD card. This gives the motherboard

the ability to optimize its threshold. We have successfully integrated the MMFC into the firmware and added code to the microcontroller software to receive the MMFC data via SPI protocol. The FPGA now measures RF trigger rates with ~5% fractional error across a range of 100 Hz to 25 MHz, and the results are captured and used by the microcontroller.

Natalie Graf

Faculty Mentor: Rebecca Overmyer-Velázquez

Educación Sexual de Madres Mexicanas Urbanas

Present-day females continue to experience less sexual pleasure and tenacity than males. Despite recent shifts around sexual liberation and feminism, statistics show orgasms, sexual self-esteem, sexual communication, and recognition of arousal are significantly less for women. Sexual education in schools is measured to decrease rates of pregnancy and sexually transmitted diseases. In addition, children's behaviors often align with that of their parents. I study how sexual education received from family influences how a cisgender mother chooses to sexually educate her children. What sexual values remain constant, which are left behind, and what new information is added? Participants include ten female mothers, born and raised in various states of Mexico, currently all living in urban environments, differing in socioeconomic status, ranging from 27 to 83 years old. The data reveals that these mothers consistently received less sexual education than they provided for their children. Refraining from promiscuity remains a central part of sexual education for these Mexican women, as well as attaching sex to feminine value and romantic partnership. Sexual pleasure and the specifics of female anatomy were ignored by the majority of participants.

Amelia Gregorio

Faculty Mentor: Laura McEnaney

The Role of Fallout Shelters and Civil Defense in Public Education (1949-1965)

Scholars have researched and written on the Cold War and civil defense, however not many have focused in on the subtopic of education. While not as prominent in the corpus of historical work on civil defense, the government's use of education as a proponent of nuclear preparedness was a huge undertaking in the late 1940s and throughout the 1950s. Those who have written on the subject all appear to agree that the government was using public education as a way to efficiently disseminate civil defense 'propaganda' to its civilians. The historiographical portion of my research examines the different historical works and utilizes them to create an argument about how objects symbolizing nuclear readiness, like the fallout shelter, found their way into America's public schools. The second portion of my project contains the analysis of my primary sources regarding this topic and some background context is essential in order to understand the documents that I have pulled from. The Cold War was a political arms race between the Soviet Union and the United States from 1947-1991. While the tension lasted for over 40 years, the period where anxiety appeared the most apparent was from 1949, when the Soviets successfully developed the atomic bomb, until the mid 1960s, after the Cuban Missile Crisis. In order to combat this fear, the government started to implement a tactic they branded as civil defense. Civil defense promoted alertness and mobility among all Americans, however the Federal Civil Defense Administration (FCDA) focused their attention and resources on the public education system. The government utilized public schools as a way to implement civil defense, because schools were an easy way to reach a large, captive, and malleable population. Sources including government reports, school board plans, articles in periodicals such as *The Elementary School Journal*, government

promoted films, and public opinion polls, confirm the government's intentional use of schools as an agent in promoting national preparedness. These documents paired with the historiography on civil defense education in public schools, advance the argument that the government saw schools as an important and cooperative entity that contained an easily accessible, captive audience. Through this audience, the FCDA and the Office of Civil Defense were able to implement large scale civil defense practices nationally.

Anthony Gutierrez

Faculty Mentor: Sean Morris

The One

Creating myths and worlds has been a long passion of mine ever since I could write or draw. I decided to create a creation myth that explains how everything came into being utilizing my short fiction skills. In an abstract but understandable way, this creation myth explains how the multiverse or 'creation' came into being and the many entities that reside in it. This creation myth was inspired by the creation myths seen in the Norse, Greek, Lovecraft, and Tolkien's Silmarillion mythologies. It's important because new creation myths that are utilized in stories not only remix and renew old mythologies but can also inspire others to create new worlds to add to the mythologies of the modern era for future generations.

Danielle Gutierrez

Faculty Mentor: Nora Obregon

A Review of Theory of Mind and its Impact on Communication in Children Ages 0-5 who are Diagnosed with Autism Spectrum Disorder (ASD)

Communication skills are significantly impaired in children with autism spectrum disorder (ASD). Those who are diagnosed with ASD tend to shy away from interaction and therefore miss out on critical cognitive and social exercises that could improve communication skills. According to Autism Speaks, 1 in 59 children is diagnosed with an ASD. In a world that relies heavily on communication, it is imperative that all children have the opportunity to develop language skills. The purpose of this literature review is to examine the impact of theory of mind (ToM) development on communication in children of ages 0-5. Specifically, this paper will (a) provide an extensive overview of ToM related to ASD accompanied by communication impairment, (b) examine how the development of ToM is influenced by social interaction, and (c) discuss the importance of developing adequate communication skills early on to promote long term success of children who are diagnosed with ASD. This review contributes towards the need for research on ToM development and communication in children who are diagnosed with a variation of ASD.

Christopher Harras

Faculty Mentor: Sara Angevine

Radicalization and Polarization in the U.S. Congress

There appears to be a growing trend in polarization in the American Political system. This will likely lead to an increase in radicalization of representatives. There has been some research into congressional radicalization, but it needs to be given a more recent evaluation. Will

representatives show a trend of increasing radicalization since the 1980's? My hypothesis is that the trend is not only present but has increased since it's last observation. I will test this hypothesis by monitoring the statements of 20 U.S. senators regarding legislature, 10 republicans and 10 democrats, with as much diversity in race and gender as possible. I will gauge the language that each senator utilizes over time and determine if their language has gotten more inflammatory over time by weighing their words on an ordinal scale ranking from 0 to 5, with 0 being least and 5 being most inflammatory. I will also utilize the dynamically weighted nominal three-step estimation (DW-NOMINATE) procedure to weigh the roll call voting trends of the selected representatives over time. I look to find an increase in inflammatory language in Senator testimonies regarding legislature and State of the Union responses, as well as an increase in polarization on the DW-NOMINATE scale. These finding will better allow us to see the trends and or attitudes of congressional representatives over time. The U.S. senate in particular has a huge impact on passing national policy. If congress is indeed becoming more radical, it will have a massive impact on how legislation and how they represent their voters in Washington.

Alyssa Hayne

Faculty Mentor: Nora Obregon

Anxiety and Depression: How Does It Affect Middle Childhood?

This literature review focuses on how anxiety and depression affect social, emotional, and cognitive development in middle childhood that can have lasting effects all the way into adulthood. Within social development, we will focus on family interactions, friendships, and peer rejections. Using Murray Bowen's family systems theory to find correlations with family interactions and social development. Within cognitive development how academics, memory, information processing, and problem solving are

affected by anxiety and depression. Emotional development can be affected by anxiety and depression, including emotional regulation and the child's expression. Associations have been shown when considering Erik Erikson's stages of psychosocial development. In middle childhood, roughly 2% of all children are diagnosed with clinical depression and 6.5% are diagnosed with an anxiety disorder. Reviewing the literature, one major trend is family dynamics, such as attachment and dysfunction are an important variable in both a child's social development and their emotional regulation that can lead to the child developing anxiety and depression in middle childhood. Another trend is that anxiety and depression affect cognitive error, memory, and judgement in middle childhood. My rationale for doing this paper is due to the prevalence of mental health in middle childhood. I wanted to research this so that teachers can better understand anxiety and depression overall and know the symptoms to look for in their students so their students can get any help or resources they need. This is an implication for further study.

Elizabeth Hernandez

Faculty Mentor: Peter Peterson

Monitoring of NO₂ using MAX-DOAS in Whittier California

Air pollution and its lasting effects on the Earth, such as its contribution to climate change and respiratory problems for humans with long-term exposure, have been a concern and have been monitored for many years. Monitoring air quality allows the government to create standards for the concentration of air pollution components and propose limits on anthropogenic sources for human safety. NO₂, a known compound contributing to air pollution, is emitted mainly by fossil fuel combustion and can be detrimental to human health if the concentration of NO₂ becomes too high. NO₂ levels also play a key role in formation of tropospheric ozone. Currently, there are no available data for atmospheric trace gases in the city

of Whittier, so obtaining these data can aid in studies of Los Angeles county's air pollution. Over the summer of 2019, I have measured NO₂ from the roof of Whittier College's science building using Multi-Axis Differential Optical Absorption Spectroscopy (MAX-DOAS). These data represent the first vertically resolved NO₂ measurements in Whittier. The comparison of these data along with Pico Rivera NO₂ data, available on the California Air Resources Board website, shows any general differences between the air quality of the nearby city as well as showing any major differences through the form of trends. It was found that, despite the close proximity of Pico Rivera to Whittier, there are significantly different trends in NO₂ content. The possible causes behind this dissimilarity will continue to be explored. Also, using temperature data in Whittier, a probable correlation between NO₂ and temperature is evaluated.

Manuel Herrera

Faculty Mentor: Cinzia Fissore

Co-authors: Jenna Rosales, Mary Wright, Jennifer Vanos, and Nathan Downs

Solar Protection and Thermal Comfort Provided by Trees of Various Water Use Levels in Tempe, AZ

The City of Tempe, Arizona, located in the heart of the Sonoran Desert, lacks high-quality shade from urban trees to protect residents from ultraviolet (UV) radiation. Tempe hopes to become a more active and mobile city by providing a more comfortable commuting experience through UV shielding from trees. The city has the ambitious plan of reaching 25% urban forest tree canopy cover by 2040, simultaneously increasing the protection of its urban-dwellers from UV radiation exposure. Yet the extent to which different tree species provide UV protection is not well known. Additionally, many native desert trees that have relatively lower water requirements also have sparse foliage which may decrease their UV protection potential. The overall

objective of this project was to calculate the UV protection factor (UPF) of various trees commonly planted in the Tempe urban area and to determine if there is a link between the amount of UV protection a tree offers and its water use. A 4k resolution GoPro camera was used to capture footage under the tree canopy of various species, then the footage was analyzed using MATLAB to quantify the amount of UV that penetrates through the canopy of the tree. UV data were compared to the tree's water usage based on the tree species it was taken from. The extent to which the UPF was related to water usage varied by tree species. Seventeen differing tree species' UV protection were found. The amount of UV protection they offered indicated significance dependent on the water use requirements of that species. With the data collected, we will be able to help the City of Tempe better assess which trees protect urban-dwellers from health concerns of thermal heat exhaustion and sunburns related to skin damage, while also making water-conscious decisions that promote both sun and heat protection while preserving water resources.

