

Spring 5-2021

## **Spring 2021 Student Scholar Symposium Abstract Volume**

Chapman University Center for Undergraduate Excellence

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# STUDENT SCHOLAR SYMPOSIUM

SPRING 2021

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May 5-7, 2021

SPRING SESSION

## ABSTRACT VOLUME



# Message from the Director

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Greetings and welcome to the Spring 2021 Chapman University Student Scholar Symposium!

Student Scholar Symposium celebrates the remarkable scholarship and creativity conducted by Chapman students. Student Scholar Symposium is sponsored by the Center for Undergraduate Excellence, which is the first stop and the central hub for students to learn about and engage in undergraduate research and creativity activity; and to discover the wide range of prestigious external scholarships available.

Our student presenters reflect the diversity of academic and creative disciplines thriving within the Chapman community.

The Spring Student Scholar Symposium is 100% virtual. On this platform you can attend a live Zoom meeting to connect with our students and discuss their research/creative activity. The virtual symposium allows our students to showcase their research and creative projects through a poster presentation, an oral presentation, or a creative performance.

Our virtual symposium would not have been possible without the extraordinary effort by the CUE staff, Lisa Kendrick, Operations Manager, and Jackie Coyne, Administrative Assistant, who have designed, developed, and organized the event. A special thanks to both of them!

Thanks to all the student presenters, their faculty mentors, and our faculty moderators!

Dr. Julye Bidmead

Director of the Center for Undergraduate Excellence at Chapman University

# Schedule of Events

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## **Wednesday, May 5**

Oral Presentations-Session I	11:00AM-12:00PM
Oral Presentations-Session II	1:00PM-2:00PM
Oral Presentations-Session III	3:00PM-4:00PM
Poster Presentation-Session I	5:00PM-6:30PM

## **Thursday, May 6**

Poster Presentations-Session II	9:00AM-10:30AM
Oral Presentations-Session IV	11:30AM-12:30PM
Poster Presentations-Session III	1:00PM-2:30PM

## **Friday, May 7**

Oral Presentations-Session V	9:00AM-10:00AM
Poster Presentations-Session IV	10:30AM-12:00PM
Oral Presentations-Session VI	1:30PM-2:30PM

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## **ROOM A**

### **English**

**11:00-11:20AM**

***Gender Gap in Computer Science: An Invitational Rhetoric Study***

**Presenter(s):** Cindy Ramirez

**Advisor(s):** Dr. Jan Osborn

This project will address the gender gap in computer science through a discourse analysis of materials used to attract young girls to the field. Applying Invitational Rhetoric, Foss and Griffin's feminist rhetorical theory, I will determine how rhetoric is being used to attract or possibly dissuade young females from entering computer science. Women have contributed to the field of computer science beginning in the 19th century even though computers were not yet invented. Considered the world's first programmer, Ada Lovelace helped pioneer the first modern computer science concepts, and many of the same ideas we use today, like variables and looping. While many women played an important role, the statistics of women majoring in computer science have declined over the years. By the mid-80s, the number of women began to decrease. Women have developed many computer science inventions dating back 200 years. Many of these are still used today, have become the foundation for technological advancements, or played a role as participants in computing development. The 1980s saw the growth of personal computers in U.S. homes. These early computers were toys marketed to males with media catering to males, movies like *Weird Science* and *Revenge of the Nerds* established a male feel to the field of computer science and "geeky" culture. This played an important role that impacted young women to not choose computer science and helps explain the gap we have today. The theory and method used in this research will show how invitational rhetoric differs from traditional rhetoric. It is important to know the methods used to incorporate young women in the field of computer science. Invitational Rhetoric is rooted in valuing the individual experiences of everyone to "enter the rhetor's world and to see it as the rhetor does" (Foss & Griffin, 5). The methods will allow me to explore in-depth how rhetoric could be used to portray computer science by instilling equality, immanent value, and self-determination between rhetor and audience.

### **Political Science**

**11:20-11:40AM**

***Beyond the Politics of Climate Change: How Education and Income Level Affect Environmental Values***

**Presenter(s):** Joanna Falla

**Advisor(s):** Dr. John Compton

Human-caused climate change has been acknowledged for decades, but public opinion on its validity and severity has been consistently questioned in the United States. Despite the overwhelming evidence pointing towards fossil fuel emissions and unsustainable practices as the leading causes of global climate change, its politicization during the beginning of the century has seriously slowed down America's path towards a green future. Because this has become a partisan issue for many voters, there has been considerable research done on the affiliation between party identification and public opinion on climate change. Although party identification has been studied as a major factor, other variables also come into effect. This paper aims to explore the relationship between how Americans view federal spending on the environment with their income and educational background. We will be obtaining and analyzing data from the 2016 American National Election Survey to see if these variables have statistical significance on how



important federal climate change action is to the public. We expect that education will have a larger effect on public opinion than income and that people who want to increase the federal environmental budget will have lower incomes but higher education.

**11:40-12:00PM**

***Are Religious Latinos More Likely to Vote Republican than Non-Religious Latinos?***

**Presenter(s):** Leo Ortega

**Advisor(s):** Dr. John Compton

A current topic of discussion in American politics is why significant numbers of Latinos are voting for the Republican Party when many Republican policies seem to negatively affect them as a group. Identities have long been a part of our way of life and a part of politics everywhere. Identity politics emerged once certain minorities groups didn't feel represented or felt oppressed in some manner. In the case of the Latino community, how could Latinos vote for a candidate (Donald Trump) and a party whose beliefs work against their own interests? Building on existing research, this paper hypothesizes that many Latinos who are voting Republican are devout Protestants. Using survey data from the 2016 American National Election Study, this paper evaluates how religion influences Latinos' voting behavior. I hypothesize that religiously affiliated Latinos, and particularly Protestants, are more likely to vote Republican than non-religious Latinos.

## **ROOM B**

### **Political Science**

**11:00-11:20AM**

***The Growth of Isolationism and its Impacts in the United States***

**Presenter(s):** Pedro Marquard

**Advisor(s):** Dr. John Compton

Isolationism as defined by Merriam-Webster is when; "a policy of national isolation by abstention from alliances and other international political and economic relations." During the 1800's the United States behaved as an empire would, engaging in a series of conflicts which resulted in acquiring new territories such as the Philippines and other island nations. As time progressed politicians and the people in the United States became more concerned with national interests and decided to abstain from participating on the world stage. The politicians implemented a set of isolationist policies such as applying tariffs towards products not made in the country and not taking part in the European affairs. The paper will focus on the rise of isolationism in the early 1900's and how it negatively impacted the country. Additionally, the essay will include how isolationist sentiment has grown in the United States following the 2016 election of Donald Trump. The paper will analyze isolationist sentiment among people due to their socioeconomic status, their education, their race and whether or not they have been out of the country. After conducting research, it was found that people who had a bachelor's degree were more likely to believe that taking part in foreign trade was good for the United States, compared to those who did not have a bachelor's degree which have a different set of views. It is clear that isolationist sentiment has grown. It is important to analyze historical data in order to have an overview on how it can affect the United States.

**11:20-11:40AM**

***Asian American Party Identification in Presidential Elections: A Look into Age and Length of Residence in the United States***

**Presenter(s):** Caitlin Guiao

**Advisor(s):** Dr. John Compton

Asian Americans are an important voting group that have unfortunately lacked research and scholarly analysis of their party identity and specifically voting behavior in presidential elections. By using length of residency and age as independent variables I hypothesize that Asian Americans who are younger and native born or have spent a longer amount of time in the United States are more likely to vote Democrat in presidential elections in larger margins. I will be testing variables that prove to have no correlation to party identity such as, education and income level. In comparison to other racial groups whose party identity has a statistically significant correlation with education and income level. My second hypothesis is Asian Americans who are older or have recently moved to the United States as a foreign-born citizen will increasingly identify and vote Republican in presidential elections in increased margins versus their younger Asian American counterparts. Reviewing previous research and literature about Asian Americans, other scholars have not addressed this specific hypothesis. For example, other scholarly literature has consisted of grouping racial and ethnic voter groups like Hispanics with Asians together and have not solely focused on Asian American party identity. Similarly, other literature have tested variables such as political participation and not strictly party identification in presidential elections. Although Asian Americans have increasingly become a focus for both Republican and Democratic candidates during elections; the empirical evidence as to why they identify and eventually vote for one party over the other has not been analyzed independently. With the past 2020 election it is important to look at what party Asian Americans identify with the most and why. I will be using voter survey data from the 2018 and 2020 Asian American and Pacific Islander Data, and the 2016 and 2020 American National Election Study.

**11:40-12:00PM**

***The Impact of Socioeconomic Status on Abortion Views***

**Presenter(s):** Breil Bonaguro

**Advisor(s):** Dr. John Compton

The question considered is; does social class impact religious opinions on abortion rights along gender and party lines? There have been many studies considering the demographic differences of views on female reproductive rights; covering gender, political party, education level, and many other factors over time. Each of these studies has shed light on the generalities of pro-life or pro-choice beliefs. Recent years have shifted the conversation while disparities between social classes have grown wider. One of the most polarizing issues within the United States is dependent on access and belief systems, but can greatly be impacted by the intersectionalities of life circumstances. Expanding generalities and considering this could be impactful on the opinions of the most controversial topic in the United States. Many factors will be considered to gather demographic information. Independent variables will include; gender, political affiliation, religious or non-religious, and social class. The dependent variable will be opinion on abortion legality. To gain a greater understanding of these correlations, data will be taken from the American National Election Studies to analyze recent trends and opinions. The findings of this study will exhibit how social class has impacted beliefs on abortion specifically. Within the disparities found within the social class, women and men who come from a lower social class have to deal with many different circumstances

that make the salience of opinion on abortion much more malleable. American people who come from higher socioeconomic status have a greater privilege in making decisions based solely on belief systems whereas people that have to understand a different way of life due to socioeconomic class have much more to consider. Lower socioeconomic class people are more likely to have a less salient belief on abortion rights despite religious affiliation or political party.

## **ROOM C**

### **Psychology**

**11:00-11:20AM**

***Anxiety, Pandemics, and Politics: An Analysis of their Entwined Relationship***

**Presenter(s):** Sophia Morrisette

**Advisor(s):** Dr. Desiree Crevecoeur-MacPhail

The political atmosphere has changed significantly in the last year, as has the day-to-day experiences of Americans, due to a historical Presidential election and a global pandemic. In some instances, politics and one's mental health has minimized or exacerbated the threat of COVID-19. The goal of the study was to determine the significance that political ideology has on COVID-19 concerns and risk assessment. The study also looked for a correlation between anxiety disorders and this phenomenon. The study surveyed over 40 people from the general U.S. population, ages 18 years and above. There were four condition groups in which participants were randomly placed. All survey takers had to answer three questionnaires and watch a short video. The questionnaires measured participants' political affiliations and levels of trust in their government, what COVID-19 precautions the individual takes, and used the GAD-7 scale to measure anxiety levels. The study expects to find the following results: 1) mentioning political events and increased COVID-19 rates causes anxiety to increase in individuals, compared to if politics and COVID-19 were not mentioned, 2) conservatives perceive less risk of COVID-19 than liberals, and 3) a high distrust in government leads to more COVID-19 precautionary behaviors and a higher degree of risk perception than in individuals who have trust in government.

**11:20-11:40AM**

***The Effects of Ethnicity and Socioeconomic Status on Anxiety Prevalence and Treatment***

**Presenter(s):** Brianna Liberman

**Advisor(s):** Dr. Desiree Crevecoeur-MacPhail

With the growing rise of anxiety related psychiatric disorders, many psychosocial factors including ethnicity and socioeconomic status may be influencing the disparities in diagnoses among different groups of people. The primary explanations for this rising trend have been income and ethnic differences. While previous research has gathered a plethora of information regarding income levels and anxiety development, few findings have delved further into all of the socioeconomic factors contributing to anxiety disorders such as parental education, social stress, and access to healthcare. Data was collected from undergraduate students to determine what role ethnicity, income, and homelife (e.g., parental marital status), plays in the development of anxiety, frequency of visits for psychiatric disorders, and ability to access healthcare. Students were asked to take a brief questionnaire assessing demographic

background information, the Beck Anxiety Inventory, and the Perceived Stress Scale. It is expected that there will be rise in anxiety and stress among lower income or minority individuals. Additionally, it can be expected that the frequency of visits as well as the ability to access healthcare opportunities will be less among low-income individuals compared to high income individuals, but the need for mental health assistance will be highest among low-income individuals. These findings indicate drastic disparities in access to healthcare and the prevalence of psychiatric disorders based on socioeconomic and ethnic differences. Finally, our results illuminate the need for equal access to healthcare.

**ROOM A**

**Political Science**

**1:00-1:20PM**

***Gun Control: The Gender Gap Within Parties***

**Presenter(s):** Maggie Kabilafkas

**Advisor(s):** Dr. John Compton

The recent uptick in mass shootings partnered with rhetoric in politics has led to a growing discussion about gun control within both the Democratic and Republican parties. While past research has discovered that women voters in the United States tend to be more moderate and that there is a prominent gender gap within the Republican party, it has failed to account for the recently changing climate on gun control policies. I hypothesize that the Democratic party will tend to vote in support of gun control regardless of gender, whereas, Republican women will be more divided with their male counterparts in support of gun control. Additionally, I will analyze if population density influences voting behavior. I hypothesize that there is a significant gender gap among rural, Democratic women (no gender gap among rural Republican women), a gender gap among Republican suburban women (no gender gap among suburban Democratic women), and no significant gender gap among urban women among both parties in support for gun control. Using data from the American National Elections Survey, I will study trends within the Democratic and Republican parties have respectively become more liberal or conservative regardless of gender, or if there is a growing gender gap in support of gun control.

**1:20-1:40PM**

***The Structure of Environmental Racism in Long Beach, California***

**Presenter(s):** Mallory Warhurst

**Advisor(s):** Dr. John Compton

Research related to the geographic spatiality of environmental racism has focused on analyzing relationships between community demographics and proximity to environmentally hazardous conditions. More recently, studies have focused on broadening the understanding of environmental racism as not only the consequence of specific discriminatory actions, but also the result of structural, institutionalized forms of racism. Using Long Beach, California as a case study, this project integrates historical records, census data, and ArcGIS StoryMap software to explore patterns of contemporary environmental racism within the city. In addition to mapping the features of the built environment that explicitly contribute to environmental inequities, this study represents an exploration of the historic and current hegemonic structures that create conditions of environmental injustice and racism in Long Beach.

**1:40-2:00PM**

***Catholicism's Effects on American Public Opinion In the Kennedy Era***

**Presenter(s):** Nikki DeBonis

**Advisor(s):** Dr. John Compton

Joe Biden is only the second Catholic to be elected President. The first Catholic President, John F. Kennedy, was not elected until 1960 – nearly two centuries after the nation's founding. This paper will examine the

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driving factors of anti-Catholic bias in the electorate and evaluate how this bias has changed over time. Little research has been done regarding the evolution of anti-Catholic attitudes in the electorate. I hypothesize that less-educated Protestant voters are the most biased voters and the major force behind anti-Catholic bigotry. In addition, I hypothesize that anti-Catholic bigotry has declined over time.

## ROOM B

### Political Science

**1:00-1:20PM**

***The Great American Divide: How Race has Shaped the Republican Party and Modern Politics***

**Presenter(s):** Madison Demaris

**Advisor(s):** Dr. John Compton

After the 2016 United States Presidential election, I conducted research examining the causes for fundamental shifts in the Republican party that led to the election of Donald J. Trump. I concluded that from comparing 2008, 2012, and 2016 American National Election Studies results and the Chapman Fear survey, overwhelmingly, the biggest shifts in the party came from views about race. In the four years since, we have seen a national rise in populism, fracturing of the Republican party, and a conglomerate of domestic and foreign issues fester to novel heights including domestic terrorism and an attempt to overthrow the United States government. I am going to probe into the 2020 Presidential election, 2016 Presidential Election, and collective data from every election since 1948 to delineate the progression and development of the Racism that we see today. During the Trump Presidency, we saw an unprecedented rise in hate crimes, murders of unarmed Black people, and exuberance of racist rhetoric. I argue that former President Donald Trump and his policies and rhetoric led to an increase of racist acts and aggression within the American public. I also argue that his candidacy allowed for the Republican party to become outwardly racist and has led to a higher correlation between racism and Republicanism.

**1:20-1:40PM**

***Is Modern Media Driving Political Polarization?***

**Presenter(s):** Iain Richards

**Advisor(s):** Dr. John Compton

Current research into how an individual's preferred sources of information influence their political beliefs is somewhat underdeveloped. There are many existing studies demonstrating which sources of information are typically associated with an individual's political preference, but there are remarkably few that delve into the effects that individuals' preferred news source have on their beliefs for specific political issues. Furthermore, while there are also multiple studies that suggest social media has a polarizing effect on its users, very few of these studies derive their claim from a comparison with other, more traditional media types. Rather, they often focus solely on empirical psychological analysis of social media's effect on its users or on the correlation between social media use and the increasing polarization throughout the country. Both types of studies are lacking in key areas; the former type (psychological analysis), while useful, cannot be used to make claims specifically about the polarizing effect of modern media on key political issues, while the latter often does not account for the fact that the correlations which they

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observe are merely that, correlations. This paper will attempt to remedy this deficiency by examining the effects of different media types on individuals' beliefs on a select number of important political issues: immigration, discrimination, and respondents' overall view of the United States. The independent variable (the different media types) will be split into two categories: modern ones, such as the internet and social media use, versus more traditional sources of news (newspapers and news analysis programs). After controlling for age, this paper expects to find that not only will there be a statistically significant difference in all three of these areas between the modern and traditional media types, but also that the traditional media has a moderating effect on its users relative to modern media.

**1:40-2:00PM**

#### ***Racial Resentment and Voting Behavior in the Trump Era***

**Presenter(s):** Lillian Lachman

**Advisor(s):** Dr. John Compton

The U.S. Census Bureau published a report twelve years ago stating that by mid-century the country's population would shift to the majority being minorities. In other words, white people would be the minority. White identity was held up by certain groups and in certain press as being in a threatened state. Clearly, there is fear. The question is whether this fear among white people translates to higher voter turnout and votes for politicians that share negative attitudes toward minorities and immigrants, amplifying these groups as infringing on the patriotic - white - way of life. My two hypotheses are that white citizens who perceive the demographic shift as a threat to their American identity are more likely to vote and more likely cast that vote for national politicians who talk about fear and anger towards people of color. Using survey data from the 2016 and 2020 American National Election Study, I will look at respondents' magnitude of racial resentment and their voting rates and their planned vote for national elections. This will determine the level of connection between white citizens who perceive the demographic shift as a threat to American identity and translate that threat into higher voter turnout and casting these votes for national politicians who talk about fear and anger towards people of color.

## **ROOM C**

### **Political Science**

**1:00-1:20PM**

#### ***Social Media's Influence on Negative Partisanship and Affective Polarization***

**Presenter(s):** Amanda Ellis

**Advisor(s):** Dr. John Compton

Affective polarization refers to the increasing tendency of Republicans or Democrats to view members of the other party in a negative light. A similar issue, negative partisanship is the tendency of voters to form their political or policy opinions in direct opposition to whichever political party they do not like or identify with. The current literature on these issues focuses on the origins of this polarization. However, although there is analysis on the effects of negative partisanship or affective polarization, there is still little conclusive evidence on what causes these phenomena. In this thesis, I will analyze data from the American

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National Election Study (ANES) Time Series Study to continue my understanding of these concepts in order to determine the factors behind the sharp increase of negative partisanship and affective polarization. I hypothesize that one of the principal sources of these issues is due to the increase of social media usage and the growth of the internet. With the data, I will use feeling thermometer questions on political party identification in comparison with social media usage. I will do additional analysis using the 7-party ID scale. Finally, my controls will be race, education, age, economic status, religious affiliation, and sexual identity.

**1:20-1:40PM**

#### ***Who Supports Raising the Minimum Wage?***

**Presenter(s):** DJ Sollender

**Advisor(s):** Dr. John Compton

There is much debate in the United States about whether to raise the minimum wage, as many argue that wages have not kept up with the standard of living. Others argue that the increased cost to small business' owners will put many of them out of business and therefore lead to more job loss than financial gain for employees. Current research on who supports raising the minimum wage has focused primarily on ideological party lines which has made it a partisan issue. This narrow view has led to a poor understanding of who supports raising the minimum wage even within party lines. In turn, this essay seeks to utilize data from the 2016 American National Election Survey (ANES) that has not been previously taken into account to show how even those who share similar ideological views can have radically different opinions on raising the minimum wage. I hypothesize that younger people (age 25-40) will support raising the minimum wage regardless of party affiliation. In addition, I hypothesize that women will be more likely to support raising the minimum wage than men even after controlling for income level.

### **Religious Studies**

**1:40-2:00PM**

#### ***How Religion Affects Views on Abortion in the U.S.***

**Presenter(s):** Lillian Grabowski

**Advisor(s):** Dr. John Compton

For my final paper, I will be writing about how different religions in the United States view abortion and American abortion legislation. Since the enactment of Roe v. Wade in the year 1973, abortion has been a prominent discussion in the American political arena. While most Americans have a somewhat informed stance on abortion, some of those most active and passionate members of the debate are those practicing religion. The United States of America is full of religious diversity, and while there is a separation of church and state, religious advocates play a vital role in encouraging certain legislation to be passed. In this paper, I hope to accomplish a deeper understanding of what drives certain religion's views on abortion, and how that ultimately affects its legality. Throughout my research, I will study the major religions that are prominent in the United States and their specific views on abortion. With this in mind, I will test whether or not the teachings of the religion affect an individual's stance on abortion. I believe it will be clear to see whether abortion laws are restricted or embraced depending on the dominant religion of the voter's. My hypothesis is that religions with stricter views on abortion will create individuals who are more pro life and who advocate for stricter abortion laws.



**ROOM A**

**Art**

**3:00-3:20PM**

***Marie Curie: Life and Legacy***

**Presenter(s):** Morgan Grimes

**Advisor(s):** Lia Halloran

Marie Curie was a Polish-born French scientist in the early 20th century. She became the first woman to win a Nobel Prize in 1903, and became the first person to win a Nobel Prize in more than one scientific discipline in 1911. Her contributions to the field of radiation won her the Nobel Prize in Physics. Her discovery and subsequent isolation of both Radium and Polonium won her the Nobel Prize in Chemistry. Following her discovery of these highly radioactive elements Curie worked to refine and improve medical techniques utilizing these elements. After she won the Nobel Prize in chemistry, Marie Curie spent the rest of her life researching and implementing radioactive medical techniques. Her research laid the foundation for a range of diagnostic techniques as well as the development of nuclear energy and radiotherapy (RT). She was responsible for implementing mobile x-ray units for medical use during World War I as well as the foundation of the Radium Institute in France as well as Poland, both of which are devoted to utilizing radium in the field of medicine to improve and save lives. This project explores the incredible foundation that Marie Curie laid for modern science, technology, and medicine. Her contributions to these fields lead to a ripple effect of incredible advancements. The images created are to honor her incredible discoveries as well as acknowledge the fields on which she had the greatest impact. Marie Curie was an incredible woman and a brilliant scientist and my work strives to honor her and the life she selflessly devoted to science.

**3:20-3:40PM**

***Nicole Daskas: A Retrospective***

**Presenter(s):** Nicole Daskas

**Advisor(s):** Micol Hebron

Nicole Daskas: A Retrospective (2021) aims to highlight the underappreciation and marginalization of women artists that occurs in the art world. I am thinking about the ways women artists have been silenced throughout art history: outshined by their husbands, celebrated only in old age, or only after death. I present myself and my work as that of a well-known, successful artist. I also present performance relics as precious art objects, questioning why performance art is non commodifiable. By creating art books and interviewing myself, I lead the conversation around my own practice and work. This piece is not a traditional retrospective. It is questioning the structures and expectations of a patriarchal art world. I am looking back over the span of my undergraduate career, reframing the standard expected output of a BFA. In this sense, the term retrospective is fitting. I am also interested in exploring what it means to have a retrospective at the beginning of my career, and questioning the history of male artists' spectacles and egotistical gestures by essentially creating one of my own. Nicole Daskas: A Retrospective culminates in an installation featuring video documentation of my past video and performance work, relics, and staged interviews. I parody interviews by artists historically celebrated as geniuses, examining the construction

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of this idea of “genius”. I continue an engagement with art history by inserting myself into a male dominated, sexist history. Nicole Daskas: A Retrospective is an exploration and celebration of my work. This conceptual piece questions why such opportunities are not readily available for women artists.

**3:40-4:00PM**

#### ***Complementary Colors***

**Presenter(s):** Katie Carder

**Advisor(s):** Micol Hebron

While creating this 16 x 12 inch painting I was focusing on using complementary colors and what type of objects and scenery could be used to develop the contrast between the colors blue and orange. I chose to paint a variety of trees in this forest scene. I wanted them to feel out of place while still being grounded in the landscape. I felt the need to investigate how complementary colors obviously work together but also create a pleasing contrast. I believe the use of the objects and the landscape that I chose to paint helped to depict this interesting dynamic between complementary colors.

## **ROOM B**

### **Dance**

**3:00-3:20PM**

#### ***To This Day: The Tragedy of Bullying***

**Presenter(s):** Gabrielle Guzy

**Advisor(s):** Micol Hebron

Bullying occurs in 20% of students ages 12-18 throughout the nation. It used to be thought of as physical abuse, however it has become increasingly more complex in the last fifty years. Verbal harassment is the most common type of bullying reported at 79%, but the different types of mistreatment (social harassment, cyberbullying, etc.) are still prominent. The effect that bullying has on the victims is lasting and can be incredibly detrimental to their mental health. It can lead to depression and anxiety as well as increased feelings of isolation, despair, rejection, and exclusion. In extreme cases, bullying can have a contributing factor in suicide risk. People that are victims of harassment can experience effects well into adulthood. The situations they dealt with as children were at a time when they are figuring out who they are. The influence on how they see themselves throughout their lives is completely affected and can be damaged by bullying. Shane Koyczan's To This Day Project is a bitterly truthful depiction of bullying. He tells three tragic stories about experiences with victimization, the overall effect that it has on those who fall prey to bullies, and ends it with inspirational words spoken to the victims. I choreographed a dance to his project in hopes to spread the word on the pain and suffering that people face at the hands of the tormentors. There is a beautiful video that goes along with Koyczan's project, but as a dancer I express stories and feelings through movement. I aim to provide artistic visuals to increase the intention of his words, bring awareness to bullying, and spread hope to those that are struggling.

## **Political Science**

**3:20-3:40PM**

### ***How Religiosity impacts Americans' views on Immigration***

**Presenter(s):** Crash Shahinian

**Advisor(s):** Dr. John Compton

There is no doubt that religiosity influences people's behaviors in ways that aren't always apparent at first glance. Past research indicates that religiosity does have an effect on one's view on immigration, indicating that members of larger religious congregations tend to view immigration in a more negative light when compared to those from smaller religious organizations. An issue that arises in past research, is the failure to analyze if the rate of church attendance affects one's views on immigration. In this paper, I intend to quantify the effects of religiosity influences individuals sentiment towards immigration, using controls of race, age, rates of church attendance, history of immigration, and party identification using the data supplied by the 2016 ANES survey. I hypothesize that the greater the once rate of church attendance, the higher their anti-immigration sentiment will be. I expect this to be especially present in individuals who so identified their religious identification to be Evangelical, Fundamentalist, or Traditional.

**3:40-4:00PM**

### ***How Religiosity Interacts with Gender to Shape Policy Preferences***

**Presenter(s):** Brennen Ramos

**Advisor(s):** Dr. John Compton

Political Scientists have long attempted to research the factors that shape individuals' political preferences. One major factor investigated in recent years has been gender – specifically, the differences between men's and women's voting behavior. Widely known as the "gender gap," this phenomenon has been repeatedly documented even after accounting for many other factors that can affect voter support. Another major component studied in political science are the effects of religion. Religion is important to individuals all across the world, often guiding them in day-to-day life and activities. Subconsciously, this religiosity can adversely affect the political identifications made towards major parties and key issues within society. This paper will investigate how religiosity interacts with the gender gap across controversial political topics within the US. The specific topics explored will be feelings towards police, stance on immigration, and the legality of marijuana.

## **ROOM C**

## **Psychology**

**3:00-3:20PM**

### ***Personality Differences Between College Students With and Without Siblings***

**Presenter(s):** Lindsay Hammerle

**Advisor(s):** Dr. Desiree Crevecoeur-MacPhail

The purpose of the current study was to analyze the personality differences between college students with siblings and college students without siblings in regard to the Big 5 traits of extraversion, neuroticism, and conscientiousness. Additionally, the research aimed to examine whether college students with

siblings engage in higher amounts of social comparison than college students without siblings. Trait theory guided this research as the leading approach to the study of personality psychology. Extraversion is linked to the tendency to be positive, social, and talkative, for extraverts feel the most stimulated amidst social situations. Neuroticism is defined as one's level of emotional stability, and describes the tendency to experience negative affective states such as anxiety, depression, and irritability. Conscientious individuals are organized, hardworking, and possess high self-control. Furthermore, families with siblings provide ample opportunities for making social comparisons in terms of parent and sibling relations, as siblings are prone to feelings of jealousy and competition. The Big Five Inventory (BFI) and Social Comparison Scale were the questionnaires used to measure the participants' degree of extraversion, neuroticism, conscientiousness, and social comparison engagement. Data was collected from 51 college students from Chapman University and Cal State University Dominguez Hills. This study expects to find that the college students with siblings will score higher in extraversion and social comparison, while the college students without siblings will score higher in neuroticism and conscientiousness.

**3:20-3:40PM**

***The Impacts of Race Implicit Association Test Training on Undergraduate Students***

**Presenter(s):** Rachel Norum

**Advisor(s):** Dr. Desiree Crevecoeur-MacPhail

The implicit association test's (IAT) popularity has increased since it was first developed in 1995, and researchers still debate its usefulness today. Even with this debate, people have begun to create implicit association test training, for both businesses and schools, particularly for implicit race associations. Much of this training to reduce implicit associations lacks evidence-based research to support its value and application. The balanced identity theory (Greenwald, McGhee, & Schwartz, 1998) investigates the differing strengths of associations through the IAT. This paper explores different aspects of the implicit association test and whether training can reduce their implicit biases. The subjects will be asked to take the IAT two times, take another questionnaire, and the experimental group will also undergo implicit association training. The purpose of this research is to determine if participants' previous experience of the implicit association test, implicit association training, race, and explicit test scores of racial bias correlates with their race implicit association test scores. Four hypotheses will be investigated in this research. The first hypothesis is that all participants' implicit association test scores will be lower in preference of either race if they have a greater familiarity with the IAT. The second hypothesis for this experiment is that there will be a decrease in bias scores for those who underwent implicit association training. The third hypothesis is that overall, white participants will have a higher score of white preference on the implicit association test than black participants. This study's fourth hypothesis is that participants are likely to have lower scores of bias on their self-reported questionnaires compared to their implicit association test results.