Dalton Hironaka

Faculty Mentor: Sylvia Vetrone

Assessing the Antiproliferative Potential of Vitexin on Two Non-tumor Forming Cancer Cell Lines

Chronic myeloid leukemia (CML) and T-cell acute lymphoblastic leukemia (T-ALL) are two subtypes of leukemia which are relatively common and have significant subsets of patients who are resistant or develop resistance to commonly used anticancer treatments. Patients who are not successfully treated during the slow-progressing, chronic stage of CML inevitably progress to a lethal acute phase, while in T-ALL treatments frequently become ineffective before the disease is fully cleared. As novel molecular treatments are difficult and costly to develop, there is a growing interest in

natural herbs for their use as an alternative route of treatment. Vitexin is a flavonoid that is found in many traditional Chinese medicines and has demonstrated anti-proliferative capacity across multiple types of tumor forming cancers. Therefore, in this study, we aim to evaluate the effectiveness of vitexin in two types of non-tumor-forming cancers, CML, and T-ALL, using K-562 and Jurkat E6.1 cell lines respectively. Briefly, we assessed the antiproliferative capacity of vitexin at multiple concentrations using a trypan blue exclusion assay. We then assessed its effect on expression of Bcl-2 and RIP3, an anti-apoptotic and pro-necrotic gene, respectively, using RT-PCR. Our results show that vitexin had no effect on the overall total number of cells, number of live cells, number of dead cells, or percent cell viability of K-562 and Jurkat cells compared to the control when treated for 24 or 48 hours, except in one instance where percent viability decreased in K-562 cells after treatment for 48 hours. There was also no difference in the expression of apoptotic or necrotic genes Bcl-2 and RIP3 after treatment for 24 hours. Taken together, our results suggest that vitexin does not seem to have any anti-proliferative properties against non-tumor forming cancers. Future studies may look at comparing vitexin alone to vitexin-containing compounds, as vitexin is normally found in traditional Chinese medicines, which are known to contain multiple active components. It would also be pertinent to perform more trials using vitexin, as our study only utilized three trials for both the trypan blue exclusion assay and RT-PCR.

Alec Holder

Faculty Mentor: Roger White

Macroeconomic Variables as Leading Indicators of Stock Market Movement in the US

This study investigates the long-term and short-term relationships between one US stock price index (Dow Jones Industrial Average) and five economic variables over the period 1960-2019. The monthly data of aggregate output (linearly interpolated), federal funds rates, consumer price index, producer price index, and unemployment rates are evaluated. The method used to find the correlation among the variables studied is multiple linear regression. Based on prior scholarly research, stock prices are expected to relate positively to aggregate output, inflation and the short-term interest rate and negatively to the long-term interest rate.

Jacob Householder

Co-author: Michael Gislason

Faculty Mentor: David Claveau

Human Rage Detection with an Interactive Robot

Human-robot interaction is an important area of research that makes it possible for humans and robots to work together. In this project, a small humanoid robot infers the emotional state of a human to guide its behavior in response to the human. The goal is for the robot to provide an appropriate reaction to a human who is speaking and gesturing in the usual manner, but may be expressing extreme joy or extreme anger. The robot makes use of vision, hearing, and artificial intelligence-based techniques to infer the human's emotional state and map this to the appropriate actions by the robot. The project involves the use of artificial neural networks, machine learning, and humanoid robotics.

Noah Humphrey

Faculty Mentor: Jason Carbine

Holistic Care: A Comparison / A Shamanistic Research Analysis

Research on holistic care demonstrates its contribution to patient well-being (Cohen, Boni 2018; Friese 2013; Bochanski 2014; Greer, Joseph 2016). Holistic care refers to a type of healthcare that focuses on the mind, body, and soul/spirit. In a more expanded sense, holistic health refers to the use of advancements within the medical field and spirituality to provide people with new talents and skills to benefit themselves and also impact the way science is done. Building from these areas of holistic care and holistic health, my research focuses on healthcare practitioners in the Los Angeles and Whittier area and their use of holistic care. My sample size is small but focused and diverse: a shaman, indigenous healer, chiropractor, nutritionist, and athletic trainer. My research found that the health practitioners had different views on holistic care and health yet some similarities, especially in terms of the common conception of compassion in aiding patient cure or health. As a case in point, for this presentation, I focus on the work of a shaman, who exemplifies what compassion means within the vast field of "medical" practice. I ultimately suggest that the shaman helps us rethink what it means to be holistically oriented.

Alexander Jelloian

Faculty Mentor: Roger White

The Fight for \$15: Is it Worth It?

We utilize a range of employment elasticities to analyze whether increases in the minimum wage will impact national employment, individual state employment, and a wide array of demographic groups including gender,

race, age, educational attainment, nativity, and disability. In order to find an accurate employment elasticity, we average the estimated employment elasticity of 20 different peer-reviewed studies using various models and methodology. The range of elasticities is determined by taking the mean value plus and minus one standard deviation. We find that increases in the minimum wage will most likely lead to negative employment effects. However, it is possible that the American labor market is currently acting as a monopsony which would indicate that increasing the minimum wage may lead to slight employment increases. Furthermore, we find that increasing the minimum wage will disproportionately impact African American workers, women, and foreign-born individuals. We conclude that it would be unwise for the federal government to implement an overarching policy to increase the minimum wage. Rather, individual states should consider the "cost of living" in their own states and decide what a reasonable minimum wage is for their constituents. Finally, a detailed breakdown of low wage workers is detailed in the Appendix.

Sam Johnson

Faculty Mentor: Sylvia Vetrone

The Effects of *Allium sativum* and *Cynara scolymus* extracts on Chronic Myeloid Leukemia and Acute T-Cell Leukemia Cell Proliferation and Death

Modern science has significantly changed the way that doctors and allied health professionals treat cancer patients over the last 50 years since the war on cancer was first started. Modern anti-cancer drugs such as chemotherapy, and other treatments, such as radiation and hormone therapy, have changed the prognosis of cancer for many individuals. Though effective, current treatments are often expensive, require hospitalization, and can often cause more harm to the body, than good. As a result, more natural approaches are currently being made in the treatment of cancer. Two specific types of

cancer, Chronic Myeloid Leukemia, and Acute T-cell Leukemia are both non-adherent cancers that have current treatments, however through mutations and biological disposition, many patients have to discontinue various treatments as they are no longer effective or comfortable for the patient. As such, artichoke and garlic extracts have shown anti-cancer properties through their reduction in cell proliferation and ultimately their stoppage of the cell cycle. While many studies have focused on adherent cancers, few have focused on non-adherent cancers. For this study, we hypothesized that the anti-proliferative and subsequently apoptotic factors present in the artichoke and garlic extracts would decrease the overall cell viability of both cell lines. The results of our study do not support previous research, as cell proliferation and cell viability were unaffected in both cell lines. Continued research would include an assessment of a new cell viability assay, as samples were affected by the nature of the colorimetric assay.

Daewon Kwon

Co-author: Charles T. Hill

Faculty Mentor: Chuck Hill

Correlates of Racial Ethnic Prejudice Among College Students

Correlates of perceived racial-ethnic prejudice were explored using data from a Multiple Identities Questionnaire at an ethnically diverse small liberal arts college in a suburb of Los Angeles. The questionnaire was completed for extra credit by students in Introductory Psychology. Data for these analyses were available from 2078 women and 1240 men. Students were asked, "To what extent have you felt that others have been prejudiced (had a negative attitude) against you because of your nationality, race, or ethnicity?" Responses were on a scale from 0=NOT AT ALL to 8=COMPLETELY. The mean response was 3.17 for the women and 3.18

for the men. Both men and women reported greater perceived prejudice if their grandparents were not born in the U.S, and if English was less likely to be used by their parents when they were growing up. They were also more likely to say that they experienced prejudice because of their social class background, religious background, political views, and gender. They reported that ethnicity had become more important for their self-concept since childhood. In general, ethnicity is less relevant until one encounters others who are different, especially if one experiences prejudice. They felt that they are more in competition with others of their gender, and they are more anxious about forming relationships with others. And they reported being more anxious in general, and less happy. If they could change who they were, they would be more likely to want to change their national, racial, or ethnic background, as well as their social class background. On the other hand, some were more likely to have developed pride in their ethnicity as a way of coping with prejudice.

Sydney Lawler

Faculty Mentor: Rebecca Overmyer-Velázquez

Courageous Conversations About Race and Practices that Disrupt the Achievement Gap

The achievement gap of Black and Hispanic/Latinx students to their White counterparts has been prevalent in the United States dating to the development of education. Educational reform has addressed the issues of the achievement gap countless times throughout history. Recent examples include the No Child Left Behind Act (2002) and the Every Child Succeeds Act (2016). Still, today in the twenty-first century, there are discrepancies between White, Black, and Latinx student achievement. My research question asks what, despite federal policies that have been enacted, are local school districts doing to improve the achievement of Black and

Hispanic/Latinx students, and what practices are being implemented? In addition, I am asking what conversations surrounding race have local school districts had to address the achievement gap, and whether the leadership believes equitable opportunities of achievement began at combating racial inequalities. The literature does not include how discussing racial issues in educational settings is one mechanism to close the achievement gap. I examine a Southern California public school district to understand how well their policies and practices are targeting and working to close the gap within their schools. The district being examined is majority-led by teachers, staff, administrators, and district office officials who are of White descent with a diverse student population. By utilizing mixed methods, I have conducted interviews with seven members of leadership. Preliminary findings suggest that the administrators believe programs such as priority after school tutoring, 1-to-1 iPad accessibility, intervention classroom and teacher positions, AVID, and the implementation of the CSDSS have all been used to target the achievement gap that is prevalent in their district. However, a majority of participants believe that the district is not doing well enough in terms of discussing racial inequalities and how they impact minority student achievement. Quantitative preliminary findings suggest that during the school year 2018-2019 there is a clear achievement gap compared with Black, Hispanic/Latinx, and White students. 27.27% of Black or African American students met standards, while 29.22% did not meet standards and 30.52% nearly met standards. As for Black or African American achievement in mathematics, 16.34% met standards, while 44.44% did not meet standards, and 30.07 nearly met standards.

Rachel Lazerson

Faculty Mentor: Christina Bauer

Co-authors: Felicia Delgado, Omaia Olivas, Alyjah Perez, Yuliana Chavez, and Helen Mendez

Chemistry and Color: Using the Principles of Spectroscopy to Investigate Solutions of Unknowns

There is a lot more to color than what meets the eye, both figuratively and literally. How do scientists know so much about the atoms and molecules we study if we can't observe them? Well, in a way, we simply look at them, but not always directly. Our eyes don't tell us everything, so we use instrumentation to separate the information for us to graphically 'see' the details of the colors that our eyes cannot perceive. Our group utilized self-discovery to identify the parameters that control observed colors. Afterward, we applied spectrophotometry techniques to observe and study the interaction of incident light with our samples to extract information about our unknowns, both in terms of quantity and quality. The light can be absorbed, scattered, or can be converted into different colors via emission (such as fluorescence). This depends on the identity of the individual components from which our unknowns are composed. Each student examined an unknown sample of their choice with a specific question in mind. These included: 1) What is the composition of molecules in marker ink, 2) What are the formulations that control colors in make-up, 3) What causes the change in color and transparency that occurs upon adding milk to coffee, and 4) What makes Gatorade so bright? For each sample, we looked at all modes of the interaction of light with our samples.

We quantified the components, extracted and separated individual components by chromatography, and observed fluorescence and scattering. Further, we utilized different solvents and concentrations to understand how the local environments affect the observed colors. For makeup samples,

the applied color does not always correlate to the color "in the bottle". The formulations are very particular and can be used to control the environment and the colored molecules. Marker ink often involves more than one color, which comes together to yield a much different color than observed in a dilute solution. Coffee and creamer combinations are a complex mixture of molecules that separate into individual components that scatter light. We separated the two parts by centrifugation to observe the components. Gatorade dyes were separated and re-dissolved in the new environment. We discovered that the electrolytes significantly change the environment around the molecules and alters the color.