**3:40-4:00PM**

***COVID-19 Conspiracy Beliefs are Linked to Reduced Prevention Behavior and Lower Receptivity to Vaccination***

**Presenter(s):** Natalie Standridge, Clarissa Tadros

**Advisor(s):** Dr. Tara Gruenewald

Conspiracy theories are beliefs that a group of individuals is attempting to achieve sinister goals in secret. These beliefs usually result from fear and existential threat and are associated with decreased psychological and physical well-being. The COVID-19 pandemic has impacted many people in the United States and COVID-19 conspiracy beliefs have grown in popularity. Such beliefs may undermine public and personal health, as past research indicates that greater conspiratorial thinking is associated with lower frequency of preventative health behaviors. This study examined whether greater belief in COVID-19 conspiracy theories would be linked to lower levels of COVID-19 prevention behavior, less receptivity towards the COVID-19 vaccine, and lower levels of COVID-specific prosocial behavior in a sample of 1,728 U.S. adults collected through the Amazon Mechanical Turk platform. Participants completed four online surveys over approximately one-year (April, July, September-October 2020, March-April 2021) to assess COVID-19 experiences and psychosocial and physical well-being. COVID-19 conspiracy beliefs were measured at waves two and four and frequency of engagement in COVID prosocial and prevention behaviors were assessed at every wave. Vaccine receptivity was assessed at wave 4. As hypothesized, greater belief in COVID-19 conspiracy theories predicted lower frequency of engagement in COVID-19 prevention behaviors (wave 2  $\beta = -.36$ ,  $p < .001$ ; wave 4  $\beta = -.42$ ,  $p < .001$ ) and less receptivity to COVID-19 vaccination ( $\beta = -.76$ ,  $p < .001$ ), in regression models including age, sex, and race covariates. Contrary to hypotheses, greater COVID-19 conspiracy beliefs exhibited a small positive association with frequency of prosocial behavior (wave 2  $\beta = .08$ ,  $p < .01$ , wave 4  $\beta = .07$ ,  $p < .05$ ). Given observed associations between COVID-19 conspiracy beliefs and decreased engagement in COVID-19 prevention behaviors and much lower receptivity towards vaccination, these beliefs appear to be important public health targets.

## **Biochemistry and Molecular Biology**

**1. *Compounded Gabapentin for Felines: A Review of Associated Metabolic Processes and an Analysis of Potency***

**Presenter(s):** Johnny Altwal

**Advisor(s):** Dr. Elaine Schwartz

Pharmaceutical compounding provides pharmacists and clinicians the opportunity to create unique drug formulations that are better suited to a specific patient's needs. This is especially prevalent in veterinary medicine where clinicians treat a variety of maladies in a large number of species, thereby requiring unique formulations to more easily deliver drugs to animals. Several examples of compounded veterinary formulations with sub-therapeutic potencies have been published, but none examine compounded gabapentin. Gabapentin is frequently compounded into an oral suspension for veterinary use from tablets or capsules for the purpose of pain management in felines and other small animals. The project's goals are two-fold. Utilizing HPLC, the primary aim is to quantify the concentration of gabapentin in compounded formulations of the drug from various pharmacy sources. The data generated will be cross-referenced with US Pharmacopeia guidelines to determine if the concentration of gabapentin is within appropriate ranges for the oral suspensions, providing insight into the efficacy of the protocols employed to complete the compounding process. The second goal is to provide a brief review of the literature on veterinary compounding, its need and limitations, and specifically administration of gabapentin and its associated metabolic processes. We predict that the specific formulations acquired for testing have been compounded efficaciously, and will not be in violation of US Pharmacopeia guidelines. However, larger-scale testing of compounded formulations of gabapentin would be necessary to confirm the efficacy of the process taken to compound gabapentin for animal use.

**2. *Solving the Protein Folding Problem by Machine Learning***

**Presenter(s):** Kaitlyn Abdo

**Advisor(s):** Dr. Michael Ibba

Determining protein folding accurately is a fundamental step to understanding a protein's structure, functions, and roles in a biological system. The current methods of determining a protein's three-dimensional structure are labor-intensive and often limited by the requirement for direct comparisons with experimentally-determined known structures. Current computational methods also present their own set of challenges, where the interfaces are difficult to use and the data can be inherently biased. Machine learning creates new possibilities for modeling and prediction. Machine learning models are trained using the large quantities of data available and are able to accurately and rapidly predict and classify unknown proteins. With more data available than biologists and biochemists know what to do with, the future directions of the field are not limited to structure prediction, drug design, and precision medicine. Here, we will discuss the strengths and limitations of the current methods used to solve protein folding. The introduction of machine learning into the field addresses these limitations and opens the door to new research endeavors. The goal of this review is to address the current strengths and ongoing challenges of machine learning and how that affects the feat of determining protein folding patterns from the amino acid sequence alone.

**3. *Investigating the Interactions Between Nitrogenase and C<sub>2</sub>N<sub>2</sub>***

**Presenter(s):** Ruchita Kharwa, Terrence Lee, Emily Wong, Kiersten Chong, Chloe Garcia, Michelle Jin

**Advisor(s):** Dr. Cedric Owens, Max Strul

Nitrogen is an essential plant nutrient, but the most abundant form of nitrogen, dinitrogen gas (N<sub>2</sub>), is unreactive. Plants get nitrogen from a more reactive form of nitrogen, ammonia (NH<sub>3</sub>). The Haber-Bosch process is used at an industrial level to produce ammonia-rich fertilizer, however, this process is environmentally problematic. A bacterium called *Gluconacetobacter diazotrophicus* can sustainably produce

ammonia under ambient conditions without polluting the environment. Nitrogen fixation in *G. diazotrophicus* is catalyzed by an enzyme called nitrogenase. Nitrogenase is inhibited by carbon monoxide (CO). The presence of a small protein called CowN will mitigate the inhibition by CO. CowN is hypothesized to protect nitrogenase from CO through protein-protein interactions. The mechanism of interaction between nitrogenase and CowN that allows for nitrogen fixation to occur in the presence of CO is unknown. This project aims to investigate the interaction between nitrogenase and CowN using crosslinking assays. We attempted crosslinking with several crosslinkers, including an EDC crosslinker to permanently link together nitrogenase and CowN via glutamic acid and lysine, and a Sulfo-NHS-LC-Diazirine crosslinker that nonspecifically binds the two proteins together under UV light. Products from the crosslinking assays were run on SDS-PAGE gels to determine the possibility of an interaction between CowN and nitrogenase. We expect to see a band indicative of the combined molecular weights of MoFeP (60 kDa), a component of nitrogenase, and CowN (13 kDa). Results show no bands using the EDC cross-linker, however, a reproducible band at roughly 70 kDa appears when using the diazirine crosslinker. The band's intensity is dependent on CowN concentration and not present in a series of negative controls. Together, this data allows us to conclude CowN and nitrogenase, in fact, do interact.

**4. *Delivery and Genome Editing of CRISPR/Cas9 RNP Systems***

**Presenter(s):** Desmond Talia

**Advisor(s):** Dr. Hamidreza Aliabadi

CRISPR/Cas9 is an emerging gene therapy tool that has shown great potential in gene-editing in a variety of diseases. CRISPR/Cas9 is a promising gene therapy tool, but the delivery of the CRISPR/Cas9 plasmids is a challenging task. In this study, we initially focused on delivery of CRISPR/Cas9 plasmids and used lipid nanoparticles as our gene delivery system. The fatty acyl conjugated cell-penetrating peptides, also called peptide lipid-associated nucleic acids (PLANAs), allowed for targeting and transfection of the RPS6KA5 gene in MDA-MB-231 triple negative breast cancer cell lines. Although delivery of CRISPR/Cas9 plasmids have been successful, our study shifted our focus from delivery of CRISPR/Cas9 plasmids to delivery of CRISPR ribonucleoprotein (RNP) complexes. The IDT Alt-R CRISPR/Cas9 RNP gene editing system is composed of a crRNA:tracrRNA duplex and Cas9 enzyme. Each component of the RNP complex plays a distinct role. The crRNA is designed to target and edit specific genes, while the tracrRNA operates as a binding scaffold for the Cas9 nuclease. The crRNA:tracrRNA duplex works to guide and trigger cleaving of double-stranded DNA by the Cas9 enzyme. Delivery of CRISPR/Cas9 in the form of an RNP complex instead of a plasmid is beneficial in terms of efficiency of genome editing and time saving advantages. Our study has shown uptake of the RNP complex by our breast cancer cells, but we are currently working on confirming gene editing of our cells via the Alt-R Genome Editing Detection Kit.

**5. *Testing Potential Binding of Curcumin Analogs to the Estrogen and Progesterone Receptors***

**Presenter(s):** Lauren Brewster

**Advisor(s):** Dr. Marco Bisoffi

The curcumin analog, ca27, is a diarylpentanoid known to downregulate the expression of the androgen receptor in prostate cancer cells potentially by binding to the androgen receptor and inducing its degradation. Similar to the androgen receptor in prostate cancer, the estrogen and progesterone receptors are generally upregulated in breast cancer cells. The objective of this study is to examine whether ca27 and its analogs, which differ with respect to the position and presence of the hydroxyl groups and the Michael acceptors, feature binding affinity for the estrogen receptor and progesterone receptor. The affinity of ca27 and its analogs were evaluated using the software, MolSoft. This was accomplished by docking the ligands into the ligand-binding domain of each receptor and determining the scoring function. It was found that ca27 and its analogs show a strong affinity for estrogen receptor  $\alpha$ , estrogen receptor  $\beta$ , and the progesterone receptor. Analog ca58 (meta-positioned hydroxyl groups on the aryl rings) had the highest affinity for estrogen receptor  $\beta$  and the



progesterone receptor while ca27 (ortho-positioned hydroxyl groups on the aryl rings, but missing the Michael acceptors) had the highest affinity for estrogen receptor  $\alpha$ . Most current endocrine therapies for breast cancer block the hormone receptors, temporarily inhibiting their function. However, ca27 and its analogs could bind the receptors and induce their degradation, which represents a novel potential molecular therapeutic modality against breast cancer.

**6. *Exosomes as Inducers of Field Cancerization in Prostate Cancer***

**Presenter(s):** Adam Nagourney

**Advisor(s):** Dr. Marco Bisoffi, Dr. Molla Islam

Field cancerization is the phenomenon where areas of tissue surrounding well-defined malignancies contain genetic and biochemical alterations. This incident is present in many types of cancer, including prostate cancer. While the concept of field cancerization is clear, its molecular etiology remains unknown. Potential inducers of field cancerization are microvesicles, in particular exosomes. Exosomes are microvesicle bodies that range in size from 40nm to 130nm. They are excreted by cells, mediating intercellular communication through carrying biomolecules like RNA, lipids, and proteins. Many studies show that exosomes are generated and expelled at higher amounts by cancerous cells. We investigated exosomes and their connection to field cancerization using prostate cancer epithelial cell lines. We used RWPE1, PC3, and C42B. The RWPE1 cells are normal prostate cells, and the C42B and PC3 are cancer cells. The two prostate cancer cell lines are bone metastatic cancer cells, distinguishable by the presence and absence of the androgen receptor. This key feature was the study variable as the androgen receptor is known to play a pivotal part in the development of prostate cancer. Isolation of the exosomes was performed by multiple rounds of centrifugation. Dynamic light scattering and electron microscopic analysis confirmed their presence. Normal RWPE-1 cells incubated with exosomes from cancerous cells, especially C4-2B, displayed a higher metabolic activity (growth), indicating a potential role in the induction of field cancerization.

**7. *Curing Mental Health Disorders One Microbial at a Time***

**Presenter(s):** Karyss Thompson

**Advisor(s):** Dr. Michael Ibba

The connection between one's mental health and gut microbiome has been a topic of recent research and has led to the emergence of a new field of study, "psychobiotics". The gut contains approximately 10<sup>13</sup>-10<sup>14</sup> microbial cells and viruses that have an important role in the healthy metabolic function of their host. When this symbiotic relationship between bacteria and host is off balance it can lead to several medical conditions such as inflammatory bowel disease. Studies of the modern microbiome have suggested there is a link between some mental health disorders like anxiety and depression and an unhealthy gut. One indication of this connection is the prevalence of major depressive disorder among individuals with gastrointestinal illnesses, which are often caused by bacteria that are part of our normal microflora. Additionally, some studies have found increased levels of immune response, such as inflammation, in individuals with depression and other mental health related issues. This increase in immune response is believed to be caused by gut dysbiosis, an imbalance in the microbiome. Therefore, an imbalance in the gut microbiome could result in an increase in mental health related issues for an individual by inducing an immune response. While further research is required, this new field of study could eventually provide successful treatments for mental health disorders with few side effects.



## **Biological Sciences**

**8. *Seeing Light From a Different Angle: The Effects of Diffuse Light on the Function and Growth of Tomato Plants***

**Presenter(s):** Kendra Ellertson

**Advisor(s):** Dr. Gregory Goldsmith, Carter Berry, Dr. Anuradha Prakash

Maximizing plant growth and water use is a critical challenge in the face of a changing climate. Global change models suggest that an increase in water vapor, cloud cover, and aerosols in the atmosphere will increase the amount of diffuse light in the coming years. This increase in diffuse fraction causes sunlight to scatter and distribute across the plant canopy and leaf surface more evenly and has the potential to impact plant photosynthesis, water use, plant growth and yield. To explore how changes in light quality will affect function and growth of tomato plants, we designed an open-air greenhouse experiment with direct and diffuse light treatments. We measured leaf-level physiology, leaf structure, as well as whole plant physiology and morphology to quantify these effects. Diffuse light slightly decreased leaf photosynthesis, transpiration, and stomatal conductance, but these plants had a significantly greater biomass production overall. Reductions in photosynthesis, but an increase in biomass could be due to the fact that these variables were measured on different time scales. We also found that diffuse light led to lower leaf and greenhouse temperatures, which demonstrates the implications of diffuse light for reducing the energy requirements needed to control atmospheric greenhouse conditions. As atmospheric conditions shift, analyzing leaf carbon uptake, water use and ultimately plant productivity is one of the most critical issues we face if we plan to continue to feed the population and protect our resources.

**9. *Superior Clogging by Hagfish Slime: The Functions of Mucus And Slime Threads***

**Presenter(s):** Luke Taylor

**Advisor(s):** Dr. Douglas Fudge

Hagfishes are bottom-dwelling, eel-like fishes that release thick slime when attacked. The slime acts as a defense mechanism by clogging the gills of gill-breathing predators and hindering the flow of water. The slime is extremely dilute yet displays an exceptional ability to clog and capture large quantities of water. The mechanisms by which hagfish slime clogs are uncertain, but clues may lie in the functions of its components. Hagfish slime is composed of mucus and bundles of microscopic threads called skeins, which rapidly unravel during slime deployment. The mucus and slime threads together form a functional network, but the specific role each component plays in the overall function of the slime remains unclear. Furthermore, it is unknown just how effective hagfish slime is at clogging relative to other substances. Therefore, the purpose of this study was to determine how the components of hagfish slime function to facilitate its clogging capabilities. Using a custom clogging assay, we quantified and compared the clogging ability of hagfish slime, hagfish mucus, and other clogging materials at varying concentrations and under varying conditions. Our results show that the mucus and thread components play distinct yet crucial roles in the function of hagfish slime. The mucus alone is extremely effective at clogging, while the structural threads are critical for retaining clogging function over time. The slime can effectively clog at extremely dilute concentrations similar to those found naturally in hagfish slime, and displays superior clogging performance over other materials like xanthan gum, hydrated psyllium husk, and the high molecular weight polymer, polyethylene oxide (PEO). The slime was able to clog at concentrations two to three orders of magnitude lower than those of the other materials. Additionally, our experiments on porosity indicate that the slime reduces flow by virtue of resistance posed by the slime itself. Our findings provide further insight into the unique qualities of hagfish slime and may inspire the design of novel biomaterials.

**10. *Handedness in Hagfish Thread Skein Coiling***

**Presenter(s):** Arly Adame

**Advisor(s):** Dr. Douglas Fudge

Hagfishes are a group of eel-like animals that are known for their secretion of slime when they are disturbed or attacked by predators. Slime glands contain intermediate filament protein threads that are manufactured within specialized gland thread cells. The glands produce two main cell types, gland thread cells and gland mucous cells. The thread cells are then diluted by the sea water where they uncoil and extend as fibers. The mucus absorbs the water, making the mucous component of the slime. Gland thread cells make the fibrous part of the slime, which deploys as coiled threads known as skeins. The slime threads within skeins exhibit a coiled morphology. While it is known how slime threads are coiled within these cells, the origin of the coiling is unknown. The coiling of the thread can be left-handed or right-handed. I wondered whether there are patterns of skein coiling within individuals and species. One possibility is that the coiling direction is the same in all individuals, but varies among species. It is also possible that left- and right-handed coiling is randomly distributed individually, within a species, and among species. In my project, I will measure the handedness of coiling in skeins from numerous individuals from several species of hagfishes. I will do this by observing skeins under a light microscope and establishing a protocol for determining the handedness. The results will provide clues on how there are mechanisms on how skeins are made.