Lindley Lee-Niegas

Faculty Mentor: Roger White

Foreign Degrees and Educational Mismatches

Education is considered a fundamental ingredient in the pursuit of a professional career. Yet the foreign degrees and professional skills of immigrants are frequently devalued by domestic employers, who tend to favor native-born applicants. Furthermore, immigrants with educational degrees and higher levels of education have often experienced educational mismatches: a phenomenon in which these individuals are often overqualified for their current job(s) in their host country. In other instances, the jobs that immigrants work have no relation to their educational degree. The low returns on educational investments for these individuals contrasts sharply with the long-held belief that educational investments increase earnings and the likelihood of employment in one's field of expertise. However, it is critical to also recognize that this devaluation of foreign education does not occur among all immigrants. This paper explores how the origin country of an immigrant's degree affects their earnings and chances of an educational-occupational mismatch in their host country,

especially in comparison to other immigrants and native-born individuals with degrees from the host country (the US, in this study). I also explore which countries have higher and lower likelihoods of having their degrees devalued, and the demographics specifically focusing on the ethnicity, English-language skills, and gender-of immigrants who gain the most from their investments in education from their home country. Data used for this study are from the 2018 American Community Survey.

Daisy Lopez

Faculty Mentor: Marie-Magdeleine Chirol Hill

Épreuves et Survie (Hardships and Survival): La Pirogue (2012) de Moussa Touré

In *La Pirogue* by Senegalese filmmaker Moussa Touré, a group of African men and one woman decide to leave Senegal for Spain, believing that employment and other opportunities are waiting for them across the Atlantic. However, they face physical and psychological perils along the way. The purpose of this paper is to illustrate the underlying psychological struggles endured by those who leave their home country in search for better lives. In my study, I will first analyze Touré's presentation of Senegal's beautiful culture through dance, ritual, wrestling, while simultaneously presenting its poor economic state. I will then analyze the way Europe, Spain in particular, is presented as a haven full of prosperity for these men. Lastly, I will study the physical and psychological hardships that these men experience through their journey across the Atlantic; first, looking at their struggle for survival, then the role of solidarity, and finally, the effects of isolation. This paper will be presented in French.

Piper Lowinger

Faculty Mentor: Michael McBride

Implementing the Global Compact on Refugees in Tanzania and France

As of June 2019, there is an unprecedented forcibly displaced population of 70.8 million people worldwide. The Office of the United Nations High Commissioner for Refugees (UNHCR) defines a refugee as someone who "is unable or unwilling to return to their country of origin owing to a well-founded fear of being persecuted for reasons of race, religion, nationality, membership of a particular social group, or political opinion." This paper offers a deeper understanding of the linkages between the current humanitarian assistance environments in Tanzania and France, two countries that represent both ends of the economically developed spectrum, and how their efforts to solve their refugee crises align with the non-binding Global Compact on Refugees (GCR). Adopted by the United Nations General Assembly in December of 2018, the GCR is structured around a proposed shared responsibility. It is designed to: "(i) ease pressures on host countries; (ii) enhance refugee self-reliance; (iii) expand access to third-country solutions; and (iv) support conditions in countries of origin for return in safety and dignity." Country-specific data regarding the current refugee situations in both locations were collected through explanatory and historical research methods, including literary research and interviews with Tanzanian and French professionals in the community development and humanitarian assistance sectors. I hypothesize that my findings suggest that a country's degree of economic development will largely bias its ability to adhere to the GCR in successfully addressing and alleviating consumptive refugee situations. Though this may be valid in some contexts, what I found was more compelling for Tanzania and France to follow the guidelines and goodwill principles of the GCR, however, is the country's perspective regarding humanity and attitude toward refugee immigration. This paper encourages readers-professionals, intellectuals, and students alike to think

critically about the ethical importance of addressing refugee situations and what criteria are necessary to ensure the sustainability of efficient refugee initiatives in various states of economic development. The global refugee crisis calls upon the international community to address the root causes of displacement, promote resilience and preparedness, and implement sustainable solutions.

Farrah Luu

Faculty Mentor: Roger White

U.S. Opioid Epidemic: Links Between the Labor Market and the Opioid Prescription Rate, 2015-2017

In 2016, the US Health and Human Services reported that opioid overdoses that resulted in death were at an all-time high. With the opioid epidemic getting worse, there is an expectation for it to affect US labor productivity. Once individuals become addicted to opioids and begin to abuse the substance, they become less productive members of society. This does not necessarily affect the unemployment rate directly, so the corresponding labor market effects are difficult to detect, especially when the current administration and media uses the record low unemployment rates to boast of a healthy US economy and labor market. Instead, the opioid epidemic may be one of the leading causes in which the US labor force participation rate has remained at a near 62.9 percent since 1977. To determine the extent to which the opioid epidemic is affecting the US labor market, we examine the negative relationship between the change in the labor force participation rate and the opioid prescription rate. Additionally, we examine how labor productivity is impacted by the opioid epidemic.

Bryan Martinez

Faculty Mentor: Roger White

Terrorism: Creating a Scared Economy

This paper studies the effects that terrorism has on an economy. By using data from 1990-2017, an analysis is conducted on the region of the Middle East and Northern Africa. The purpose is to find whether or not terrorist organizations and their activities are indirectly attacking the economy of a nation. After analyzing the data by using an economic model, it is found that terrorism has a negative effect on a nation's macroeconomic performance. It is also found that this effect that greatly increased in recent years with the drastic increase in terrorist activity.

Lauren Mercado

Faculty Mentor: Sara Angevine

Black Voter Enthusiasm and the Impact on American Elections

In American political research, studies show the importance of African American voters in our general and primary elections. Within the last few years, the impact of Black America's role in elections has become a topic of many political scientist's research. Following Barack Obama's victory in the 2008 election, there appears to be a link between Black voter enthusiasm and the presidency (Kilson 2011, Philpot, Shaw, McGowen 2009). Thus, one may expect that a candidate must be favorable to the African American community to increase their chances of being successful in elections. However, scholars have not yet examined the impact of these voters spanning over multiple election years. In what ways did black voters' enthusiasm affect the outcomes of the 2000, 2008, and 2016 elections? I hypothesize that as Black voters favor a candidate more, their participation will increase, thus directly impacting the outcome of the election. This leads

to what I call the Black Voter Enthusiasm Theory. To test this theory, I compare Black voter participation and feelings towards candidates in the 2000, 2008, and 2016 primary and general elections. Using American National Election Studies (ANES) Time Series Studies, I compare Black voters against White and Hispanic voters and test for feelings of trust and love amongst them and candidates in the recent elections. I compare Black voter turnout in these elections to see if there is an increase in turnout when enthusiasm for a candidate is higher. I expect to find that Black voters will have the most impact in the 2008 general election due to the high amount of support for the first African American candidate. I will compare that data with data from 2000 and 2016 to analyze the importance of Black descriptive representation and voter turnout. These findings will help us better understand the impact of descriptive representation among African Americans as well as the impact these individuals have on the American Electorate. Historically, Black Americans have been one of the most marginalized and unrepresented groups in America. We need to understand the crucial role they play in American politics and elections to allow for a more democratic country. By better understanding these voting patterns, we can gain insight into campaigns and the importance of candidates appealing to Black voters across the nation.

Emily Montgomery

Faculty Mentor: Alvin Alejandrino

Comparative Analysis on the Effects of Human Interference on Biodiversity Between Tidepools at Cabrillo Beach and Abalone Cove Shoreline Park

Tidepools are of the most biologically important marine ecosystems. Each pool sits within a different rock formation, and therefore each has a different surface area, height, and depth. These dimensions provide distinctive ecosystems for a number of aquatic organisms, mostly algae and gastropods.

Because they house a wide selection of sea creatures, they are a popular destination for many human sightseers. Detrimental effects can occur in these fragile tidepool ecosystems because of a number of human behaviors: touching the organisms within the tidepools; stepping into the tidepools; and disrupting the water flow into the tidepools. The purpose of this project is to study the effect of human activity on tidepool biodiversity. The two tidepool locations in question are Cabrillo Beach in San Pedro, CA, and Abalone Cove Shoreline Park in Rancho Palos Verdes, CA. Cabrillo Beach is more accessible to humans than Abalone Cove and is therefore hypothesized to show lower biodiversity than Abalone Cove. The expected outcome would be that Cabrillo Beach tidepools will show lower levels of biodiversity than the Abalone Cove tide pools due to the difference in human activity levels. To effectively perform this study, a 60 cm x 60 cm quadrat was used to sample organisms in the tidepools. All samples were taken when tides were lower, and organisms were counted using the visual quantitative method. Once data was collected, a t-test was used to determine if there was a significant difference between the levels of species diversity between Cabrillo Beach and Abalone Cove. The mean number of species at Cabrillo Beach was lower than the mean number of species at Abalone Cove, and the t-test concluded that this difference was significantly different. These findings provide evidence that use of natural ecosystems as a ground for recreational activities by humans leads to negative effects for the organisms living in and near the ecosystem. This study, and studies similar to it, can be used to guide the implementation of new regulations on the use of natural spaces by humans.

Joshua Morales

Co-authors: Kai Zinn and Shuwa Xu

Faculty Mentor: Kai Zinn

Analyzing the Significance of DIP α and Dpr 10 at Wiring the Nervous System

In developmental neurobiology, neurons must make correct synaptic connections with other neurons for the nervous system to develop properly. Many studies have shown that cell surface proteins are responsible for guiding neurons to their correct synaptic formation. The Zinn Lab at Caltech has previously identified two classes of interacting cell surface proteins, known as the defective proboscis extension response proteins (Dprs) and Dpr-interacting proteins (DIPs), that function in neuronal targeting and synaptic specificity in the visual system of the central nervous system (CNS) and neuromuscular system of *Drosophila melanogaster*. Here, we examine the roles of DIP/Dpr protein interactions in neuronal development. This is done by modifying the genome sequence of *D. melanogaster* using CRISPR/Cas9 technology which weakened the binding affinity DIP alpha. Through various screening tests by gel electrophoresis and sequencing, we can ensure that the guide RNA, its donor plasmid, and the RMCE donor plasmid were correctly made for the CRISPR/Cas 9 edits. Embryo fluorescence staining was also utilized to visualize where Dpr proteins were being expressed. Thus far, we have selected the EGFP UAS line because it gave the strongest visual signal. Future work includes conducting crosses with this UAS line along with other Dpr lines to see where these Dprs are being expressed. Overall, this work leads to a better understanding of neuronal synaptic specificity.