**11. *Identification of Genes Involved in Chia PAMP-Triggered Immunity***

**Presenter(s):** Cailyn Sakurai

**Advisor(s):** Dr. Hagop Atamian

*Salvia hispanica* L., commonly known as chia, is becoming a rising agricultural crop because of its favorable nutritional qualities. Chia seeds have a high concentration of  $\alpha$ -linolenic acid, which provide several different health benefits, in addition in being a rich source of protein and fiber. With the anticipated increase in chia cultivation worldwide, it will face challenges such as diseases and insects that will increase the levels of economic losses. Plants have two major immune responses to combat against pathogens: Pathogen associated molecular pattern (PAMP)-triggered immunity and resistance (R) gene-mediated immunity. Plants initiate PAMP-triggered immunity upon detection of conserved signature domains within the invading pathogen such as the bacterial flagellin. A conserved 22 amino acid region of the flagellin (flg22) is perceived by plant receptors and initiates downstream immune responses. Bacterial infection of chia was simulated by the treatment of two chia accession, pinta (currently used for commercial production) and wild-type with flg22. Transcriptome responses of the chia accessions were assessed using high throughput RNA sequencing (RNA-seq) technology. Differentially expressed genes were identified by application of the quantile-adjusted conditional maximum likelihood (qCML) method from the EdgeR package in R. The expression of a subset of the differentially expressed genes was further validated through quantitative PCR (qRT-PCR). Both accessions experienced significant upregulation of genes belonging to the biological pathways known to be mediators of immune system functioning such salicylic acid regulation, stress response, and cell death regulation. While major overlap was observed in the response to flg22 treatment between both accessions, a more robust and unique response was evident in wild-type in comparison to pinta. Here we provide the first comprehensive profiling of chia immune responses against bacterial infection, helping us predict chia's ability to combat bacterial infection and identify the main genes in the immune pathway.

**12. *Hagfish Egg Biomechanics: A Study of the Structure and Function of Hagfish Egg Hooks***

**Presenter(s):** Zachary Baker

**Advisor(s):** Dr. Douglas Fudge

Hagfish are deep-sea creatures known for their slime secreted in self-defense. The eggs of hagfish contain a peculiar morphology on their tips, clusters of hooked filaments covered in thick mucous. The structure and

function of the hooks on hagfish eggs are the focus of this study. Experiments using the Instron universal testing machine enabled the identification of tensile forces. The tests were done applying a cyclic tensile test where one egg was held in place, and the connected egg was pulled away until the attachment separated. Images and videos of hooks and attachments were taken to analyze the hooked filaments' structural design to determine potential intents of function. Mucous covers the hooked filaments of fresh eggs and prevents hooks from attaching to other eggs. The tensile force of a hooked attachment between two hagfish eggs was experimentally determined to be around 0.7 Newtons on average. The forces of subsequent hook attachments with the same eggs after the initial attachment is broken average around 0.1 Newton of force, a much smaller force than the initial tensile force. The tensile force involved in hooked attachments of hagfish eggs exceeded expectations in its original attachment. The discovery of the mucous preventing hagfish egg attachment has led to the designing of more studies to understand the hooked filaments' function.

## **Chemistry**

### ***13. Mechanism and Chemoselectivity for HOBr-Mediated Oxidation of Zinc-Bound Thiolates***

**Presenter(s):** Alexandros Drivas

**Advisor(s):** Dr. Maduka Ogba

Zinc-thiolate complexes play a central role in bacterial defense against persistent “oxidative bursts” of reactive oxygen species by animal hosts, of which hypohalous (HOX) acids are one of the most potent. A multidisciplinary effort is underway to understand these bacterial redox sensing mechanisms and consequently, develop novel therapeutics for diseases of chronic inflammation. Recent quantum mechanical calculations by us reveal that the preferred mechanism and chemoselectivity for HOCl-mediated oxidation of zinc-bound thiolates is governed by minimizing geometric strain at the zinc-thiolate active site. However, the robustness of the reported reactivity and selectivity models against other biological oxidants is not known. In this project, we investigate the redox-sensing mechanism with two other biologically-relevant hypohalous acids – HOBr and HOSCN – using the identical zinc-thiolate complex and compare with that of HOCl. Our current findings on the reaction pathway for the HOBr-mediated process will be disclosed, and emerging trends with respect to general HOX-sensing by zinc-bound thiolates will be discussed.

### ***14. Ketone Hydroboration with a New Carbodiphosphorane Catalyst***

**Presenter(s):** Cara Fleener

**Advisor(s):** Dr. Allegra Liberman-Martin

Around 90% of all commercial chemicals require a catalyst for their production. However, many catalysts used in the refining, chemical, environmental, and polymer industries lead to harmful byproducts and deplete limited resources. An arising interest in carbodiphosphoranes (CDPs) supports the field of green chemistry by providing a more sustainable catalyst alternative while maintaining catalytic efficiency. Environmental concerns are mitigated when using carbodiphosphorane catalysts, which contain the main group element phosphorus as an earth abundant and inexpensive alternative to other industrial catalysts containing precious metals. This research investigates the use of a cyclic six-membered ring carbodiphosphorane with pinacolborane in catalyzing ketone hydroboration, a widely used reduction reaction in the pharmaceutical industry and production of consumer products. Carbodiphosphoranes contain a highly nucleophilic carbon center making them reactive Lewis bases and thus sensitive to air and moisture. Our research group utilizes a glovebox to maintain a nitrogen gas environment while working with these reactive compounds. This research seeks to uncover catalyst design principles to improve carbodiphosphorane reactivity. This presentation will discuss the carbodiphosphorane reactivity trends observed due to varying steric and electronic effects in the ketone substrates.

**15. *Why Do Counterions Play a Non-innocent Role in Calcium Catalysis?***

**Presenter(s):** Michael Bertagna

**Advisor(s):** Dr. Maduka Ogba

Calcium ions, bound to weakly coordinating anions (i.e., bistriflimide or triflate ions), have gained significant utility within the last two decades as catalysts for facilitating challenging chemical reactions. This is particularly exciting because calcium, unlike the transition metals typically used as catalysts, is an exquisitely cheap, abundant, and non-toxic resource. Despite this obvious advantage, calcium catalysis in its current state is in its infancy - we still know very little molecular detail as to the mode in which calcium ions activate substrates in chemical reactions and how the calcium salt facilitates chemical transformations. This lack of mechanistic detail inhibits our ability to design more optimal calcium catalysts that rival the efficiency of transition-metal-catalyzed reactions. Our lab has been investigating calcium ion activation mechanisms in a Sulfur(VI)-Fluorine Exchange (SuFEx) reaction mediated by calcium bistriflimide salts, converting sulfur(VI) fluorides toward nitrogen-containing sulfur(VI) compounds of medicinal relevance. Interestingly, a closer look at the experimental data shows that switching the anion from bistriflimide to triflate results in dramatic loss in reaction yields, indicating that the counterion plays a crucial role in facilitating the chemical process, beyond just being weakly coordinating. In my project, I will use theoretical chemistry techniques to compute the SuFEx mechanism mediated by calcium triflate and compare the geometries, energies, and electronic properties at the resting and activated transition states of the calcium triflate-mediated process to that of calcium bistriflimide to uncover the origins of the counterion-induced reactivity differences between calcium bistriflimide and calcium triflate. In this poster, I will present on my literature review, specific aims, research methodology, preliminary data, and two hypotheses for the role the counterion plays in affecting calcium ion reactivity.

**16. *Fe-oxyhydroxide Aggregation and Sulfate Effects on Cu(II) Adsorption and Retention***

**Presenter(s):** Abigail Kim

**Advisor(s):** Dr. Christopher Kim

Iron oxyhydroxide nanoparticles (NPs) are commonly found in aquatic systems, where they act as effective sorbents for dissolved metals because of their small size, high surface area, and natural surface reactivity. Geochemical changes such as pH, ionic strength, and temperature can cause NPs to aggregate, affecting their sorption and retention capacities. In this project, we studied the effects of changes in temperature, pH, and ionic strength on NP aggregation, and the subsequent sorption to, and retention of, Cu of those aggregates when exposed to increasing concentrations of sulfate (ranging from 0-0.15 M). The goals of this project are to observe and characterize the changes occurring between the NP aggregates, sulfate, and Cu using dynamic light scattering (DLS) analysis to measure the average size of the aggregates, and inductively coupled plasma – optical emission spectrometry instrument (ICP-OES) to measure the adsorption and retention of Cu to the aggregates. The DLS analysis of the NPs aggregated at 25°C, 50°C, and 75°C showed no major average size difference. NPs aggregated at pH 10 increased in size compared to particles aggregated at pH 8. NPs aggregated at 1.0 M ionic molarity increased in size compared to those aggregated at 0.1 M ionic molarity. The ICP-OES analysis showed an overall increase in adsorption of Cu from 50°C to 75°C when sulfate was added as well as an overall increase in retention, but no major change in adsorption or retention relating to increasing concentration of sulfate. Changes in pH from 8 to 10 showed an increase in adsorption when sulfate was added but no major change in retention and no correlation to concentration of sulfate. Based on these results, aggregation size may have less bearing over adsorption and retention properties of the NPs than aggregation state. Additionally, the general presence of sulfate may enhance the adsorption and retention of the NPs, but the increasing concentration of sulfate has yet to show significant trends.

## **Communication Studies**

### ***17. Social Media Mental Health***

**Presenter(s):** Ben Cohen, Antonia Gross, Harrison Brewer, Hazly Marquina, Carolyn Chang

**Advisor(s):** Dr. Austin Lee

The lack of routine social interaction has increased the presence of depression and anxiety throughout the duration of the pandemic. The overwhelming majority of people have been negatively impacted by Covid-19 through the increased use of social media/news concerning the pandemic. Our group will use a questionnaire to confirm the extent to which people have felt the effects of social isolation. Through administering an anonymous survey, people will feel more comfortable discussing mental health issues, and the overall effect that Covid-19 had on their lives. We plan on using a sample size of between 50-100 people, depending on how many participants we are able to obtain in time. Research on social media and adolescent mental health has proliferated in recent years, with many studies exploring whether more frequent use of social media is associated with various mental health concerns, including depression, body image concerns and disordered eating, and externalizing problems. In general, findings from these studies have been mixed, with many revealing a small but significant negative effect of social media use on mental health. A growing body of work now seeks to build on these studies with more nuanced investigations of how, why, and for whom social media use may have positive or negative effects on youth development. This topic is particularly interesting because our generation has never navigated such a drastic health and social crisis, especially in the age of rising technology and social media use. This is a public health crisis that will magnify existing issues with mental health and create long term effects of the pandemic.

## **Computational Science**

### ***18. Odor Capture by Hair Arrays in Multiple Configurations***

**Presenter(s):** Sarah Yang, Allison Dao, Kaylee Nguyen-Phuoc

**Advisor(s):** Dr. Lindsay Waldrop

Olfaction, the sensing of chemical cues, is a key task for most animals. A variety of crustaceans, including marine crustaceans and insects, gather chemical cues by moving external chemosensory hair arrays through environmental fluids. These arrays come in a vast diversity of morphologies and interact with a large number of odorants. Many of these hair arrays are dense, providing a large odor-capture surface area to detect rare odorants. However, the outer hairs of a dense array shields inner hairs from fluid containing odorants. Does the density of the array help to detect rare/dilute odorant signals? And does the fluid or speed of movement matter in detection? We constructed a variety of different hair arrays using a computational fluid dynamics model, varying in hair number and arrangement and simulated odor capture in a range of fluid properties and odorant diffusion coefficients. We found differences between hair array configurations in terms of shear flow around hairs and the overall leakiness on the array, and these depend heavily on the Reynolds number of the array. Odor capture varied with each array, and more sensory surface area did not result in higher levels of odorant captured, but varied with odorant diffusion coefficient and specific configuration. These results could help to describe the performance of hair arrays with common versus rare target odorants.

### ***19. Norepinephrine and Global Brain Dynamics: a TMS-EEG-Pupillometry Study***

**Presenter(s):** Emma Krivoshein

**Advisor(s):** Dr. Aaron Schurger

The brain is a dynamic system: many different global activity patterns can emerge from similar underlying network structures (Deco et al., 2015). How shifts between global activity patterns are achieved is not currently known. One candidate is norepinephrine (NE), a neuromodulator that is widely present in the brain. NE affects gain, a network parameter that describes how much regions influence each other's activity, and has been

proposed to be involved in shifts between integration and segregation (e.g. Shine et al., 2019), a central dichotomy in global brain dynamics (Deco et al., 2015). Crucially, the human pupil can reliably index NE release, because the brain's source of NE (the Locus Coeruleus) projects to pupil dilator muscles (Joshi et al., 2016). In the present project, we investigate global activity patterns are related to NE levels in the brain, indexed by pupil size. We use a perturbation paradigm by administering transcranial magnetic stimulation and recording the brain's response to stimulation with electroencephalography, a technique that has previously been applied to analyze global brain dynamics (Sarasso et al., 2013). We investigate whether aspects of the brain's response to stimulation is modulated by pupil size, which would support arguments that norepinephrine is involved in controlling global brain dynamics.

## **Computer Science**

### ***20. Low Power, Low Energy Integrated Circuits***

**Presenter(s):** Jacob Anabi

**Advisor(s):** Dr. Peiyi Zhao

As computers become more powerful, considerations in regards to their energy and power usage must be taken into account, with there being many different techniques for designing low-energy flip-flops. Thus, the aim of this project is to design ultra low-voltage flip-flops for clocking systems. We used transmissions gates, as well as other techniques about low-power design from published IEEE papers. Different integrated circuits were designed using the Cadence/Calibre layout/schematic tools and Hspice was used for simulations in an attempt to compare the power and delay of different designs.

## **Data Analytics**

### ***21. Analyzing Speech Recognition for Individuals with Down Syndrome***

**Presenter(s):** Yingying 'Yuki' Chen

**Advisor(s):** Dr. Franceli Cibrian

With the increment of voice assistants, speech recognition technologies have been used to support natural language processing. However, there are limitations on how well the technologies perform depending on who the users are. They have been predominantly trained on "typical speech" patterns, leaving aside people with disabilities with unique speech patterns. More specifically, people with Down Syndrome are having trouble using speech recognition technology due to their differences in speech. To develop a more accessible voice assistant, this project aims to characterize the speech recognition from individuals with Down Syndrome. To accomplish this aim, we analyze the quality of transcripts generated by two popular algorithms used for speech recognition (IBM and Google) to see the differences of speech from neurotypicals and people with Down Syndrome. We analyzed 7 videos of interviews between a neurotypical interviewer and Down Syndrome participants. We computed the symmetric differences between auto generated subtitles(IBM and youtube) and subtitles that were provided by humans(ground true) as well as the word error rate in all sentences. We found that current speech recognition algorithms don't recognize Down Syndrome speeches as well as speeches from neurotypicals. We are currently analyzing the specific type of error. By finding the speech patterns for people with disabilities, speech recognition technologies will be more inclusive, and truly help those who need voice assistants the most.



## **Environmental Science and Policy**

### ***22. The Effects of Livestock Agriculture, CAFOs, on Local Atmospheric Concentrations and Vegetation Health***

**Presenter(s):** Madison Sher, Lauren Burokas, Rejoice Thomas, Sachi Perera

**Advisor(s):** Dr. Hesham El-Askary

Concentrated Animal Feeding Operations (CAFOs) are large agricultural feedlots that mass-produce livestock—typically for dairy and meat production. These sites are notorious for their negative impact on surrounding environments because of the emissions that large populations cattle produce. In this study, we will be taking a comparative approach to studying these impacts, specifically through atmospheric emissions. There is much existing research on this topic, but none that take a closer look at the exact number of how concentrations fluctuate between areas of high-low dairy cow density. The six US states with the largest animal agriculture industries were chosen (Texas, Kansas, California, Nebraska, Oklahoma, and Missouri). In these states, the county with highest dairy cow density and lowest dairy cow density were compared. Two remote sensors were used to gather this data: MODIS Terra and Aqua, and Tropospheric Monitoring Instrument (Tropomi). MODIS was used to measure Aerosol Optical Depth (AOD) and NDVI levels. Tropomi was used to measure methane (CH<sub>4</sub>) levels and NO<sub>2</sub> concentrations. The nominal spatial resolution for these studies is between 0.01 degrees and 7 kilometers, depending on the observed variable. The data was collected from these sensors with seasonal averages. Our original hypothesis was that the counties with cow population densities will display higher amounts of NO<sub>2</sub>, CH<sub>4</sub>, and AOD, this might lead to lower vegetation health. Our data is still being processed and modeled, but will be complete by the end of the week. The 2020 Global Risk Report notes that failure to act on climate change is the most likely and most impactful problem facing the human race today. This risk report places great significance on studies like this one, especially considering that many people are unaware of the effect these CAFOs can have on the environment.