Karen Neilson

Faculty Mentor: Nora Obregon

Parental Influence on Children's Vocabulary and Syntax: A Review of the Literature

The purpose of this literature review is to examine how the language development of children less than five years of age are affected by verbal and non-verbal communication with their parents. Specifically, this paper reviews the literature on parents' influences on a child's (a) vocabulary development and (b) syntax development. Research has found that how parents' input in communication with their children can influence the children's language, as in syntax and vocabulary, to develop in terms of diversity, pace, and understanding. Parents' verbal and non-verbal communication with their children offers their children opportunities to develop language skills. These opportunities are viewed in earlier stages of language development. More specifically within language development, parents help children develop vocabulary and syntax. As children engage in verbal and non-verbal communication with their parents, these areas of language development are influenced based on the kind of communication; thus, parent input is critical towards their children's development. Through Vygotsky's theory of the zone of proximal development, parents aid in their children's scaffolding in language development. In terms of vocabulary, it has been found that children gain a more productive vocabulary when they are offered multiple labels for objects and that parents' diverse vocabulary correlates to children's diverse vocabulary. In addition, children's vocabulary is influenced by verbal and non-verbal communication, with non-verbal being a crucial part. When syntax is considered, the grammatical input parents put into their speech reflects the syntax and grammar that the children develop. How parents speak to their children will influence how quickly or wide their children's language skills will grow.

Allie Novak

Faculty Mentor: Anne Sebanc

Learning Styles and their Effects on Academic Achievement in Elementary Students

This literature review examines how students' learning style influences their academic achievement in school. I discuss how learning styles, learning preferences, and students' motivation and attitudes affect how they will perform in their academics. Theories such as Dunn vs. Dunn learning model and Kolb Learning Style Inventory can demonstrate how learning styles are important to a student's academic achievement and allows for students to become aware of their own learning, which is a highly relevant topic in the field of child development. These studies were developed in the 21st century, including several relying on technology that can be used in the classroom to benefit students' learning process, as well as transferring their learning styles to determine what they can achieve in school. The age range analyzed in these studies include elementary grades from second to fifth to show growth from early childhood into adolescence, and how this too can affect the academics based on student's age. The studies focused on how elementary students learn individually and specific subjects and aspects of the classroom can help or hurt their academic progress as they enter adolescence. A main finding discovered in these studies are how every student's learning style is distinct and affects their academic achievement in numerous ways, such as developing various types of knowledge like social and personal knowledge which can be used in the classroom and student's experiences in real life. A lasting main finding that these research articles make is that learning theories such as the Dunn vs. Dunn learning model as well as Kolb's Learning Style Inventory can be used to measure student's learning styles as well as their learning preferences, motivations, and attitudes towards learning.

Martin Olmos

Faculty Mentor: Sylvia Vetrone

Investigating the Effect of Cannabidiol (CBD) on Cancer Cells

Cannabis, although commonly associated with its use as a psychoactive drug, also has been shown to alleviate pain and disease symptoms. In particular, Cannabidiol (CBD), a constituent of Cannabis, has demonstrated numerous benefits such as acting as an anti-inflammatory, anticonvulsant, and antioxidant. Studies exploring the benefits of CBD on cancer have shown its ability to trigger the induction of ER stress and inhibition of AKT and mTOR signaling in breast cancer cells and the upregulation of Beclin 1 triggering apoptosis in melanoma. Taken together these studies suggest that CBD's cytotoxic and anti-proliferative properties may be suitable as a treatment for cancer, and our previous studies demonstrated that CBD exposure as low as 5 ug was effective in statistically decreasing viability in four cancer cell lines, two tumor-forming cell lines (LNCaP prostate cancer and MCF-7 breast cancer), and two non-tumor forming cancers (Jurkat T-cell leukemia and CML myeloma). Therefore, this current study aimed to explore if lower exposures of CBD could also induce death, and also sought to determine the cellular pathway through which the cells were dying. Using viability and biochemical reporter assays, our findings show the CBD was successful in statistically reducing viability at even low concentrations (1 ug, 2 ug, 4 ug, and 6ug) when exposed to CBD for as little as 24 hours. Using a real-time apoptosis/necrosis assay, we also found that 5 ug of CBD exposure induced apoptosis in the MCF-7 cells, but mainly necrosis in the others, LNCaP, Jurkat, and CML cells. The results of these assays were also supported through RT-PCR analysis demonstrating an increase in gene expression of BAX, BCL-2, and BNIP3 and RIP3 respectively. Taken together, these findings lend to the increasing evidence of CBD as a potentially viable, alternative, and less harmful treatment option against both adherent and non-adherent cancers.

Gabriel Perez

Faculty Mentor: Michelle Chihara

Blood-Red Picket Fence: Class Conflict and the Violence of Bourgeois Aesthetics in Saunders' *Semplica Girls*

Having swallowed every indigenous society within its reach and effectively achieving global hegemony, postcolonial capitalism has all but succeeded in commodifying life and reducing consciousness to an alienated gutter brimming with anxiety and starved ambition. This paper applies Pierre Bourdieu's theory of habitus and Lauren Berlant's theory of cruel optimism to explore the ways in which George Saunders' "The Semplica-Girl Diaries" lays bare neoliberalism's colonization of discourse and the structural violence at the heart of American empire. The terse, colloquial language and broken syntax employed in the narrator's first-person journal entries is characteristic of a neoliberal zeitgeist which (a) emphasizes radical self-optimization at the expense of health and human connection, and (b) derives meaning along lines defined by market-based competition and social Darwinism. Beyond this, as living, breathing commodities, Saunders' *Semplica Girls* poignantly incarnate the West's exploitation of the Global South and commodification of indigenous female bodies-on which American comfort and luxury so heavily depends. The tragic irony embodied by the narrator's crisis of dignity and agency is his simultaneous failure (or refusal) to recognize the SGs as anything more than flesh-and-blood lawn decorations. Further, the narrator's detachment from and dehumanization of the SGs reveals the ways and extent to which the narratives we internalize allow us to rationalize the absurd and normalize the inhumane. This speaks to the violent potential of discourse as a vehicle through which the contradictions and class antagonisms inherent in postcolonial capitalism are reconciled, reified, and reproduced. Ultimately, Saunders' *Semplica Girls* remind us of our own culpability and relationship

to violence-violence we inflict on ourselves and on others in the destructive pursuit of an American pipe dream.

Gabriel Perez

Faculty Mentor: Deborah Norden

Citizen Consumed: The Neoliberal Attrition of Agency in the United States

The third wave of democratization in modern history culminated in the collapse of the Soviet Union and consequent end of the Cold War in 1991, signaling to many observers the definitive failure of the communist project and a high point in capitalism's pursuit of geopolitical hegemony. As one New York Times contributor put it, "America's victory in the Cold War was a victory for a set of political and economic principles: democracy and the free market." These principles are "the waves of the future-a future for which America is both the gatekeeper and the model" (Friedman 1991). As the second decade of the twenty-first century comes to a close, Friedman's political forecast almost holds true-barring one notable departure: the absolute supremacy of the market and the subordination of democracy to the will of capital. In reality, the democratic linchpins of autonomy, equality, and solidarity seem to have taken a back seat to the market principles of efficiency, productivity, and competition. Engaged citizens have been reduced to atomized consumers, and liberty confined to the exploitative realm of private enterprise. Neoliberalism-the root and manifestation of these developments-dominates not only political policies and institutions, but social and cultural domains as well. Its pervasive influence has systematically consolidated the tyranny of capital and directly given rise to a crisis of human dignity, self-determination, radical imagination, and collective purpose. This paper interrogates the relationship between neoliberalism's ascendance and human agency as it exists in the United States. What better case to determine the quality of democracy than the

"gatekeeper and model" of its glorious capitalist future? Presupposed by the central questions raised hereafter is the premise that human agency functions as an essential component of democracy. As such, this research uses degrees of structural inequality as well as the nature and intensity of civic engagement as a metric for agency. Our analysis suggests that neoliberalism's seizure of political and discursive processes, along with its violent reinvention of the individual and the social structures in which they operate, have suffocated the exercise of agency among the U.S. population. In so doing, neoliberalism has ushered U.S. democracy into a deeply precarious stage in its evolution.

Marianella Perez

Mentor: Deanna Merino-Contino

Undocumented Student Financial Resources, 2020

My objective is to bring light to the lack of financial resources for first-generation and undocumented students and how they are deeply affected by the opacity of this topic. During the summer of 2019, I visited all private colleges in California to speak with their financial aid offices, giving them hypothetical scenarios and ask how their office would handle those situations. The hypothetical scenarios I collected from undocumented student stories I could find online and used their experiences to ensure I had the most thorough responses from the financial aid offices. At these private colleges, I would also speak to cultural centers to see what sorts of resources and support they provide to the undocumented community. I also talked with different lawyers that offered more background on new laws and policies in California that affect undocumented students' educations. I argue that numerous factors are presented as obvious in colleges. Some examples that are assumed from undocumented students is that they can all apply for loans, that their parents have good credit scores, that their parents can just

pay off whatever debts are left, that any language barriers are minimal, and that schools are unaware of undocumented students' rights, just to name a few. These lawyers also informed me on undocumented students' rights and their experiences dealing with different cases. This information would allow me to not only become more knowledgeable on the topic but also to gain a legal perspective. I combined the collected data with online statistics to illustrate several relationships, including how many undocumented students drop out of private colleges due to lack of financial resources in comparison to public and community colleges. Again my focus is on California because it is one of the states with the highest percentage of undocumented students.

Misty Perez

Faculty Mentor: Lori Wallrath

Co-authors: Margaret R. Ketterer and Lori L. Wallrath

Pharmacological Treatments of a Fruit Fly Model of Muscular Dystrophy

Emery-Dreifuss muscular dystrophy (EDMD) is a rare type of muscular dystrophy caused by mutations in the human LMNA gene. The LMNA gene encodes lamins, filamentous proteins that line the inside of the nuclear envelope. To understand the molecular basis of the disease, fruit fly models were made. These models have mutations in the fruit fly Lamin C gene that corresponds to disease-causing mutations in the human LMNA gene. The fruit flies develop muscular dystrophy and have reduced motility and viability. Prior studies showed that the fruit fly muscles expressing mutant Lamin C had destabilized microtubules and altered redox status. This project determines if paclitaxel, a drug that stabilizes microtubules, and pamoic acid, a compound that inhibits the malic enzyme that is predicted to promote redox homeostasis, suppress the muscle defects. Neither drug treatment increased larval motility relative to wildtype; however, pamoic

acid was trending towards significance. Paclitaxel treatment was detrimental to adult viability for flies expressing wild-type Lamin C. Pamoic acid, which reduces NADPH production, suppressed the lethality caused by mutant Lamin C. Therefore, pamoic acid is a potential therapeutic agent for EDMD. The knowledge of effective pharmacological treatments could potentially provide new avenues for therapy.

Monique Perez

Faculty Mentor: Devin Imoto

Co-authors: Emily B. Lewis, Jonathan Wenzel, Michelle Ammerman, Cheryl Samaniego, and Lihua Wang

Analysis of Beetroot Leaf and Stalk (*Beta vulgaris*) Extracts for Medicinal Properties

Beetroot leaf and stalk (*Beta vulgaris*) are a common waste product, as beetroots are traditionally consumed around the world. Despite this, these common waste products may have high medicinal properties. To determine the medicinal properties of beetroot leaf and stalk extracts prepared using supercritical carbon dioxide and ethanol at temperatures between 45 °C and 80 °C, we utilized High Performance Liquid Chromatography - Mass Spectroscopy (HPLC-MS), Total Phenolic Content (TPC) Assays, and Disk Diffusion Assays. TPC analysis, used to characterize antioxidant content, showed no consequential differences when the temperature was varied and no dramatic effect on antioxidant content upon filtering of the extracts. Furthermore, HPLC-MS analysis tentatively confirmed that two flavonoids vitexin-2''-o-rhamnoside and vitexin-2''-o-xyloside were present in the extracts. Lastly, antimicrobial activity was detected against the bacteria *Bacillus cereus*, as evidenced through the Disk Diffusion Assay. Utilizing these results, we can support the hypothesis that supercritical CO₂ and

ethanol can be used to extract medicinal compounds from beetroot leaves and stalks.

Kiara Pojoy

Faculty Mentor: Roger White

Do Higher Tax Rates Decrease Tax Revenue?

Taxation is a mandatory collection by the government to fund public expenditures. At any given level of economic activity, how much is collected depends on the level of the tax rate, and this affects our lives. The Laffer Curve shows a hypothetical relationship between tax rates and tax revenue, with an optimal tax rate being that which maximizes tax revenue. The curve suggests that as tax rates rise tax revenue increases; however, revenue will increase only until a peak is reached. Above a certain tax rate, it becomes counter-productive to further increase tax rates. This is because higher tax rates decrease the incentive to work since less money will be in the hand of workers. To examine the relationship between tax rates and tax revenue, I perform a non-linear regression analysis using annual data that span the period from 1960 through 2018 from the World Bank's World Development Indicators. Additionally, to consider variation in the Laffer Curve across levels of economic development, a series of models are estimated with countries categorized as low, middle, or high income. The examination provides empirical evidence that helps to explain the relationship between tax rates and tax revenue.

Morgan Post

Faculty Mentor: Roger White

Wage Discrimination in the Workforce: An Examination of Same-Sex Couples

Since gay marriage has recently become legal in the United States, it is now possible to collect data on same-sex married couples. This paper analyzes whether members of same-sex married couples experience wage discrimination compared to members of straight married couples. After answering this question, the paper then addresses the questions of whether other characteristics known to cause discrimination will increase the effect of discrimination on individuals as well as whether discrimination is the same across all states or varies with differences in public opinion in each state. To accomplish this, a variant on the Mincer earnings equation will be estimated to identify potential wage discrimination experienced by members of same-sex married couples. The data are from the 2018 American Community Survey.

Christina Prestella

Faculty Mentor: Roger White

Analysis of Post-Communist-Transitional Economies and the Effects on Human Development

We employ plot point analysis to examine the relative contributions to economic transitions and the effects on human development. Each component of macro-economic transitions is examined as well as the examination of the Human Development index. Identification of the determinants of gross domestic product, industrial production, aggregate labor productivity, manufacturing labor productivity, aggregate employment, manufacturing employment, registered unemployment exit

rates from unemployment, investment and perceptions of the current situation are then plotted to identify the factors that most influence HDI values. Thus, our results identify the factors that underlie economic and social development as measured by the HDI and provide valuable insights on which factors should be most intensively addressed by policy makers to effectively improve the economy of countries post transitions. The analysis performed using data sourced from the United Nations, World Bank and the OECD. In total, our data represents 5 post-communist countries from 1990 through present day.

Tyler Putnam

Faculty Mentor: David Mbora

Comparison of Arthropod Richness between Native and Non-native Plants in a California Urban Space

Natural habitats and their underlying ecological conditions play a large part in the distribution and abundance of organisms that are found therein. This study was conducted to better understand how arthropod and insect population family richness differs between native and non-native plants in an urban setting. The study was conducted on the Whittier College campus, located in an urban area with varying vegetation types. I expected that native plants would support a significantly higher arthropod richness than non-native plants, given that previous studies have demonstrated similar results across geographical areas. Specifically, 20 pitfall traps distributed between 4 different plots, representing 2 native concentrations and 2 non-native concentrations of plants, were placed throughout the campus green space. After five days, the traps were collected, cleaned, and the specimens caught inside were analyzed under a microscope and compared against a hand guide and online databases to determine their classification down to the family level. Finally, a simple t-test was conducted to determine the

difference in richness between the two population groups. My results showed that there was no significant difference in arthropod family richness between native and non-native plants, causing me to reject the hypothesis I set forth at the onset of the study. Further and more focused research, such as investigating the effects of specific species of host plants and the relative ecological benefits of the arthropods they support, could provide more information to urban planners, gardeners, and other conservationists on the most beneficial flora that could be planted in urban areas to support specific populations of insects and arthropods.

Zayne Repp

Faculty Mentor: Roger White

Who's Watching the Kids? Examining Early Childcare and Employment Decisions

We consider the different types of early childcare and their correlation with the labor force status of parents in several different household compositions. Using the ordered logit regression technique, we examine the effect that utilizing a specific type of care will have on the likelihood that a parent will have a certain labor force status. We find that the utilization of any type of childcare in a single-parent household increases the likelihood that the parent will fall in a higher-ordered labor force category-i.e., more likely to be employed full-time. This effect is strongest with the use of nonrelative care and weakest with the use of center-based care. Considering two-parent households, we find the effect of utilizing childcare yields results that are consistent with the single parent equation-the use of care correlates with a higher likelihood of being more employed, but with an even higher magnitude. Further, we confirm prior findings that if the parent does not identify as male, they are more likely to be out of the labor force.

Raquel Rivera

Faculty Mentor: Chuck Hill

Co-author: Chuck Hill

Correlates of Discussing Sex with Parents among College Students

Correlates of discussing sex with parents were explored using data from a Multiple Identities Questionnaire at an ethnically diverse small liberal arts college in a suburb of Los Angeles. The questionnaire was completed for extra credit by students in Introductory Psychology. Data for these analyses were available from 1,969 women and 1,138 men over eighteen years. Being comfortable discussing sex with father and with mother was measured using responses ranging from 0=NOT AT ALL to 8=COMPLETELY. Both sons and daughters are more likely to discuss sex with both parents if the parents' parenting styles are warm, accepting, or are seen as role models. Both sons and daughters are less likely to discuss sex with mothers who are controlling or rejecting. If sons are not a part of a religious group, sons are less likely to discuss sex with their mother and father. If daughters are not a part of a religious group, daughters are less likely to discuss sex with their mothers. It is also shown that sons and daughters are more likely to discuss sex with their mothers if they pray. Asian sons are less likely to discuss sex with both parents while Asian daughters are less likely to discuss sex with their mother. In Asian culture, having premarital sex reflects poorly on parenting (Algae and Chen, 2019). In addition, the positive correlation between white daughters and fathers indicates that non-White daughters are less likely to discuss sex with fathers. Both sons and daughters who rate themselves as independent, assertive, competitive, or masculine are more likely to discuss sex with their mothers. Sons and daughters who consider themselves as outgoing, at ease around others, a leader, popular, or secure are more likely to discuss sex with both parents. Sons who are shy, lonely, insecure, or pessimistic are less likely to discuss sex with both parents while daughters with those traits are less likely to discuss sex with their mothers. In

conclusion, sons are more likely to discuss sex with both parents if the parenting style is positive, if they are close to their father, if they rate themselves with positive traits, or rate themselves traditional or romantic. Daughters are more likely to discuss sex with their mothers if their parenting style is positive, if the daughter prays, or if they rate themselves with positive traits.

Cynthia Rodela

Faculty Mentor: Chuck Hill

Correlates of Feeling Competition Among Men and Women in College

Correlates of feeling competition, with same-gender and opposite-gender others, were explored using data from a Multiple Identities Questionnaire at an ethnically diverse small liberal arts college in a suburb of Los Angeles. The questionnaire was completed for extra-credit by students in Introductory Psychology. Data for these analyses were available from 1835 women and 838 men over eighteen years. Competition for sex and for leadership roles were measured using responses ranging from 0=NOT AT ALL to 8=COMPLETELY. Same-gender competition for sex and both same-gender and opposite-gender competition for leadership roles were explored. Of greatest interest were correlations relating to parenting style, self-perceived traits, body satisfaction, and well-being. For example, both males and females who felt competition for sex, tended to have parents who were hostile and rejecting, felt lonely and insecure, and were more distrusting of others. The females who felt competition for sex had less satisfaction with their body, in particular, their weight and how sexy their body was. This was not true for the males. Females who felt more competition for sex tended to have lower self-esteem and be more depressed, while males who felt more competition for sex had more anxiety. Both males and females who felt same-gender and opposite-gender competition for leadership roles, tended

to have parents who were controlling, considered themselves a leader, but felt insecure. Females who felt both same-gender and opposite-gender competition for leadership roles had less satisfaction with their body, in particular their weight and how sexy their body was. This was not true for the men. The only statistically significant correlation between competition for leadership roles and well-being, was that females who felt in competition with other females for leadership had more anxiety. In general, there were more statistically significant correlations for females than for males.

Ambaar Romero

Faculty Mentor: Sara Angevine

Latino Underrepresentation

With media influencing how we see Hispanics and African Americans, it is hard for racial minorities to believe in politics and if it will ever represent them. Williams (1998) believed in using three themes; voice, trust, and memory in order for marginalized groups to feel represented and trust legislators to do their jobs. Due to the lack of representation of Latino/as in Congress, will their addition cement the transformative link between descriptive and substantive representation? Will this enhance Latino/as feelings of inclusion within the realm of American politics? To address these questions, I examine the 2016 ANES data set and look at different issues that can resonate with Latinos and Latinas. In addition, I consider how Latinos and Latinas feel towards Congress. I predict that Latinos and Latinas have similar views on many issues and believe that Latino/as are underrepresented within Congress. These findings will help us better understand the under representation of Latino/as and the urgency of descriptive and substantive for Latino voters. Throughout history, Latinos have been one of the most underrepresented marginalized groups within

politics and to have them engaged and included within politics, it can help foster the link between descriptive and substantive representation.

Karen Romero

Faculty Mentor: Sara Angevine

The World Around Us: How the Institutional Model of Representation Functions as a Symbol of Exclusion

The existing political science literature from Williams (2000) identifies that American political institutions such as Congress fail marginalized groups through the vehicle of fair representation under the normative model of liberal representation. Examining the larger structure, what are the visual and symbolic parallels to the institutionalized exclusion that manifests within the tangible interior of the U.S. Capitol? I hypothesize that within the Capitol building, key architecture, art, and statues will parallel the larger institutions' tendency to favor white masculinity which ultimately reflects the nation's historic exclusion of women and racial minorities. To examine this, I have combined a qualitative method of observation and content analysis to produce a series of focused coding that focus my examination on identifying if the majority of symbolic displays within the Capitol reflect the influx of white males within institutions. I compare the percentages found within the Capitol based on statues, names, and architecture and contrast them to the national average in terms of demographics. I find that overall, the notion of inequality manifests within the interior of the Capitol building based on the consistent influx of symbolism towards white males while women and people of color are represented in minuscule figures. These findings help illuminate the institutional facade of equality and highlight the substantive work that still needs to be done in terms of achieving fair representation for all members of the U.S. When measuring the amount of social progress that has been made within the country, critical observation

allows us as researchers to uncover powerful visual text that contains deeper reflections regarding our society and framework as a country.