## **FFC**

### ***23. Death in Seasons: How the Tale of Persephone Reflects Life in Death in the Seasons***

**Presenter(s):** Calum MacDermid

**Advisor(s):** Dr. Julye Bidmead

The Greek myth I researched was the myth of Persephone and her connection to the underworld and the underlying message and modern implications of the story. While sad, the story reflects the concept of death being an inescapable ending, shown through Persephone's constant return to the underworld. While she can live on Earth for half of the year, Persephone is still bound to the underworld and must return for the other half of the year. In connection with this, I will explore the seasons and how winter is made out to be a time of gloom and sorrow while spring represents life and prosperity. This story was created as a way to explain these seasonal changes, why most nature fades during winter and returns during spring, and to also highlight the idea of life being a finite, delicate thing that can fade and also return. While only spring and winter take front and center in the story, I will also connect summer and fall into my analysis, displaying how this slow change in seasons reflects stages of Persephone's time on Earth, with spring being a season of new life, summer being peaceful bliss, and fall showing warning signs of death. This story was created as a way to explain these changes and how they all make up the cycle of life, and eventually, death, and how this death is unavoidable. However, life will continue on, even though death's constant grasp on the world.

## **Mathematics**

### **24. *The Mathematical Basis of General Relativity***

**Presenter(s):** Trevor Kling, Natanael Alpay

**Advisor(s):** Dr. Mihaela Vajiac

In 1915, Albert Einstein introduced his theory of gravitation known as general relativity. The development of Riemannian geometry enabled the precise formulation of Einstein's general theory of relativity. In this project, we investigate the mathematical underpinnings of the theory to better understand the meaning and implications of these formulae. The central results of general relativity are the Einstein field equations, which relate the geometry of spacetime to the distribution and motion of matter within it. While frequently introduced purely through tensor manipulation, these equations have a rich mathematical basis that we explore in this poster. In general relativity, equations are defined over spacetime, a union of three spatial coordinates with a single time coordinate. From a Riemannian geometry perspective, spacetime is formally defined as a pseudo-Riemannian manifold, which is a differentiable manifold equipped with a nondegenerate metric tensor. To better understand this concept, we introduce the notion of manifolds, metrics, and a variety of operations on manifolds related to tensors. Additionally, spacetime is referred to as "curved," and to explain the implications of this statement we define notions of curvature on manifolds, such as the scalar curvature and the Ricci Curvature. We conclude by examining solutions to the Einstein equations and their implications for cosmology.

## **Political Science**

### **25. *Mass Shootings: Conspiracies, Fear, and the Media***

**Presenter(s):** Karsyn Aoki

**Advisor(s):** Dr. Ann Gordon

Media, whether it be traditional news sources or social media platforms, has a powerful impact on people's interpretation of mass shootings. It can create excess fear or feed the fire of conspiracies that make people disregard the severity of situations and their victims. In this paper, I analyze the impact of different media formats and their overall influence on how seriously Americans fear and believe in these events. I predict to find two distinct groups, one of which is extremely fearful of shootings and another that believes conspiracy theories on shootings and other mass murder events. Utilizing the Chapman Survey of American Fears, a representative national sample of US adults, I hypothesize that those with higher fear of shootings are younger groups since shootings are popular in school and crowded settings like concerts which younger people are more willing to attend and therefore be more at risk of becoming a victim. Also, that the groups with higher fear ratings choose to get their news from either online networks or politically left-leaning traditional broadcast networks. Contrastingly, those who believe conspiracy theories are to be older and choose to get their news from television networks like Fox News. These findings will help clarify why groups tend to lean to the extremes of fear and disregard, and how media can be changed into reporting events like mass shootings more responsibly to avoid wrongful interpretations.

### **26. *Beliefs and their Byproducts: The Impact of Religiosity and Political Ideology on Attitudes Toward COVID-19, Vaccines, and Climate Change***

**Presenter(s):** Philip Goodrich

**Advisor(s):** Dr. Ann Gordon

Several studies have indicated that an individual's level of religiosity impacts their views toward science and scientific phenomena. Moreover, research shows that these views can also be impacted by an individual's political affiliation and ideology. In this research paper, I examine the relationship between one's religiosity



and political ideology and their attitude toward the novel coronavirus (COVID-19), vaccines, and climate change. Using data from the 2021 Chapman University Survey of American Fears, I find that while religiosity plays a role in one's attitudes toward these three scientific phenomena, the greatest correlation stems from one's political ideology. In other words, this study shows that when evaluating one's outlook on COVID-19, vaccines, and climate change, an individual's political views serve as a more substantial indicator of one's perspective than religiosity. Tackling COVID-19, combating climate change, and convincing the public of vaccine safety and efficacy is of the utmost importance. These issues cannot be properly addressed if leaders, governments, and organizations do not understand the viewpoints of the general public. The conclusions of this research will allow these stakeholders, along with society as a whole, to gain a better grasp of the audiences in which they are dealing with as well as an enhanced awareness of why different individuals adopt certain attitudes toward scientific issues.

## **Psychology**

### ***27. Types of Bias-Based Bullying and School Climate Perceptions, Attendance, and Grades***

**Presenter(s):** Erin Bonham

**Advisor(s):** Dr. Meghan Cosier, Dr. Desiree Crevecoeur-Macphail

Bias-based bullying relating to disability, sexual orientation, and gender identity has extremely detrimental effects on the victim's school climate perceptions, attendance records, and academic achievement. This study used a cross-sectional research design to compare the self-reported school climate perceptions, attendance habits, and grades of student-victims of disability-based bias-related bullying and sexual orientation- and gender identity-based bias-related bullying using secondary data from the California Healthy Kids Survey. Participants ( $n = 322,369$ ) filled out the California Healthy Kids Survey self-report surveys in the years 2017, 2018, and 2019. Regression analyses and a two-sample t-test were used to analyze and compare the relationships between gender identity- and sexual orientation-based bullying versus disability-based bullying and self-reported student grades, attendance rates, reasons for absences, and school climate perceptions. When compared to students who experience gender-identity- or sexual orientation-based bullying, students who experienced disability-based bullying had significantly more negative perceptions of their schools' climates. Victims of disability-based bullying also reported more absences and lower grades than victims of gender-identity- and sexual orientation-based bullying. Also, when compared to students who reported experiencing sexual orientation- and gender-identity-based bullying, students who reported experiencing disability-based bullying more frequently reported missing school due to mental or physical illness, bullying or mistreatment in school, feeling unsafe traveling to and from school, and feeling negative emotions such as sadness, hopelessness, anxiety, stress, or anger. The findings were used to determine where certain interventions for victims of sexual orientation- and gender identity-based versus disability-based bias-related bullying are needed.

### ***28. Sex as a Moderator in the Relationship Between Post-Operative Pain and Analgesics Administered in Children Undergoing Elective Surgery***

**Presenter(s):** Amber Osorno

**Advisor(s):** Dr. Brooke Jenkins

About 85% of children who undergo elective surgery experience pain post-operatively and many do not receive proper pain management care after discharge. Most parents lack an understanding of proper pain care management using analgesics upon discharge. Research reveals that adults rate girls as more sensitive to pain and that they display a greater amount of pain in a pediatric post-operative environment. In adulthood, women report more sensations of pain and have a higher pain tolerance, which can be attributed to physiological characteristics. Nonetheless, the social differences by which boys and girls experience pain and express their

pain cannot be denied. The purpose of this study is to understand the relationship between a child's post-operative pain and the amount of analgesics given to the child, and how sex moderates this association. Parents of children ages 2-13 (59% male, 41% female) (N=112) were asked to evaluate the pain of their child and report the amount and type of analgesic use days 1, 3, and 7 post-operatively. The Parents Perceived Pain Management (PPPM) Scale was used to evaluate the child's pain and analgesic use was self-reported. Using this scale in regression-based analysis, there was a significant association between pain and the amount of analgesic use given to the children on post-operative days 1 (ibuprofen:  $b = 0.24$ ,  $t = 3.55$ ,  $p < 0.05$ , acetaminophen:  $b = 0.22$ ,  $t = 5.38$ ,  $p < 0.05$ ) and 3 (ibuprofen:  $b = 0.72$ ,  $t = 4.81$ ,  $p < 0.05$ , acetaminophen:  $b = 0.34$ ,  $t = 4.44$ ,  $p < 0.05$ ); however, sex did not significantly moderate this association ( $ps > .05$ ). Evidence in this study does not suggest that boys receive different postoperative analgesic care from girls as a function of pain. Future analysis should analyze factors that interact with this association like the sex of the parent that is administering analgesics and the parent's education of analgesic usage.

**29. *How Would You Feel If Your Child Was LGBT? Effects of Target Gender and Sexual Orientation on Expressed Prejudice.***

**Presenter(s):** Debbie Nguyen

**Advisor(s):** Dr. David Frederick

INTRODUCTION: Stigma against the LGBT community is fostered by both mainstream and minority cultures. Over the past several decades, however, a more positive framing of LGBT identity has become more widespread. In Southern California, Asian American youth are often exposed to anti-LGBTQ messages from parents due to traditionally negative views of homosexuality and valuations of gender conformity in some Asian cultures. These views compete with the LGBT-affirming perspectives that have become common in Southern California. GOALS: The goal of our study was to examine the extent of prejudice faced by people with different genders and sexual orientations, and also test how religiosity, ethnic identity, and ethnicity relate to these attitudes (Whites and Asians). METHODS: We surveyed 1229 university students in Southern California. In a 2X4 within-subjects design experiment, we examined how target gender (man, woman) and identity (heterosexual, homosexual, bisexual, transgender) interacted with participant ethnicity, ethnic identity, and religiosity in shaping anti-LGBT prejudice. Prejudice was assessed using social distance measures. FINDINGS: We found that trans targets received the greatest prejudice. However, the average participant had positive views of all identity groups. Asian participants reported more discomfort towards LGBT identities than White participants, but there were few correlations between ethnic identity and prejudice found for Asian participants. Religious identity was found to be significantly associated with negative attitudes towards LGBT identities. IMPLICATIONS: Our findings highlight the sexual minority groups who face elevated prejudice, and how this relates to one's own ethnicity and identity. The present study emphasizes the importance of examining attitudes towards transgender individuals, as anti-trans prejudice was particularly elevated, even within the context of Southern California.

**30. *Resilience Factors in LGB Veterans: A Scoping Review***

**Presenter(s):** Riley Murphy

**Advisor(s):** Dr. Jessica Walker

The resilience construct can be defined in many ways, and is often considered a trait, a dynamic process, or an outcome. Resilience factors, which are the main contributors of resilience in the face of adversity, can consist of personality traits, engagement in the community, or lived experiences. Recently, research involving specific groups and marginalized populations has pointed towards the existence of population-specific resilience factors. The goal of the current project is to better understand the LGB Veteran population and gain insight into their resilience. More specifically, this review seeks to explore the following questions: Are there population-specific resilience factors in the LGB Veteran population? If so, what are they? Are there gaps or

discrepancies in the literature regarding resilience factors in LGB Veterans? Scoping review methodology was utilized using broad search strategies to fully evaluate the extent of the current literature on LGB Veteran resilience factors. Abstract screening and full text screening was completed by two independent reviewers for inclusion in the review. Included articles were then extracted of all relevant information using an Excel form. We identified several resilience factors specifically related to the LGB Veteran population in multiple domains, such as community-based, interpersonal, and intrapersonal factors that contributed to an LGB Veteran's resilience. We were also able to evaluate differences in resilience factors between the LGB population, Veteran population, and the LGB Veteran population, further supporting the notion of population-specific resilience factors. Our findings, however, suggest the need for a uniform, specific definition of resilience. Future research should consider conducting interviews and more research with the LGB Veteran population to further determine additional resilience factors.

**31. *The Effects of Workplace Stressors, Discrimination, and Racism on Younger Black Women***

**Presenter(s):** Crystal Coleman

**Advisor(s):** Dr. Desiree Crevecoeur-Macphail

The intent of my thesis project is to examine the impact workplace stressors (e.g., racism, discrimination, and harassment) have on black women. The minority stress theory (Meyer, 2003) suggest that minorities often experience greater levels of stress due to their identities. Prior studies have looked at black women as a whole or have looked into specific careers to see how the impacts of workplace stressors may affect black women. This thesis makes a contribution by looking into a specific age group -younger black women. The research methodology involves surveying those who identify as women and are between the ages of 18 and 45. This thesis uses several inventories to ask various questions relating to the hypotheses. It is expected that younger black women will deal with racism by relying on more social support than older black women. The absence of interpersonal relations at workplace will encourage black women to leave a job sooner than if they had interpersonal relationships. Black women who deal with workplace racism experience higher levels of anxiety than those who don't. And, finally, that Black women who experience more sexual harassment than other women in the workplace. The results of this study will be useful in providing insight on to how black women cope with workplace stressors and discrimination.

**32. *Adverse Childhood Experiences and their Role in Shaping Behavior and Well-being***

**Presenter(s):** Jordyn Krohn

**Advisor(s):** Dr. Desiree Crevecoeur-Macphail

Adverse childhood experiences were examined for their significance in influencing individual's mental health. There have been great strides in the mental health world that show the impact early experiences can have later on in life. That along with the shocking statistics that 1 in 4 children experiencing some form of trauma before the age of 18 are what drive this study to look into such a topic. Students from Chapman University were asked to answer questions from the ACE Questionnaire (Brown & Ryan, 1998), the MAAS (De Haan et al., 2011), the PANAS (Watson et al., 1988), RT-18 (De Haan et al., 2011), and the WHO-5 Well-being Index (Topp et al., 2015). Total scores from the ACE Questionnaire were compared against scores from the other surveys to assess the relationship between adverse childhood experiences and mindfulness, risk-taking behavior, overall well-being, and emotional intelligence. It was predicted that when participants recorded more adverse childhood experiences, they would have scores for the MAAS reflecting a lower level of mindfulness, a lower emotional intelligence quotient demonstrated by the PANAS, and would be less likely to report greater overall well-being via results from the WHO-5. For assessing risk-taking behavior this study looked more so at the frequency and severity in which men partake in the behavior compared to women when both report high ACE scores.

**33. *Resilience of Sexual Assault Survivors: Promotive Factors***

**Presenter(s):** Mariana Segovia

**Advisor(s):** Dr. Desiree Crevecoeur-Macphail

The present study examines how promotive factors influence the resiliency of sexual assault survivors. Resilience is defined as conceptual framework that encompasses different variables and explains how these variables can interfere with or completely change a negative outcome that was caused by stressors and/or adversity. This study examined personality traits, types of coping skills, socioeconomic class and self-compassion as possible variables that might influence the resiliency of sexual assault survivors. All these variables have been shown to be important promotive factors when overcoming life struggles, but they have not been studied when it comes to overcoming the trauma that resulted from being sexually assaulted. 128 undergraduate students were recruited from Chapman University and California State University Dominguez Hills. From the 128 students, 37 reported being sexually assaulted or harassed. Participants were asked to complete a survey packet that included the Self-Compassion Scale, the Brief\_ COPE scale, the 10-item Personality Inventory, and the Connor-Davidson Resilience Scale. Participants were also asked to self-report their socioeconomic status. Results should show a positive relationship between self-compassion score and resiliency scores, a negative relationship between high neuroticism personality trait score and resiliency score, a positive relationship between socioeconomic status and resiliency score, and a positive relationship between problem-based coping skill score and resiliency score.

**34. *A Data-Driven Approach to Mood Classification and Neurofeedback***

**Presenter(s):** Emma Chen, Victoria Caldera, Riley Murphy, Natalie Richardi

**Advisor(s):** Dr. Uri Maoz, Elnaz Lashgari, Jake Gavenas

The current standard of care for depression consists of antidepressant medication coupled with psychotherapy. However, critical shortcomings with this route (e.g., variable efficacy, adverse side effects, and treatment-resistant depression) indicate a need for alternative treatment methods. Neurofeedback is a type of therapy in which patients learn to regulate their brain activity by way of real-time external feedback, and has previously been used for depression treatment (e.g. Choi et al., 2011). Unlike previous studies, however, we adopt a data-driven approach, using machine-learning to identify ideal neural regulation targets for each individual based on their own brain activity. We first record electroencephalography (EEG) from a mood-induction paradigm, then train machine-learning algorithms to decode each participant's mood. Then, we will bring subjects back and give real-time external feedback based on personalized algorithms, allowing subjects to regulate brain activity underlying their mood. Here, we demonstrate the efficacy of classifying mood from EEG, a critical first step for this project.

**35. *Traditional Sexual Script and Double Standard Adherence: Predictors of Heterosexually Identified Women's and Men's Previous Engagement in Consensual Non-Monogamy***

**Presenter(s):** Nina Dours

**Advisor(s):** Dr. Amy Moors, Dr. Desiree Crevecoeur-Macphail

Consensual non-monogamy (CNM) is an umbrella term for all relationships in which an agreement has been made regarding having multiple romantic and/or sexual partners (Hauptert, Moors, Gesselman, & Garcia, 2017). Interestingly, a consistent gender difference has been found regarding CNM: heterosexual men systematically report greater engagement in CNM than heterosexual women (Hauptert et al., 2017). This gender difference raises the question: Why do women and men differ in their engagement in CNM? This gender discrepancy may be due to women's stronger adherence to the traditional sexual script, which is rooted in gendered dating norms, punishes women who engage in non-committed sexual behaviors, and glorifies monogamy (Fritz & Kitinger, 2001). Using the theoretical framework of sexual script theory, this secondary data analysis uses a nationally representative sample of US adults ( $n = 3,438$ ) to examine how heterosexual men's and women's

adherence to the sexual script affects their engagement in CNM. Relevant to this study, participants completed three measures that will be analyzed: 1) endorsement of the sexual script (attitudes towards sex and love; (S. S. Hendrick & Hendrick, 2002), 2) endorsement of the sexual double standard (level of permissiveness towards casual sex; (C. Hendrick, Hendrick, & Reich, 2006), and 3) previous engagement in open-relationships and polyamorous relationships. Due to the mono-normative nature of the current sexual script, greater endorsement of both the traditional sexual script (IV1) and the double standard (IV2) is hypothesized to be related to less reported engagement in CNM. Gender is expected to moderate the effect of these independent variables such that women's greater endorsement of the traditional sexual script and sexual double standard will drive their resulting lower reports of engagement in CNM. This is the first study to attempt to understand gender differences in CNM engagement, and it will thus allow for expansion on the current understanding of CNM relationships, which continue to be understudied (Moors et al., 2013).

**36. *Exposure to Generative Messages May Boost Cognitive Performance in Older Adults***

**Presenter(s):** Natalie Standridge, Clarissa Tadros

**Advisor(s):** Dr. Tara Gruenewald

Generativity is meaningful care and contributions to others, especially younger generations. Greater engagement in generative activity and greater perceptions of oneself as a generative force in the lives of others have been found to predict better cognitive and physical functioning, mental well-being, and greater longevity in older adults. In a previous investigation (Hagood & Gruenewald, 2018), we found that exposing older adults to messages of older individuals being a generative force in society elicited improvements in cognitive performance on a verbal memory task as compared to exposure to messages of older adults being a social burden. However, this former study did not include a neutral condition raising concerns that generativity priming might not drive enhancements in cognitive function but instead that social burden priming may depress cognitive performance. The present investigation aimed to replicate our prior findings in a modified experimental protocol that included a neutral non-social prime condition and which deployed the experimental protocol in an online testing environment. A total of 304 adults age 55 or older completed our online experiment in the Amazon Mechanical Turk platform. Participants completed demographic and psychosocial assessments and then completed a series of cognitive tasks. The priming manipulation (generativity, burden, or neutral prime) was embedded in the set of tasks and presented as a measure of reading comprehension and recall. Verbal memory performance was tested following the priming exposure task. An ANOVA analysis indicated that verbal memory performance varied by experimental condition ( $F(2,4)=3.41$ ,  $p = .034$ , with higher levels of performance in the generativity priming group ( $M=17.3$ ) as compared to the social burden ( $M=15.9$ ) or neutral ( $M=15.6$ ) prime conditions. Memory performance did not differ between the burden or neutral conditions, suggesting that exposure to messages that one's social group makes meaningful contributions to others and society may boost older adults' cognitive performance.

**37. *Analysis of the Levels of Embodiment and its Relationship with Depression and Anxiety***

**Presenter(s):** Erin Kelly

**Advisor(s):** Dr. David Pincus

Embodiment is a relatively abstract psychological concept that refers to the connectedness between the mind and the body and how one is able to perceive themselves and their situations. In previous research, it was shown that embodiment is correlated to anxiety and depression. This finding prompts analysis between the variables in order to look at the relationship between embodiment and depression as well as the relationship between embodiment and anxiety. This study aims to take a deeper look at this correlation by investigating the differentiating levels of embodiment (low, medium, high) and finding which levels correlate to higher or lower depression or anxiety. Previously collected data by Pincus et al. (2019) is utilized and the measures investigating depression, anxiety, and embodiment are isolated and used within the analysis. The analysis will

result in descriptive statistics on embodiment, anxiety, and depression, scatterplots displaying the relationships, and quartiles to show the levels of embodiment. These results will be able to give a further explanation as to how embodiment relates to anxiety and depression. The significance of this study is to find which level of embodiment is ideal in terms of having low depression and anxiety and thus a healthier mental status.

**38. *Psilocybin Microdosing in Healthy Volunteers: Comparative Effects on Sleep, Brain Activity, Psychosocial, and Cognitive Functioning***

**Presenter(s):** Gilana Pikover, Leyla Rakshani, Sharon Cohen, Alice Wong

**Advisor(s):** Dr. Amir Raz, Dr. Uri Maoz

Microdosing psychedelic drugs refer to the frequent use of low doses of psychedelics for an extended period of time, during which people go about their daily routines. Recently, microdosing has become popularized as a way to enhance mood, cognition, empathy, and cordiality in working with others. Psychedelics have been seen to induce altered states of consciousness, dreaming, and perception. Psilocybin is also chemically and structurally similar to serotonin, allowing it to stimulate serotonin-sensitive neurons in the brain. Serotonin is also closely linked to sleep and dreams, therefore this study is also interested in investigating the connection between microdosing psilocybin and dreams, and if psilocybin has any effect on lucid dreaming. Lucid dreamers have the ability to control their dreams by becoming conscious that they are dreaming while asleep. This phenomenon along with the effects of microdosing psilocybin may pose an interesting change in sleep systems. To investigate dreams, participants report dream content and sleep quality after taking a psilocybin microdose the night before. Thus, this study's objective is to investigate the effects of psilocybin microdosing on various human functioning measures, including empathy, sleep architecture, psychosocial and cognitive functioning, and dream states.

**39. *Prevention of School Shootings: Understanding Generational Perceptions of School Shooters***

**Presenter(s):** Hannah Ravitch

**Advisor(s):** Dr. Edson Cruz, Dr. Jessica Walker, Dr. Ed Dana

School shootings are a global phenomenon that have attracted public and academic interest since the Columbine shooting in 1999. Social scientific research focuses on underlying causes of school shootings and identifies factors that may lead to these acts of violence. My interdisciplinary study fills a gap in this literature by using psychological and sociological theories to examine the public's perceptions of school shooters. Specifically, I identify and analyze the perceptions of school shooters held by different generational groups, including Gen-Z and Baby-Boomers. Between January and March 2021, I used various social media platforms to distribute an online survey with scaled questions about school shooters and their characteristics. I hypothesize that younger age groups perceive school shooters as victims of society and personal life circumstances, including mental conditions, bullying, and parenting. Additionally, they may have more explanations for why school shooters commit these acts of violence. By contrast, I expect that older age groups will most likely perceive school shooters as sole perpetrators of the shootings and have fewer explanations for why school shootings occur. My research has the potential to decrease school shootings in the future. As institutions better understand the widespread perceptions of school shooters, they can design preventative programs and effectively communicate about school shootings with teachers, policymakers, and therapists.

**40. *Conditions of Achieving Flow State***

**Presenter(s):** Mary Harding

**Advisor(s):** Dr. Desiree Crevecoeur-Macphail

The purpose of this research is to understand what the optimal conditions are of entering a flow state. Understanding the precursors to flow can help people master the ability to enter into a state of high



performance in everyday situations. Csikszentmihalyi found that the conditions for entering flow include: opportunities that stretch but do not overmatch a person's existing skill set, and clear goals and immediate feedback about progress. Guided by these findings, it is under these conditions that a seamless and rewarding experience can unfold (Csikszentmihalyi, 1975, 2000). One hypothesis of this study is that individuals will report less flow state elements if there is not a balance in challenge to skill ratio compared to individuals who do report a balance in challenge to skill ratio. Prior research has found the interaction of body movement and the activity contributes to the experience of flow (Chirico et al., 2015). The current study hypothesizes that individuals who report a significant sense of embodiment will be more likely to report flow state elements compared to individuals who do not report a significant sense of embodiment. The literature on flow also points out the importance of mental preparation as a precursor to experiencing flow qualities (Norsworthy et al., 2017). The current study intends to expand on the research involving the role of meditation and mindful intention setting in the flow experience. It is hypothesized that athletes and musicians who practice meditation three times per week will report experiencing more elements of flow and higher performance results compared to athletes and musicians who do not practice meditation. Participants in this study will take a pre-survey before a performance and a post-survey immediately after, measuring flow, embodiment, and challenge to skill ratio. The treatment group will meditate 3 times a week before performance.

## **Religious Studies**

### **41. *Women in Leadership: Quakerism and Voodoo***

**Presenter(s):** Caroline Gardner

**Advisor(s):** Dr. Julye Bidmead

Religion, like many cultural practices, is a gendered experience. Historically in the United States, both Quakerism and Voodoo have defied standards for women's representation amongst religious practices. Quakerism, The Society of Friends, was founded on the belief that all men and women were equal in the eyes of God. Upon their emergence in the United States in the seventeenth century, Quakers provided the most equitable roles for women within the Christian tradition. Voodoo, developed from a combination of African and Catholic traditions, materialized in the states soon after and offered similar opportunities for female participation. Though these religions are vastly different in ideologies, historical development, and ritual practices, the emphasis in both traditions on gender equality allows women to serve as religious leaders. Female practitioners, Mambos, played a dominant role in Voodoo in the United States- specifically, Louisiana. Both the early Quaker women and early Voodoo priestesses were chastised for their leadership because they threatened the pre-established patriarchal religious ideologies of other religions, particularly Protestant Christianity. My research explores the religious roles of women in Quakerism and Voodoo in the context of their socio-historical background.

## **Sociology**

### **42. *How do undergraduate students practice off-grid culture and what does it mean to them?***

**Presenter(s):** Bentley Kandel

**Advisor(s):** Dr. Edson Cruz

The off-the-grid living movement has arisen in the last few decades and has been the topic of conversation in numerous sociological circles. These "off-gridders" are moving back to locations where they can be self-reliant, and work to benefit themselves and the others in their society. Previous research in this field has come to different conclusions based on the sample of people that have been studied so far. Technology, life stages, and life meaning have become common topics in the off-grid conversations and offer more opportunities for further research on these topics. My study addresses the younger generation, undergraduates, a generation not heavily studied in previous research, and how they use technology. I interviewed undergraduate students

who participate in a non-technological activity and I am focusing on their use of technology, experience with technology, and attitude toward "off-gridness". I expect that undergraduates will have similar relationships to these variables and that their relationship will be different than that of the previously studied older generations. This topic impacts how younger generations will function in society and interact with each other. Furthermore, this study is relevant in the current era, because society has become increasingly concerned with the advancements in technology, and there appears to be no limit on the amount and advancements of it. Therefore, most individuals in American society use technology every day, thus this study may shed light on how individuals are navigating the increasingly complex technological landscape.



## **Biochemistry and Molecular Biology**

### **1. *Synthesis of Fatty Acyl Conjugated Cell Penetrating Peptides for siRNA Delivery***

**Presenter(s):** Yeseom Cho

**Advisor(s):** Dr. Rakesh Tiwari

siRNA can efficiently silence the specific targeted gene by interacting with RNA-induced silencing complex (RISC) to degrade mRNA. siRNA has a potential to treat cancers without causing the side effects observed in the traditional chemotherapeutic agents. The biggest obstacle for siRNA to reach the bedside is impermeability to cell membranes. Cell penetrating peptides have shown promise in successfully delivering siRNA intracellularly to cause gene silencing. In our lab, we proposed to synthesize the library of peptides and their fatty acyl conjugates with the sequence of C18-(R)<sub>n</sub>-(HR)<sub>4</sub>; C18 is oleic acid and n= 0,1,2,3,4 & 5. We synthesized the peptides and their conjugates using Fmoc SPSS. The preloaded protected amino acid on Wang resin was used to synthesize peptides with the sequences mentioned above, the portion of which were acylated using HBTU/DIPEA. The peptides were cleaved using the cleavage cocktail reagent R. After 4 hours of cleavage, the peptide was precipitated using cold diethyl ether, followed by centrifugation and purification using RP-HPLC. We used the gradient system of water and acetonitrile in 0.1%TFA (v/v) from 0 to 100% in one hour. After purifications, the fraction was collected and analyzed by MALDI. The fractions were pooled and lyophilized to obtain the solid powder of peptides and their conjugates. The expected and obtained masses of purified peptides and their conjugates are as follows: (HR)<sub>4</sub> [1191.6436 amu; 1191.6211 amu], R1-(HR)<sub>4</sub> [1347.4948 amu; Not obtained], R2-(HR)<sub>4</sub> [1503.6836 amu; Not obtained], R3-(HR)<sub>4</sub> [1658.9514 amu; 1660.622 amu], R4-(HR)<sub>4</sub> [1815.0535 amu; 1816.513 amu], R5-(HR)<sub>4</sub> [1971.1536 amu; 1972.483 amu], C18-(HR)<sub>4</sub> [1455.8391amu; 1456.039 amu], C18-R1-(HR)<sub>4</sub> [1611.4398 amu; Not obtained], C18-R2-(HR)<sub>4</sub> [1767.6586 amu; Not obtained], C18-R3-(HR)<sub>4</sub> [1923.1939 amu; 1924.404 amu], C18-R4-(HR)<sub>4</sub> [2079.3004 amu; 2080.557 amu], C18-R5-(HR)<sub>4</sub> [2235.4302 amu; 2237.599 amu]. The synthesized and purified peptides will be used for determining their ability to deliver siRNA in MCF-7 and MDA-MB-231 cancer cells.

### **2. *Synthetic Platelets Derived from Designed Microgels***

**Presenter(s):** Sanika Pandit

**Advisor(s):** Dr. Andrew Lyon, Dr. Molla Islam

The body's ability to manage thrombosis by forming clots is an essential function crucial in wound healing. In order to help control blood clotting when the body is unable to, microgels have been designed and finely tuned in order to carry out specific functions. In order to address the need for platelets in trauma applications, our group has collaborated with several other groups to create platelet substitutes that we call Platelet-Like-Particles (PLP). Ultra-low crosslinked (ULC) particles were synthesized as a base and then conjugated with Fibrin Fragment E to make PLPs. To visualize how the PLP's interact with a fibrin network, the PLPs were labeled with a dye and then visualized on a confocal microscope. Confocal microscopy allows for imaging of microgels in real-time to better understand how simple polymer particles can recapitulate complex biological functions, such as clot formations. By visualizing the microgel particles and applying the airy scan technique in the super resolution mode of the confocal microscope, we were able to characterize the particles and get more qualitative and quantitative understanding of how the particles interact with nascent fibrin clots.