Forrest Rouleau

Faculty Mentor: Roger White

Intergenerational Income Elasticity: Social Mobility Across the U.S.

Using data from the Panel Study of Income Dynamics, we identify how social mobility has varied across both location and birth cohort. In doing so, we find that the IGE of the US is 0.246 when we control for the gender and race of the child. Employing separate models for both males and females, we find that the IGE estimates to be significantly different. Considering geographic locale, we find that the West is the most socially mobile while the South is the least socially mobile. When accounting for inter-regional mobility, we find that inter-regional mobility is statistically significant when estimating IGE. Lastly, when analyzing the fluctuations of IGE over time, we find that IGE can range between 0.230 through 0.314 depending on the year the child is born.

Austin Saephan

Faculty Mentors: Stephanie H. Yu and Anna S. Lau

Ethnic Discrimination and Internalizing Symptoms: The Mediating Role of Public Ethnic Self-Esteem

Asian Americans are at elevated risk of internalizing symptoms due to increased experiences of ethnic discrimination, yet the mechanisms of this relationship are unclear (Shrake & Ree, 2004; Neblett Jr. et al., 2012). The current study aimed to address this gap by examining the mediating roles of three constructs of ethnic self-esteem (ESE, i.e., public, private, and

importance of identity) on the relationship between ethnic discrimination and internalizing symptoms in a sample of 709 Vietnamese or Vietnamese American adolescents (M=15.53 years, 61.12% female). Private ESE is defined as one's self-esteem relative to their own perceptions of their ethnic group (Luhtanen & Cooper, 1992). Public ESE is defined as one's self-esteem relative to how they perceive outgroup evaluation of their ethnic group (Luhtanen & Cooper, 1992). Importance of Identity is defined as one's self-esteem relative to the importance of their ethnic group to their own identity (Luhtanen & Cooper, 1992). Across each of the models, gender was included as a covariate due to prior research suggesting that females are more likely to report internalizing symptoms than males (Midlarsky, 2003). Using mediational analysis, we found that ethnic discrimination significantly predicted internalizing symptoms ($\beta=1.86$, $p<.001$) and public ESE ($\beta=-1.20$, $p=.001$), while public ESE significantly predicted internalizing symptoms ($\beta=-1.07$, $p<.05$). Thus, there was a significant indirect effect such that public ESE mediated the relationship between ethnic discrimination and internalizing symptoms ($\beta=0.13$, 95% CI=0.01 to 0.30). Neither private ESE ($\beta=-0.03$, 95% CI=-0.13 to 0.03) nor importance of identity ($\beta=0.05$, 95% CI=-0.03 to 0.17) was a significant mediator. Future directions include research on strategies for bolstering public ESE to prevent internalizing symptoms when ethnic discrimination is a concern.

Jocelyn Saldana

Co-authors: Alyssa Garcia, Karissa Cisneros, Camille Clendenon, and Valerie Acevedo

Faculty Mentor: Ralph Isovitsch

Latent Fingerprinting – Ninhydrin and Luminol Comparison

The purpose of the experiment is to synthesize Ninhydrin and an analog of Ninhydrin, Luminol, and then test the latency of the synthesized chemicals

to see which provides better luminescence of the fingerprints used. Ninhydrin is a chemical that reacts in blue or purple color, often described as a Ruheman's purple, when in contact with amino acids; thus, it has become a primary source for finding fingerprints due to the way it reacts with the amino acids in the fingerprint. Luminol is used in forensics to detect any traces of blood at crime scenes by reacting with hemoglobin and producing "light" through a process known as chemiluminescence. The research question that was asked for this experiment was: Would a chemical similar to Ninhydrin in function create a more visible latent fingerprint than the standard, synthesized Ninhydrin? In our approach to answering this question, we compared the structure and functional groups present in each compound through IR spectroscopy. Additionally, the development of latent fingerprints with each chemical would also allow for discussion to compare and contrast the practical application of each compound in a forensic setting.

Naya Sawah

Faculty Mentor: Marie-Magdeleine Chirol Hill

Tissage d'une Femme Tunisienne: *Satin Rouge* (2002) de Raja Amari

Satin Rouge (2002) by Raja Amari is a film that shows and critiques the role of a woman in Tunisian society. The two contrasting worlds of responsibility by day and frolicking by night are brought together in Lilia, a mother who stumbles into the life she never knew she wanted. In the film, the widow learns about the hidden world of belly dancing in cabarets and struggles to keep her desires of dancing and her responsibilities as a mother in balance. In this presentation, I show how the fabrics and styles of her outfits are a window into her changing identity. We see her go from a modestly dressed woman who hides behind the role given to her by society to a stunning seductress dressed in flashy colors, to finally a woman who figures out how

to have the best of both worlds by updating her style and allowing herself to be the alluring woman she wants to be while still maintaining her image and dignity in Tunisian society. This presentation will be in French.

Garrett Silva

Faculty Mentor: Paula Sheridan

Co-authors: Michelle Arreola, Briana Boteo, Maria Brown, Cierah Cordova, Mariah De La Cruz Pena, Luie Espitia, Devin Gaude, Tiffany Liew, Amanda Pavon, Niya Ranjattan, Tyler Syrett, Emily Villedrouin, Marissa Young, and Maria Angelica Zabin

Their Own Voices: High School Student Perceptions of Success after Graduation

Students in the SOWK310: Approaches to Social Research class partnered with LEARN, a non-profit organization, to gather information from high school students about their plans for success after high school using grounded research methods. This information, gathered from focus groups at three local high schools, will be used to create exercises for LEARN's Summer Palooza. Summer Palooza is a weekend retreat for high school students that provides academic and personal enrichment on a university campus. Exercises include communication and team building activities, and leadership training. LEARN staff provided the primary research question that shaped the focus group questions: What do students need to be successful after High School Graduation?

Cameron Smith

Faculty Mentor: Roger White

The National Football League's Impact on Metropolis Areas

This study examines the NFL's impact on the income growth of Metropolis. This study includes a sample of 12 metropolis areas that gained or lost NFL teams during 1990-2017. The findings show that there is no evidence that NFL teams increase the income of growth of metropolis areas. However, the findings show that metropolis areas have less income when an NFL franchise is present. Findings suggest that cities should not look for NFL franchises to increase their growth of income. This paper also offers an analysis of the impact NFL franchises have on residential housing prices. Findings show that housing prices are higher when a metropolis area has an NFL team.

Cassady Smith

Faculty Mentor: Glenn Piner

The Smallest Measurements in the History of Humanity: Gravitational Wave Detectors

Einstein theorized the existence of gravitational waves in his 1915 General Theory of Relativity. Ever since then, scientists have been trying to prove the theory through experiments. Although the waves are produced from some of the most massive and cataclysmic events in the universe like black hole and neutron star collisions (and even the Big Bang) - they are 1000 times smaller than the diameter of a proton by the time they reach us. This means scientists have the task of measuring something smaller than they've ever measured before. Giant laser interferometers have accomplished this task, and improvements to the instruments allow us to see the impossible. I aim

to show the instrumental improvements made on past detectors, as well as hyper-sensitive detectors planned to be built.

Taylor Soto

Faculty Mentor: Nora Obregon

The Social and Emotional Effects in Siblings of Children with Autism during Adolescence

Siblings of children with autism have unique challenges. For some siblings, life with a brother or sister with autism can be very difficult, especially in forming a satisfying relationship. Some children see their sibling's autism as a positive aspect rather than a negative one. Research shows the majority of brothers and sisters of children with autism cope well with their experiences. However, this does not mean they do not experience challenges in learning how to handle their sibling who has autism. This literature review paper aims to investigate how having a sibling with autism spectrum disorder (ASD) affects sibling relationships. Specifically, focusing on the social-emotional effects that a child with ASD has on their typically developing siblings in adolescence. The effects are both positive and negative, such as lack of closeness, high levels of social competence, feeling of loneliness, prosocial behavior, and the feeling of embarrassment. In focusing on the social-emotional development of the typically developing child, I will look at sibling interactions and behaviors. I aspire to learn about the relationships that siblings form or resist due to the social deficits the child with autism may have. It is still relatively unclear why some studies reveal more positive findings, while others have discovered negative findings to having a sibling diagnosed with ASD. Therefore, the reason for writing this paper is due to the few studies that have examined the experiences of individuals with a sibling diagnosed with an autism spectrum disorder.

Dylan Stolte

Faculty Mentor: Michelle Chihara

The Biopolitical Division of Shazam! as both Film and Narrative

This essay is intended to analyze the film Shazam! under a biopolitical lens, a field of thought first developed by the French philosopher Michel Foucault. An inspection of the film for both its conflicting presentation of biopolitical imagery as well as its existence within a medium that perpetuates said ideology reveals an inherent dichotomy within American culture. The subtle permeation of biopolitical imagery and messages is both compounded and commented on by the film, which highlights the discrepancy in real life between the intent and results of such an agenda. Ultimately, the product of the contradictory representations of American biopolitical ideology in the film Shazam! is a reflection of American culture, one in which political imagery regarding health and human life underlies numerous aspects of daily life but still fails to achieve the ideal result behind their creation.

Priscilla Stout

Faculty Mentor: Rebecca Overmyer-Velázquez

Fashion and Sustainability: Re-thinking Modern Societies Consumption Habits

Sustainable fashion is becoming more prevalent in the fashion retail industry as more consumers are starting to demand ethical and sustainable sourcing. Since the retail industry thrives on fast turnover rates of production of merchandise, I want to know how sustainable brands can be successful in the industry and if their practices are as sustainable as they claim to be, how viable is that option? I introduce the topic of hyper-consumerism to get an understanding of the way society functions as consumers of fashion. The significance of this topic is impactful due to our environment being at high

risk from the large amounts of pollution that the fashion industry creates daily. To gather data, I took the approach of qualitative interviews with two participants to gain an insider's perspective on the fashion industry, specifically, the type of education they gained and what they know about the sustainable fashion industry. I interviewed one fashion designer and one company founder of a sustainable brand to gain insight on the real challenges they face and how they view the industry on whether or not sustainable brands are fully ethical or not. The results showed that it is very difficult for a fashion retail company to be fully sustainable in an industry that thrives on the exact opposite of what they implement due to costs being high and a market that is not fully aware of the benefits of a sustainable brand and the detrimental effects fast fashion brands have on our environment. There seemed to be a common understanding that starting a sustainable fashion brand is complicated and challenging due to higher prices for both company and consumer, and manufacturing partners who are not readily equipped to handle production in small batches, instead of large quantities that fast fashion retailers have set the foundation for so long. My goal was to attain information from people who have had exposure to the industry and their opinions and perspectives were consistent with preexisting literature in that sustainability are not always what it claims to be as far as being 100% ethical. Since these larger companies do not have to disclose how they source, and the fact that I have been denied interviews from large retailers, point to my conclusion that there is much more the public is not aware of on the topic of their unethical practices.