## **Biological Sciences**

### **3. *Review of Salmonella Risk in Raw, Ready-to-Eat Seafood***

**Presenter(s):** Megan Shieh

**Advisor(s):** Dr. Rosalee Hellberg

Worldwide, foodborne illness is estimated to cause 600 million cases and 420 thousand deaths annually. Around thirty-one pathogens are usually implicated in foodborne illness. Amongst them, Salmonella is the second leading cause of foodborne illness in the U.S. Although the main reservoirs for this bacterium are animals such as chickens, turkeys, pigs, and cows, unsanitary practices can lead to other foods becoming contaminated. Cross-contamination can be especially dangerous if the food is eaten without further cooking. Raw, ready-to-eat (RTE) seafood (e.g., sushi, ceviche) is not cooked and thus carries this heightened risk. Since seafood is not a major reservoir for Salmonella, the seafood industry's food safety practices do not focus on Salmonella. Moreover, consumer preferences for the sensory qualities of raw seafood make it challenging to reduce Salmonella growth. To anticipate and apprehend the risk of Salmonella outbreaks related to seafood, it is necessary to understand: (1) how prevalent Salmonella contamination of raw, RTE seafood is; (2) where Salmonella contamination occurs in the seafood production chain; (3) what seafood safety regulation are currently in place; and (4) what Salmonella-specific controls could be incorporated. This research project responds to these four statements by reviewing existing literature and government reports.

## **Chemistry**

### **4. *Synthesis and Characterization of Core-shell-shell Microgels***

**Presenter(s):** Dela Hatfield, Sanika Pandit

**Advisor(s):** Dr. Andrew Lyon, Dr. Molla Islam

The body's ability to properly control thrombosis is a vital function in maintaining human life; over or under-clotting of blood can lead to serious health problems and in many cases can be fatal. To address this unmet need, a number of bioengineering approaches have been developed to control bleeding. One class of materials that has demonstrated excellent utility in hemostasis is based on colloidal hydrogels, or microgels. This project specifically focuses on designing a core-shell-shell microgel for releasing tissue plasminogen activator (tPA) to break down clots. This drug release system will be specifically applicable to clotting experienced in the capillaries of COVID patients that eventually leads to organ failure. The synthesis of core-shell-shell pNIPAm-co-AAC (poly(N-isopropylacrylamide)-co-acrylic acid) microgels was developed and finely tuned in order to create microgels specific to this application. The core-shell-shell particles were synthesized through seed and feed precipitation polymerization to have a 10% BIS crosslinked core, 2% BIS crosslinked shell, and a ULC (ultra-low crosslinked) outer shell. The inner shell is designed with a dense clickable core to be fluorescently labeled, the 2% outer shell is designed to contain the tPA, and the ULC outer shell is meant to contain a fibrin specific antibody. High resolution laser scanning confocal microscopy, atomic force microscopy and dynamic light scattering were used to characterize the never before synthesized particles.

### **5. *Ketone Substrate Scope in Hydrosilylation Studies by a Carbodiphosphorane Catalyst***

**Presenter(s):** Vanna Kizirian

**Advisor(s):** Dr. Allegra Liberman-Martin

This research project aims to determine the effectiveness of a novel carbodiphosphorane catalyst in the hydrosilylation of ketones. The hydrosilylation involves the addition of a silicon-hydrogen bond across the C=O double bond of a ketone. In the carbodiphosphorane catalyst structure, two resonance forms either have two C=P double bonds or a structure in which the central carbon between the two phosphorus centers has two

lone pairs (double ylide form). This second resonance structure suggests that the carbon of the carbodiphosphorane may be strongly nucleophilic and may serve as a catalyst. We hypothesize that the carbodiphosphorane will be an efficient and sustainable catalyst for ketone hydrosilylation. These experiments are conducted in a nitrogen-atmosphere glovebox and are analyzed using  $^1\text{H}$  and  $^{13}\text{C}$  NMR spectroscopy. The study of a new metal-free catalyst is useful in organic synthesis because current catalysts are often toxic or expensive. Finding new efficient and low-cost catalysts benefits the organic synthesis industry, as carbonyl hydrosilylation is useful industrially for the synthesis of alcohol products. Carbodiphosphorane catalysts could potentially be an effective substitute for toxic and expensive metal catalysts and reduce the waste and emissions that are harmful to the environment.

**6. *Mechanisms and Chemoselectivity for Hypochlorous Acid (HOCl) Oxidation At A 2-Histidine/2-Cysteine Zinc-Sulfur Complex Implicated In Biological Redox-Signaling***

**Presenter(s):** Hannah Sandoval

**Advisor(s):** Dr. Maduka Ogba

Bacteria harness zinc-cysteine complexes to sense and respond to strong biological oxidants, such as hypochlorous acid (HOCl), generated by animal host systems during inflammation. A recent report from our lab shows that in the 3 histidine/1 cysteine family of zinc complexes found in chemoreceptor zinc-binding domains, HOCl oxidation at the zinc-bound cysteine proceeds through the direct transfer of the OH group to the bound cysteine (i.e., without the formation of sulfenyl chloride), contrary to the mechanism reported for unbound cysteines. Furthermore, this mechanistic preference and chemoselectivity for HOCl are governed primarily by minimizing the geometric strain around the zinc center during the redox reaction. The purpose of my project is to use computational chemistry techniques to examine the mechanism of HOCl oxidation at another family of zinc complexes with a 2 histidine/2 cysteine architecture. The overall goal is to determine whether the reported zinc geometric strain model more broadly explains HOCl-sensing across a broader scope of biological zinc-bound cysteines. First, the ground and transition states for the plausible HOCl oxidation mechanisms will be computed in order to determine whether the mechanistic preference for direct OH transfer is still operable. Then, the degree to which the zinc-complex is geometrically strained during the redox process will be revealed through a technique called distortion-interaction analysis. In this poster, the literature precedent for this project, the research methodology, preliminary data, and hypotheses for redox reactivity differences at both zinc-cysteine complexes will be presented.

## **English**

**7. *The "S" Word: Socialism***

**Presenter(s):** Nathan Reynoso

**Advisor(s):** Dr. Jan Osborn

During the 2019 State of the Union Address, President Donald J. Trump announced that his administration was alarmed "by the new calls to adopt socialism in [the United States]." Pointing to Venezuela as an example of a socialist-state failure, Trump affirmed that "America will never be a socialist country." Republicans roared in applause, subsequently filling the United States Capitol with a thunderous chant of "U-S-A." Yet, Democrat Socialists, like Alexandria Ocasio-Cortez and Bernie Sanders, sat in silence with disapproving brows. With political polarization intensifying in the United States, Republicans continue to paint "socialism" as an extremist political ideology. But why is "socialism" a dirty word in the U.S.? Why are self-proclaimed socialists identified as anti-American? And how is socialism a threat to democracy? By applying Michael Calvin McGee's rhetorical theory of the Ideograph, this project will examine the rhetoric of socialism in the United States and how the term has been conditioned to become synonymous with "communism" or "totalitarianism." As I trace the

history of anti-socialism ideology in the United States into a 7-minute video, I will highlight the skewed rhetoric from domestic propaganda (e.g., Dictators or Democracy?, McCarthyism, and Trump Campaign ads) that has constructed the knowledge of "socialism" among Americans today, for the purpose of reclaiming the term as a political and economic approach for equity.

### **Environmental Science and Policy**

**8. *Relationships Between Arsenic Encapsulation, Speciation, and Bioaccessibility in Mine Tailings From the Empire Gold Mine, CA***

**Presenter(s):** Micah Char

**Advisor(s):** Dr. Christopher Kim

Waste material left over from the processing and extraction of metals in mining areas can contain associated and elevated levels of toxic metal(loid)s including arsenic (As), which can be mobilized into surrounding communities and incidentally ingested or inhaled by residents or recreational visitors to these sites. Additionally, physical and chemical weathering processes can affect contaminant bioaccessibility in ways that may influence risk estimates for surrounding residents. Mine-impacted waste materials from the Empire Gold Mine in Grass Valley, California were collected as bulk grab samples from twenty sites including mine tailings and waste rock, then separated via mechanical sieving into eleven distinct size fractions ranging from  $\geq 2830$   $\mu\text{m}$  to  $\leq 20$   $\mu\text{m}$ . Portions of select size fractions were then crushed with a ring mill to  $\leq 10$   $\mu\text{m}$ . Nitrogen absorption surface area analysis and initial elemental concentrations (including arsenic) were measured for unground and ground samples. In vitro simulated gastric fluid extraction tests were performed on both unground and ground size fractions to determine the bioaccessibility and relative change in bioaccessibility of As. Arsenic speciation on select unground and ground size fractions was also conducted through linear combination fitting of EXAFS spectra collected from beamline 11-2 at the Stanford Synchrotron Radiation Lightsource (SSRL). Arsenic bioaccessibility was highly variable and correlated with both particle size and the presence of soluble As species. Controlled crushing experiments and As speciation analysis demonstrate that this correlation primarily arises through the removal of soluble As phases from within larger particle sizes. These findings demonstrate extended and possibly increasing As bioaccessibility in mine wastes over time, corresponding to subsequent increases in long-term exposure risk through incidental ingestion following physical weathering of As-bearing mine wastes.

### **FFC**

**9. *Gods and Goblins: The Trickster Motif in Greek and Korean Mythology***

**Presenter(s):** Deborah Kang

**Advisor(s):** Dr. Jule Bidmead

The trickster motif is prevalent among most, if not all, forms of mythology across cultural and ethnic groups. It usually entails a god or a mischievous creature manipulating specific gods either for their own benefit, entertainment, or to punish the victim for a past wrongdoing. This motif is present in both the Greek mythological system as well as in Korean mythology and folklore. The Greek gods are transcendent, divine beings from above who clash more with themselves than with the humans. Hermes is the classic example of godly trickery. As a child, he stole his brother Apollo's sacred cattle and managed to avoid punishment by gifting Apollo the first lyre. In Korean mythology, there are less "divine" gods and more "household" gods, supernatural creatures who live in close proximity to humans and often trick those humans with riddles and games. The dokkaebi, or goblin, is most often credited with these mischievous actions, however, they also reward those who do good. The Greeks's divine gods resulted in the interpretation that the gods clashed with

themselves rather than with lowly humans, while the Korean's localized household gods resulted in close interaction with the supernatural and humans. A close comparison of the two mythological systems, through the motif of the trickster, would reveal the cultural, ethnic, or religious differences that influenced the tales we hear today.

**10. *The Story of Creation: Vietnamese vs. Greek Mythology***

**Presenter(s):** Olivia Nguyen

**Advisor(s):** Dr. Julye Bidmead

Honored by many, the bravery of a young man named Lạc Long Quân has served as a distinct tale of depicting the origins of the Vietnamese people. Conquering horrific mythological beasts, saving villagers from the enemy's wrath, Lạc Long Quân has carved his identity as a hero. In the country of Lạc Việt, Lạc Long Quân was the son of a successful king while his mother was a water dragon, allowing him to possess magical powers, resulting in extraordinary strength and supreme intelligence. An agreement with a neighboring kingdom to form a unity, Lạc Long Quân fell in love with the northern king's daughter, Âu Cơ, an immortal mountain fairy. She gave birth to one hundred eggs, hatching into beautiful children. As time passed, both became unsatisfied as they missed their homeland and agreed to divide their children into two groups. Fifty following their father into the underwater palace, while the other fifty following their mother into the mountains. The children of Lạc Long Quân and Âu Cơ are said to be the original ancestors of Vietnam. In modern times, the Vietnamese people refer to themselves as "the children of the Dragon and the Fairy", hinting at the country's origin of creation. This recollection continues to illustrate the importance of love, honor, protection, and the sacred bond of unity found in the Vietnamese culture.

**11. *Aphrodite and Qetesh: Greek System vs. Egyptian System***

**Presenter(s):** Francesca Snyder

**Advisor(s):** Dr. Julye Bidmead

Why doesn't Qetesh, like Aphrodite, have a male counterpart? Though the Egyptian mythological system was older than the Greeks, both were polytheistic—the well-known Greek goddess Aphrodite the goddess of beauty, love, fertility, and sexual love. The Egyptian goddess Qetesh was likely a fusion of the Semitic goddesses Anat, Astarte, or Asherah. Qetesh is the goddess of beauty, fertility, sexual love, nature, and sacred ecstasy. Unlike Qetesh, Aphrodite has a male counterpart who is the Greek god Eros, the god of love, lust, and homosexuality. Like Aphrodite, Qetesh is depicted nude as a representation of the ideal beauty standard for women. Qetesh is portrayed to be holding snakes in her right hand. Snakes are a phallic symbol, which represents male generative power. This may be why Qetesh doesn't have a male counterpart because she represents female power and male power. Snakes also represent fertility, a power both Aphrodite and Qetesh rule over. Both goddesses have relationships with sky deities. Hathor, the Egyptian sky goddess of love, joy, and fertility, is often associated with Qetesh. Aphrodite also has a relation with a sky god, the all-mighty Zeus, her father.

**12. *The Effect of Christianity on Ancient Armenia***

**Presenter(s):** Derrick Davidian

**Advisor(s):** Dr. Julye Bidmead

The Armenian people were the first Christian nation in the world, under the Armenian Apostolic Church. But before the Armenian state religion was officially Christianity in 301, their faith was consumed by pagan gods like the rest of the ancient world. The Armenian pagan gods share quite a lot of similarities with the Greek gods, because the early Armenian gods were a fusion of ancient Greek, Roman, and Mesopotamian ideas. But there are distinct differences between the Greek gods and the Armenian pagan gods. My research examines

the shift in Armenian faith and religion from pagan polytheism to monotheism. Also, I would like to compare the differences between the Armenian pagan gods and the Greek gods, to see what overlaps and what contrasts different cultures, nationalities, and groups portray their gods with. What virtues or characteristics they align with their gods. I think I will find a lot of similarities between the pagan gods and what each one represents, though I am extremely curious to see the differences. Regarding why the Armenian people shifted their religious orientation, I am curious to see what occurred, who played a pivotal role in the shift, and why other pagan countries did not change their faith. I think my research will display a lot of reasons why some ancient countries did not shift their religious orientation and why other ancient countries shifted their orientation from polytheism to monotheism.

**13. *Ancient Stubbornness***

**Presenter(s):** Willie Sine

**Advisor(s):** Dr. Julye Bidmead

Very present in both Greek and Mesopotamian mythology is one specific trope, stubbornness. Apparent by a myriad of gods in both realms, but the gods which accentuate their stubbornness the most are the gods of war. Through the comparison of these two ancient mythologies, their myths, and gods, I intend to uncover the deeper meaning of this common theme. With such similarities, it brings a multitude of questions. Why is this the case? What does this mean from an analytical approach? Do these connections and traits continue to exist in today's society? What does this tell us about the ancient societies that these gods inhabit? By looking at both Ares (Greek god of war), and Nergal's (Mesopotamian god of death and war) myths and actions in their respective realms, I intend to answer these questions and provide insight applicable to modern-day themes and conflicts.

**14. *Greek and Norse Mythology: The Hero Archetype***

**Presenter(s):** Cole Kershner

**Advisor(s):** Dr. Julye Bidmead

Norse mythology and Greek mythology have many similar themes such as the hero archetype. The Norse god of the sky, Thor, and the Greek god of strength, Hercules, are examples of this archetype. Both have similar powers such as enhanced strength, speed, and endurance. They also have similar themes within their respective myths; such as how they both have symbols of their strength, Thor with his hammer, and Hercules with his club. Along with this, both gods are challenged in various ways, Hercules with his 12 labors and Thor with the trickery of Utgarda-Loki. Through these challenges, both gods have to display their strength and cunning, and this builds their representation in today's media. As major heroes of their respective universes, today they are used to represent an ideal being that is both strong and charismatic. This is shown through in many forms of modern art, such as movies like Thor: Ragnarok, or Hercules.