Noelle Tamas

Faculty Mentor: Cheryl Swift

The Role of Soil Depth and Water Availability in Determining Species Composition

Coastal forests in Maine are typically composed of a mix of hardwood and conifer trees. Conifers tend to grow more slowly and have lower nutrient needs than hardwoods, which may limit them to shallower soils. This study examines the effect of soil depth on the distribution of species and species' water potential. I hypothesize that hardwoods and conifers are more abundant in deep and shallow soils, respectively. I also hypothesize that hardwoods and slower-growing conifers are more abundant in deep and shallow soils. The study site is located in coastal Maine along with a series of east-west granite ledges and troughs. For my work, I identified 10 transects and, along each of them, I counted the number of trees and took the diameter for each tree located within two meters of either side of the transects. Soil depths ranged from 0.5 cm to 24 cm. Soil depth was not a good predictor of species composition or stem diameter. Additionally, I measured pre-dawn (Ψ_{pd}) and midday (Ψ_{md}) water potential at the end of summer to see if water availability might explain the distribution of hardwood and conifer individuals in soils of different depths. While most species, except white pine and paperbark birch, did have higher Ψ_{pd} in the deepest soils (mean Ψ_{pd} , ranged from -1.4 MPa to -1.8 MPa in the shallowest soils to -1.2 MPa to -0.9 MPa in the deepest soils), there was no clear pattern with soil depth. Midday Ψ_{md} showed a similar pattern with no clear increase in Ψ_{md} with soil depth; mean Ψ_{md} in the shallowest soils ranged from -2.4 MPa to -2.6 MPa and Ψ_{md} in the deepest soils ranged from -1.8 MPa to -2.4 MPa in the deepest soils). Finally, I tested the Carbon to Nitrogen ratio (C:N) within the soils in a smaller test group of samples. My results suggest that hardwoods are not a homogenous group and that factors other than soil depth and water availability control the distribution of species. My results

also suggest that soil depth may not explain wind-driven mortality of conifers, and rooting depth may play a small role in ensuring the persistence of spruce and fir in these coastal forests.

Leslie Tanaka

Faculty Mentor: Peter Peterson

Comparison of Satellite-observed NO₂ Concentrations with Ground Observations in Whittier

Nitrogen dioxide (NO₂) is an important anthropogenic air pollutant with varying health and environmental impacts. In the tropospheric layer of the atmosphere, NO₂ poses adverse health complications and impacts ozone production when present in high concentrations. Due to the severity of these concerns, it is important to observe and monitor tropospheric NO₂ concentrations and their spatial variability. This can be done with both ground and satellite-based measurements. Ground-based measurements can be done in a specific location using a Multi Axis Differential Optical Absorption Spectroscopy (MAX-DOAS) technique, which is highly sensitive to atmospheric constituents in the lower kilometers of the troposphere. Whereas, satellite-based measurements can be done remotely using instruments onboard satellites which can gather global atmospheric data based on their position at the time and their spatial resolution but are not as sensitive to surface pollutants. We present a comparison of measurements between ground-based and two different satellite-based NO₂ observations in eastern Los Angeles with an emphasis on the Whittier, California area between July to August 2019. Using NO₂ ground-based measurements taken by a MAX-DOAS and comparing them to the satellite-based NO₂ columns obtained by the Ozone Monitoring Instrument (OMI) and the TROPospheric Monitoring Instrument (TROPOMI) we analyze the effectiveness of satellite retrievals of the daily and weekly average

concentrations measured by each satellite when compared to the ground-based measurements.

Amy Trinh

Faculty Mentor: Kristin Smirnov

Brand Personality Perceptions

Instagram, the image-sharing social networking service, has become an effective marketing tool to better understand and connect with consumers. More and more brands utilize the platform to showcase their product's picture-worthy features. The purpose of this study is to gain a better understanding of consumer behavior centered around the visual impressions of a product to influence the success of small food establishment businesses. Through thorough research and the study of three small business food establishments as case studies, I have the unique opportunity to analyze the "impression management" curated by their brands. (Goffman 1959) The presentation of their brand personalities is showcased in their "Instagram worthy" product offerings, web presence, and branded environments. The main theoretical lens of this study focuses on the practice of impression management to strengthen brand personalities through the curation of content. Customers and businesses share images to showcase their values and "present a part of their identity" (Grewal et. al 2019). It was observed that the types of content shared by each business and their customer base highlighted different product features and each evoke one of the twelve brand personality archetypes. When using public Instagram and Yelp accounts to gather qualitative data of "spontaneous behavior in [a] natural surrounding", we were able to identify behavioral trends that emerged; specifically, those about how consumers choose to share about their experience with a brand. (McLeod 2015) Building off of previous naturalistic observation to effective business practices, we will be focusing

on success of customer engagement using qualitative and quantitative research methods. With three case studies to guide the development of a successful brand archetype and engaging web presence, it has been foundational to informing business decisions for own cafe business. Research gained has led to brainstorming "Instagram worthy" product offerings, the renovation our interior space, and the design of an effective brand system. The development of our small business has allowed me to apply course material to make informed decisions throughout this experiential learning process.

Patrick Tsu

Faculty Mentor: Roger White

Cost Overruns in DoD Contracts

The DoD's budget has consistently been increasing. Contract overspending has been portrayed as problematic, and many prior researchers have worked to identify the root cause of these contract overruns. This research uses a cost model based on the existing, related literature and two ordinary least squares regression models to examine which attributes of DoD contracts have the most impact on cost overruns. We analyze 269,042 Department of Defense contracts from USA Spending's contract data set. The variables used are the duration of the contract, contract competitiveness, cost burden splits, as well as contract types. The findings show that more expensive contracts, cost-plus contracts, longer contracts, and competitive contracts all lead to cost overruns.

Patrick Tsu

Faculty Mentor: Roger White

Student Veterans: Integration, Perceptions, and Misconceptions

Veterans face challenges in their transition from active duty to become full-time students. Among these challenges are misconceptions, judgment, and negative beliefs from their non-veteran student counterparts. As the student veteran population continues to grow, these same challenges will become more prevalent and it may be worthwhile to provide resources for student veterans. From previous studies done on student veterans, I have found that many student veterans face common issues such as struggling to fit in with the student body, loss of self-identity, as well as the lack of a support system. My findings show that veterans who feel included are more likely to put in more effort towards their academics as well as their extracurricular activities both on and off-campus. Additionally, the leadership and teamwork skills that veterans bring to the campus can enhance student experiences on campus. This research along with survey data gathered from Whittier College students supports these findings on the benefits of student veteran inclusion. Recommendations are made for Whittier College concerning how they can assist in integrating student veterans and enable them to succeed.

Peter Valbuena

Faculty Mentor: Alvin Alejandrino

Human Interference on Sea Anemones: Comparing Northern and Southern California Intertidal Areas

As humans come into tidal areas they tend to step on the rocks causing them to move and crush intertidal creatures, resulting in a lower species abundance in higher traffic areas. In this experiment, we observe how to direct human traffic/interference affects the abundance of sea anemone

populations in two different tide pool locations. By seeing how species abundance is affected by direct human interference, we can implement better rules in tidal areas to prevent the loss of species. For both experiments, a transect marker was used to measure the distance between the plots while quadrats were used to isolate equally sized plots. A count of the total amount of sea anemones was collected per area of foot traffic. In Cabrillo beach, a total of 1 plot per area of foot traffic was used while 2 plots were used per area of foot traffic was used in Fitzgerald reserve. A one-way ANOVA and posthoc Tukey HSD test was run to determine any significance between low, medium, and high traffic datasets. In the Cabrillo site, it was found that there was no significance between any of the plots. While in the Fitzgerald site, it was found that there was a significance in the abundance between high foot traffic areas and both medium and low foot traffic areas. The reason for this result in both Cabrillo and Fitzgerald's reserve could be due to the insufficient distance between each plot. This would not have allowed enough distance to have a significant difference in the amount of foot traffic between each plot. For the Cabrillo site, the lack of significant results is due to the lack of data collected as there were only 9 total data points in total. In my research, a possible reason for the discrepancy would be the fact that Fitzgerald reserve was a protected reserve such as Cabrillo. However, they were more rigid in their rules on how we conducted ourselves in the tide pool. So, I was unable to touch and move anything from the tide pools. This resulted in difficulties in getting a proper count of the number of anemones in medium and low-foot traffic plots. For future research, I suggest that we investigate specific types of sea anemones and see how each species reacts to direct interference.

Alexis Vargas

Faculty Mentor: Nora Obregon

Music and Physical Movement's Impact in the Preoperational Stage of Young Children

This literature review assesses whether music and physical activity can impact the preoperational stage in young children as well as other cognitive and literacy skills. These cognitive skills consist of sustained attention, processing speed, and memory. The demographic of this paper ranges from 2-7 years old as it aligns with Jean Piaget's preoperational stage. Piaget's preoperational stage is one of four stages of cognitive development that focuses on language development in children ages 2-7 years old. This study is important because implementing either music or physical activity with school aged children can improve school readiness and academic performance as well as allow teachers to teach to children's multiple intelligences. Trends show that music helps to provide more cognitive functioning. As far as their speech and language skill development, children showed a consistency of academic success when involved with music. A trend that stood out in physical activity was that it too helped impact children's preoperational stage. Though there was one study whose results showed opposite, the review overall shows that music and physical activity do play a positive role.

Nicole Vigueria

Faculty Mentor: Rebecca Overmyer-Velázquez

What Does Our Gender Got to do with It? Focusing on Female Musicians

This study proposes a better understanding of what female musicians encounter while experiencing gendered inequality in the male-dominated space(s) throughout the music community. We know that inequality has been present since women first entered the music industry, but it is difficult to find the answer as to why this inequality persists if music spaces and communities are supposed to be welcoming to everybody. We ask "Does gender inequality affect female musicians positively or negatively?" When we think of inequality, we tend to think of this as a negative connotation, but for some, it may be empowering and help them with their careers. Some discoveries have been made with the help of interviews and participant observational methods. Seven questions were asked during each of seven interviews, with additional questions asked to help build the conversation. The interviews were done in person, over the phone, by email, and via FaceTime. Observational Field notes were conducted at music venues on Sunset Boulevard in West Hollywood, CA to help with analyzing what truly goes on at a performance when women are present in music spaces. The stories being shared are stories of real female musicians who are highly involved in the industry. This research is more of storytelling and a conversation because the researcher herself has either experienced situations such as the subjects involved or has seen it firsthand. As someone who also did participatory research, it never occurred to me at first that I would be able to include myself, but constantly being involved with the music scene, it was important to include myself and my experience as well. The research study goes deeper in telling the reason(s) as to why female musicians have similar backgrounds throughout their music careers and starting to answer the question of where and why inequality begins.

Rachel Villareal

Faculty Mentor: Cheryl Swift

Co-author: Cheryl Swift

California Fires, the Start that Can Help Determine the End

Global warming is an increasing epidemic affecting the Earth and its population. The increasing temperatures of global warming can be a significant factor in causing fires. California fires have been more prevalent most likely due to human causes. Fires can greatly affect the vegetation as well as animal habitats for an environment. Fire ignition date, location, and acres burned will be recorded using the 2017' Calfire database to determine which types of vegetation and habitats are affected by the fire. A correlation between the month that the fire started and how many acres that it burned before being extinguished may help to find the main factors that cause a fire. This information can then be used for further investigations that can determine the options for prescribing or preventing fires. This study gathers data using the Calfire database to evaluate California's major factors in fire ignition.

Robert Villegas

Faculty Mentor: Nora Obregon

The Factors of Body Image in Adolescents

Humans often look to others to model their own life. Social comparison theory tells us that individuals determine their own social and personal worth based on how they compare to their peers. One of these comparisons is focused on the concepts of weight, body shape, and size. The idea that women should be extremely thin and men should be muscular and lean has been engraved into society and has led people to feel that they need to fit these stereotypes. It has been observed that adolescents, people from the

ages ten to nineteen, often have an especially high sensitivity to these concepts. Recent studies show that approximately 50% of thirteen-year-old girls in America were reportedly unhappy with their bodies, an astounding 80% of teenage girls had a fear of becoming overweight, and around 25% of American boys were concerned about how muscular and lean they were. With an always-increasing number of adolescents following trends on social media, the notion of body preoccupation and body dysmorphia are becoming more prevalent in our society than ever before. These concerns are an issue because a low perception of body image can lead to eating disorders, the pursuit of fad diets, and emotional issues such as depression and anxiety, which can all have everlasting effects on adolescent's lives later on. This literature review aims to discuss the known factors that can affect body image including gender, culture, peer influence, and media influence, as well as how adolescents react to these factors.

Kylee Watnick

Faculty Mentor: Erica Fradinger

A Life in Moments

To utilize the complete repertoire of knowledge gained through the pursuit of a Human Development major, this realistic fiction novel was written to follow a single character through their life from conception to death. Throughout the book, each discipline under the umbrella of Human Development is represented through major theories, including Biology, Chemistry, Sociology, Psychology, Child Development, Anthropology, and even Physics. It is built on the major theories of each discipline, creating a more interdisciplinary understanding of each. "Evicted" by Matthew Desmond is the major inspiration for this novel, though other sources of inspiration may be found in "Simon vs. the Homo Sapiens Agenda" by Becky Albertelli and "Real Boy" by Shaleece Haas. The importance of this

novel is its unique perspective on the development of an LGBTQIA+ character in a positive manner, which diverges greatly from the media norm, which expects LGBTQIA+ people to be born from abuse and to suffer abuse throughout their lives.

Madison Wells

Faculty Mentor: Jason Carbine

Islam and India

India has the second-largest population in the world and is one of the world's most religiously diverse countries. Major religions in India include Hinduism, Islam, Buddhism, Jainism, Sikhism, and Christianity. This paper focuses on one dimension of this diversity (and potential tension) concerning Islam in India, where Muslims represent 14.2% of India's population according to the Ministry of Home Affairs, Government of India 2011 Census. In particular, this paper explores how Muslims are portrayed in India through politics, news outlets, and social media. I analyze the discourses and symbolism relative to Muslims/Islam by the Bharatiya Janata Party (BJP) and the Indian National Congress (INC), the two leading parties currently holding the majority of seats in India's government. My research involves news outlets such as newspapers, magazines, social media posts, and political speeches. I code the keywords and phrases depicting Muslims to develop solid evidence on the portrayal and treatment of Muslims in India. After analyzing the prevailing political beliefs, recent events surrounding legislation such as updates to the Citizenship Amendment Act, and the results of coding of keywords, I conclude that Muslims in India are not being treated with the same respect and tolerance as those who follow other religions. If correct, my argument suggests major hurdles for democracy in India going forward.

Stephanie Whang

Faculty Mentor: Laura McEnaney

Tracing Asian American Participation in the Civil Rights Movement

The civil rights movement saw the development of various social movements, the Black Power and Chicano movements being a few of the most well-known. While these groups had their radical groups in the Black Panthers and the Brown Berets, the existence of Asian American radical groups has been afforded less research and time. Due to the overlapping ideologies of radical ethnic groups, Asian American radical groups and activists are often assumed to be inactive or absent. It is important to analyze the Asian American movement as inherently multiethnic and encompassing the aims of other ethnic groups. Radical groups have not been isolationist in their goals and aims, and this narrative of outreach is notable, for in the overlap between ideologies. This project traces Asian American participation in the civil rights movement to explore the existence of an Asian American variant of a radical political organization. This research also has a chronological focus on the 1960s and 1970s with a geographic focus in Southern California and the San Francisco area. These decades and locations have been catalyst areas of community activism and political struggle for not only the Asian American community but for various ethnic groups.

Taylor Whitney

Faculty Mentor: Nora Obregon

The Effects of Art on Elementary School Age Children's Social Emotional Development

Children in their elementary school years, starting from kindergarten through sixth grade, are learning every day from the environment that they are immersed in, and through their social interactions, according to

Vygotsky's social learning theory. In these years from being five to twelve years old, they are experiencing complex emotions and meaningful interactions with peers along with personal relationships. Child development professionals such as teachers, psychologists, psychiatrists, and even parents can benefit from the information regarding how art can benefit elementary school children's overall social-emotional development. If a child is struggling to feel confident in regulating their emotions and communicating their ideas to their peers effectively, they can help themselves by engaging in art. Specifically, the literature covered reviewed common trends of art programs that implemented drawing, painting, acting, music, and more. These programs and initiatives focused on helping a child's self-esteem, confidence, regulation of emotions, self-efficacy, communication skills, cooperation, collaboration, along with more emotions or social skills. Main findings indicated that some studies did not find a connection with art helping the social emotional development of the child, while other studies did find some benefits for their wellbeing for social emotional development. During a child's elementary years, art can be beneficial towards their social emotional development and aid with enhancing social skills along with positively improving emotions.

Mariah Wilson

Faculty Mentor: Kristin Smirnov

Wells Fargo: An Analysis of Leadership's Effect on Business

Wells Fargo's stock is currently decreasing in value, which means there is an issue somewhere within the company. This is an issue because Wells Fargo is a bank not only in the United States but also in the Asia Pacific region, in Canada, Latin America, Europe, the Middle East, and Africa, and India, and the Philippines. This project analyzes the management and marketing policies of Wells Fargo. Within this analysis, financial elements are included

to enhance the understanding of the leadership issues and their effect on business. This analysis of how their management is affecting their sales and stock – through case studies, the direct company website information, and educational articles – reveals the issues within the company. Further, it will teach even those who do not know business terminology why leadership is important for business success.

Dan'Nyce Worthy-Mays

Faculty Mentor: Joanna Hash-Converse

The Likelihood and Impact of Mood Disorders in Queer Identifying Individuals

Recently, there has been an increase in the exposure of queer identities within the mainstream. However, this makes the community more susceptible to bigotry and trauma. The current review synthesized articles of the past ten years relative to the likelihood of queer identifying individuals developing a mood disorder and the impact of said disorders on the behaviors of those within the community. Participants in much of the literature were predominately White, cis men and women that identified as either lesbian, gay, or bisexual. Each study was correlational and based off of self-report measures, and it was found that minority stressors such as shame, internalized heterosexism, microaggressions, and binegativity contributed to poor mental health outcomes in queer identified individuals, with the bisexual community appearing to have the most disparities. Also, the diagnosis of such mood disorders correlates with poor coping mechanisms such as substance abuse and the development of disordered eating, with gay and bisexual men reporting a greater amount of substance abuse in comparison to women. Future researchers should consider examining variances in participants' identities instead of grouping queer

experiences together since, the experience for a bisexual White man may contrast greatly from that of a bisexual Latina woman.

Juliana Wright

Faculty Mentor: Sara Angevine

State-to-State Abortion Restriction

In American politics, the subject of abortion is constantly debated and remains highly controversial. Although it has been more than 40 years since the 1973 Supreme Court granted women the legal right to an abortion in the case of *Roe v. Wade*, state legislators still attempt to diminish women's reproductive and health rights. Specifically, in 2019, nine U.S. states passed laws to ban abortion, and more states are considering similar legislation (Gordon, Hurt 2019). How is the anti-choice movement able to change state laws to restrict abortion? How did Georgia and eight other states pass such restrictive policies, yet states like Florida did not? Is it because of the specific funding received from interest groups? Or does it have more to do with the gender, party identification, and religion of the individuals pushing for the passing? To find out why these specific states passed this restriction, I research who exactly was passing and pushing for the policy change state-to-state, what they have in common, and what groups are funding them. These findings afford a better understanding of what motivates the push for restrictions on a woman's reproductive rights, like abortion. Banning abortion is an immediate challenge to the precedent set by *Roe v. Wade* and strips women of the right to make decisions directly regarding their bodies.

Hans Zdolsek

Faculty Mentor: Roger White

US and UK Government Bond Yield Effect on the USD/GBP Exchange Rate

Using the OLS regression technique, a series of models are estimated to test the Asset Market Approach to exchange rate determination. Examining daily exchange rates and a variety of government bond yields during the period from 2006 through 2020, this paper studies the effect of the differential of US and UK bonds on the exchange rate between the US and the GBP. Furthermore, we extend our established model to control for economic announcements released by the U.S. Federal Reserve that are categorized using a method employed in a previous study that considered the effects of European Central Bank economic announcements on the USD/Euro exchange rate. This extension permits examination of whether economic announcements made by central banks assist in explaining the short-run variability of exchange rates. The expectation is that the model will confirm the Asset Market Approach as a valid predictor of exchange rates; thus, confirming that exchange rate fluctuations are affected by changes in fixed asset yields. Furthermore, we expect that Federal Reserve economic announcements will significantly impact exchange rates and, thus, increase the proportion of variation in exchange rates that is explained by our model.

Rong Zhang

Faculty Mentor: Roger White

Do Education, Race, and Gender Affect Unemployment Incidence? Evidence from the 2018 American Community Survey

The U.S. unemployment rate has fallen to a 50-year low and the number of unemployed people has significantly decreased. While the unemployment rate has declined, companies have expanded payrolls and now produce

more products. Many factors are directly or indirectly affected by the low unemployment rate, such as an increase in the consumption rate which will contribute to sustained economic growth. We examine the relationship between unemployment using individual-level data on the level of education, race, and gender to explore the potential influences of these factors on the likelihood of unemployment. The reason for this is to find the relationship between these factors and unemployment. In the long term, in what ways we need to change ourselves to reduce unemployment. A series of probability models will be estimated to identify the posited relationships. These models will include the linear probability model (LPM), the binomial probit, the binomial logit, and the multinomial logit. The models will include employment status as the dependent variable series (e.g., a dichotomous "employed or unemployed" dummy variable for the LPM and the binomial estimations and a categorical "employed, unemployed, not in the labor force" series for the multinomial estimation). Explanatory variables will include education, potential labor market experience, race, gender, ethnicity, nativity, state of residence, etc.