**15. *Inspiring Love Stories***

**Presenter(s):** Zachary Patterson

**Advisor(s):** Dr. Julye Bidmead

Being Chinese, we tend to celebrate many different holidays throughout the year. One of my more favorite traditions we celebrate is the double seventh festival. The double seventh festival is considered to be the Chinese Valentine's day. On this day we celebrate the Chinese folktale called the "Cowherd and the Weaver girl". The folktale is a tragic love story between a mortal and goddess. They fall in love but are separated due to the goddesses mother. The couple did many things to convince the goddesses mother to approve of their relationship, but she continued to refuse. One night, a flock of birds called magpies, formed a bridge allowing



the couple to see each other for one night. That night was July 7th, and it continued to happen on the 7th day of the 7th Lunisolar Month. I compared this Mythic system to the greek love story of Hero and Leander. Hero and Lander share a very similar story as the two lovers are separated from each other. However, the story doesn't have much of a happy ending, as one night Hero is killed during his journey to see Leander. Leander then takes her own life to be with Hero. I picked these two myths because I felt they were very similar, despite their endings. Growing up, my Pau Pau (Chinese Grandma) would tell me the Chinese folktale story every Chinese Valentine's Day. The myth meant a lot to me and it stuck with me till this day. Both involve two couples who are separated due to certain aspects. Despite this, they still are madly in love and will do anything to be with each other, even if it's just for a night. My goal with comparing the two myths is to show how inspiring love myths can be in ancient culture society. However, not many people have heard of it. The Greek Myth of Hero and Leander I feel like is a fairly popular myth. I'm hoping to share the importance of the two, and show that the Chinese myth should be as popular as the Greek myth is.

**16. *Zeus and Odin, Kings of the Gods***

**Presenter(s):** Cody Wellington

**Advisor(s):** Dr. Julye Bidmead

If you are awarded the title, King of the Gods, you can be assured of your prominence in the pantheon. Whether that's in Norse mythology or Greek mythology it is extremely impressive. Zeus and Odin are two gods from separate mythical beliefs but they display many different similarities across mythological beliefs. Odin is the Norse god of war and death. He is the ruler of Valhalla which is where all the Viking warriors believed they went after death. Zeus on the other hand is the Greek god of the Sky and ruler of all other gods like Odin. Both Zeus and Odin were born from Titans and eventually witnessed the creation of mankind. In order for humans to be born, both gods had to rid the world of their father titans. Zeus and Odin both went on to have multiple children. Odin's son became Thor, the god of thunder and the sky, much like Zeus. Zeus' numerous children include Ares, Apollo, Artemis, Athena, Aphrodite, Hermes and Dionysus. These children of Zeus became some of them most renowned gods in Greek mythology. My research explores the parallels as well as unique characteristics of each of these "King of the Gods."

**17. *"Monstrous" Women Of Mythology***

**Presenter(s):** Destiny Lujan

**Advisor(s):** Dr. Julye Bidmead

In the story of Medusa, she was depicted as a monster. She could turn anyone into stone by looking into her eyes. This curse was caused by her being punished since Poesiden raped her in Athena's pure temple. Similar to the Romans story of Lucretia. She was raped by Titan, Tarquin which caused the downfall of Rome's Monarchy to turn into a Republic. Both womens bloody dead bodies hang on display. They serve as a reminder of dishonorable commitment to each kingdom. These two women have been depicted as unloyal, monstrous and other horrendous accusations since they were victims of rape. Shortly after being raped they both were dead. Their forsaken bodies being held on showcase for something they could not control. I will be further investigating the distratment of these two 'monstrous' women and how it has impacted their kingdom. Along, with the treatment it has affected women in today's state of being victims of rape.



**18. *Ares vs Athena***

**Presenter(s):** Michael Hovsepian

**Advisor(s):** Dr. Julye Bidmead

In the Greek society Athena, goddess of wisdom and war, was an intelligent and powerful god and Ares, the god of war, was the embodiment of power and skilled in combat. Athena was ultimately liked more by the gods and humans due to her quick thinking and kind nature, where Ares was extremely brutal and cruel. The main reason why Athena was favored over Ares was because of Athena's kindness towards both gods and humans. When the gods were in trouble Athena would offer her support and even taught humans how to tame horses for riding. Ares was often depicted as having his throne covered in human flesh, and seen by the gods and humans as a savage and cruel character. He was a cruel god, but humans did need him every now and then. Ares was essential to win many wars since his brute strength alone was something to fear; however, his second ability was his intelligence just like Athena. In the battle against Kratos, a powerful spartan leader, Ares uses his cunning abilities to lead Kratos to destroying a village with his family inside. Athena is not one to lack in this department either when she uses her trickery to deceive Achilles into killing Hector of Troy since the gods didn't like Hector Athena decided to step in and take charge over the dispute. In almost every myth made about Athena or Ares, their intelligence and strength are used to prove their godlike abilities. Both Athena and Ares can now be seen having similarities, but at the same time are extremely different in character. This goes to lead the question, who would win in a fight, Athena or Ares? Athena's ability to lead armies is undeniably powerful and strategically she is more powerful. However Ares is cunning and is the symbol of power and destruction. In a one on one fight it is believed that Ares would overpower Athena, however Athena may be able to use her intelligence to gain an advantage over Ares.

**19. *The Gods Of War and Their Parallels to Greek and Irish Society***

**Presenter(s):** Jason Dillon

**Advisor(s):** Dr. Julye Bidmead

Throughout history, the landscape of the world has been an ever-changing beast. In the days of developing civilizations, people everywhere fought to claim land. As a result, war was an important part of many cultures and was reflected in most pantheons. Greek mythology's Ares is recognizable due to his short temper and love for warfare. His bloodlust spreads across multiple tales, and although he is the most unpopular god, his actions explain some Greek behavior when myths regarding his involvement were applicable. Countless battles were fought in Ancient Greece due to their advanced reputation and access to natural resources like silver and gold. Greeks also fought to colonize other lands to expand their global influence, so although it was disfavored, they were accustomed to fighting, as emulated in their mythology. However, another set of legends in another country outlined a more peaceful god of war. Camulus, as the ancient Celts called him, was a Celtic god that was much less quick to anger. Unlike Ares, he fought defensive of his people instead of leaping at the chance to kill. He was heavily associated with iron, as that was what allowed the old Irish to fight at the time. The Irish are and always have been a rather peaceful nation. Since fighting for their independence from Britain and in their own civil war, they have mostly fought only when necessary for the United Nations peacekeeping force. Recalling Camulus's role in mythology, it is evident that their defensive beliefs were reproduced in this deity as they personified their principles regarding conflict. Ultimately, these contrasting gods of war prove that ancient gods offer a relevant glimpse into the collective personalities of the civilizations which revered them, and applying this principle to other gods gifts historians more knowledge regarding those who lived long ago.

**20. *Odin Vs. Zeus: Comparing the Two God-Kings***

**Presenter(s):** Kalil Alobaidi

**Advisor(s):** Dr. Julye Bidmead

When we read Nordic and Greek mythology, there is a never-ending list of characters that represent a multitude of different aspects of human and natural life. From death to romance, gods are often created as symbols for us to rally behind, characters that attempt to explain confusing or profound aspects of our existence. However, what is the purpose of creating a leader for these figures? And why do these leaders have such contrasting qualities? On one hand, we have Zeus, a philandering god of lightning with unparalleled strength who smites all enemies. On the other hand, we have Odin, a respected king famous for his infinite wisdom, yet also his ability as a god of war and battle. Both figures command respect from gods and mortals alike, but also have traits that are undeniably treacherous and sometimes immoral. Although these figures have similar roles in their respective cultures, their actions and character are extremely different. How do the personalities of these gods reflect what both Nordic and Greek cultures value? What does it say about human behavior that we create such imperfect figures to worship? To determine the purpose of these figures, we have to look at their stories of creation and the many relationships they carry. Do these characters exist to reassure us that human life is flawed and nobody is perfect? Or do Zeus and Odin represent the corrupting nature of power and the often blinding quest to seek it? An analysis of these characters is an attempt to shed light on both the Greek and Norse view of leadership, I want to look at how the “kings” that we choose to worship reflect on our own views of people in power.

**21. *Where Have All the Gays Gone?***

**Presenter(s):** Brian Racalbuto

**Advisor(s):** Dr. Julye Bidmead

Within Ancient Greek culture, homosexual relationships were not only present, but more widely normalized than we are led to believe. History has been tainted by a condemnation of homosexuality, as well as an erasure of any preexisting homosexual cultures. Even with the degradation of the institutions which caused this erasure of history, modern education still fails to strive for an accurate historical depiction of sexual orientation. Such a large plot hole within the history of the western world begs several questions. When and Where was homosexuality present in Ancient Greece and other archaic cultures? When and How did the de-normalization of non hetero-normative sexual orientation begin? Lastly, how do archaic homosexual cultures differ from modern homosexual culture and where can the erasure of history still be found in education and modern media?

## **Physics**

**22. *Quantum Trajectories for Qutrit Processors***

**Presenter(s):** Natanael Alpay

**Advisor(s):** Dr. Justin Dressel

Modern superconducting processors for quantum computation heavily use transmons, which are quantized nonlinear oscillators. Typically only the lowest two energy levels of a transmon are addressed, to produce a quantum bit. However, there has been recent interest in adding a third level to produce a quantum trit, which more compactly encodes information into the limited available hardware. The measurement setup is identical for both, but efficient descriptions have only been derived for quantum bits. This research project aims to generalize descriptions of continuous measurement to the case of quantum trits.

## **Political Science**

### **23. *COVID-19 and Political Affiliation in America***

**Presenter(s):** Natalie Karim

**Advisor(s):** Dr. Ann Gordon

The growing atmospheric political division in America has contributed to the varied response to the COVID-19 pandemic. Due to the newness of the global pandemic, current research does not properly address why certain people deny the validity of COVID-19. During the course of 2020, people found themselves divided on the subject of COVID-19, including how the government should respond and what type of safety precautions should be taken. It became easily observable that people had varied opinions on COVID-19 depending on their political affiliation. This was heightened due to the election that occurred during the year, and COVID-19 was featured as a campaign platform. Individuals found themselves voting for a particular candidate due to their promised response to COVID-19. This research paper will provide data to address why certain individuals believe in COVID-19 while others do not, as well as how it is related to political affiliation. Previous research connects personal beliefs with the current political climate, but does not extend to the current concerns surrounding COVID-19. Data will be utilized from the 2020 American Fears Study, which contains data that will isolate how individuals voted, how concerned people are with the pandemic, and other related variables.

## **Psychology**

### **24. *The Coronavirus Pandemic: Associations of College Students' Financial Situations and Optimism with Mental and Physical Health***

**Presenter(s):** Harshitha Venkatesh

**Advisor(s):** Dr. Brooke Jenkins, Dr. Daniel Tomaszewski, Dr. Julia Boehm

The coronavirus pandemic has led to a turbulent environment, putting college students and their families in unprecedented situations. The rise in unemployment and concerns about the overall economy may be impacting student finances. Increased depression and anxiety are common responses to such stressful situations. However, certain psychosocial factors, such as optimism, may be a valuable resource for coping with stress. Individuals who are more optimistic tend to show less distress and have better physical functioning. Thus, the purpose of this study was to examine how college students' financial situation during the coronavirus pandemic is related to mental and physical health, as well as how optimism moderates this relationship. We hypothesized that worse financial situations would be associated with higher levels of depression, anxiety, and physical symptoms, but that optimism would buffer against worse outcomes. To investigate these hypotheses, students at a private university in Southern California were recruited and asked to complete an online questionnaire in the spring of 2020. Nearly 300 students self-reported their financial situation, depression, anxiety, physical symptoms, and optimism. Linear regression models tested associations. Results indicated that, as expected, a worsening financial situation and an increase in worry about paying for school were significantly associated with higher levels of depression, anxiety, and physical symptoms ( $p < 0.05$ ). Greater optimism was associated with lower levels of depression, anxiety, and physical symptoms ( $p < 0.05$ ). However, the effect of financial situation on students' mental and physical health did not depend on optimism ( $p > 0.05$ ). This may be because students in this study had lower optimism scores relative to pre-pandemic cohorts, suggesting they struggled to be optimistic during the pandemic. Further investigation is crucial to improve the quality of life for college students and to help in creating and implementing effective mental and physical health interventions.

**25. *Perceptions of Homelessness and Mental Illness***

**Presenter(s):** Sophie Srivastava

**Advisor(s):** Dr. Vincent Berardi

Homelessness is a growing issue in California, with residents consistently expressing concern and voting to dedicate funds to address the problem. Despite the abundance of public support for addressing this issue, California has more than half of all unsheltered people in the country, indicating a potential disconnect between the public's desire to help and their knowledge of how to do so. To address this possibility, we employed a survey designed to quantify the public's understanding of the homeless population, the stigma of homelessness and mental illness, and how misperceptions may lead to suboptimal homeless policy. This approach will determine if certain misperceptions are associated with resistance to effective policy solutions. This will serve as a roadmap for the public outreach required in order to generate support for more effective solutions to the homelessness problem. With a sample of undergraduate students (n=77), this presentation will compare the results of the public's perceptions of the homeless to known ground-truth values. Regression analysis was used to examine the relationship between the accuracy of perceptions about homeless demographics and the levels of support for various treatment solutions. We compared the means of our undergraduate participants to the means of a national sample from a recent study to investigate differences in views of homeless and support for certain policies. Our findings indicate a more liberal attitude towards homeless from undergraduate students as opposed to the general population, but a misunderstanding of the causes of homelessness as well as a stigma associated with both homeless and mental illness. Our results also reflect a need for interventions to correct misperceptions and encourage support for beneficial policies.

**26. *Parenting Style and the Coping Flexibility in College Students***

**Presenter(s):** Renee Grace Acupan

**Advisor(s):** Dr. Desiree Crevecoeur-Macphail

Many college students experience high levels of stress due to academics and being in a new environment. At times, students find themselves homesick or having trouble meeting new people, further heightening the stress they feel. Some students call their parents when they are homesick or seeking advice. Anxiety and depression are prominent amongst college students, causing a decline in mental health. A number of studies have shown that coping flexibility helps with stress management and depression. The research also shows that different parenting styles and relationships affect which coping strategies their children may use and the level of their social skills. This study looks at the coping flexibility, stress levels, parenting style, parent-child relationship, and social competence of college students to see how these different aspects interact with each other through different correlation tests. The results of this study are being collected, but we hypothesize that (1) better coping flexibility will help college students deal with stressors in school, (2) parent-child relationships filled with conflict will predict poor coping flexibility in college students, (3) college students with authoritarian parents will not be academically successful in college, and (4) parent-child relationships filled with conflict will predict poor social skills in college students.

**27. *Implications of Yoga on Depression and Anxiety Symptoms***

**Presenter(s):** Vanessa Wasbin

**Advisor(s):** Dr. Desiree Crevecoeur-Macphail

The purpose of this study was to assess the relationship between yoga and symptoms of depression and anxiety. As conventional antidepressant medications are not helpful for everyone coping with these issues and can cause harmful side effects, the examination of natural remedies, like yoga, may be useful in the advancement of treatment approaches. To recruit participants, 15 undergraduate students from Chapman University were selected from the "Yoga for Dancers" and "Yogalates" spring semester courses. To measure

symptoms of depression and anxiety, this study used the Beck Depression Inventory-II, the Beck Anxiety Inventory, and the Perseverative Thinking Questionnaire. In a pretest/posttest design, the survey including these scales was given at the beginning of the spring semester, and again after about 2 months of instruction. Results are expected to indicate a decrease in depression and anxiety symptoms, from the pretest to the posttest. From these results, it can be concluded that yoga may play a therapeutic role in the alleviation of depression and anxiety symptoms.

**28. *Inward and Outward Anger Experience, Anger Control, and Psychological Well-Being***

**Presenter(s):** Clarissa Tadros, Natalie Standridge

**Advisor(s):** Dr. Tara Gruenewald

Anger is a universal human emotion. Anger theorists have identified multiple components of anger experience that may be linked to health and well-being, including the outward expression of anger (anger-out (AO)), the inward but unexpressed experience of anger (anger-in (AI)), and the ability to modulate the expression of anger (anger control (AC)). Although previous research supports links between various anger components and physiological/physical health, there is a relative paucity of research examining psychological well-being correlates of these anger components. The goal of the current study was to examine how AC, AO, and AI are linked to multiple indicators of mental well-being, including depression, anxiety, positive affect, and life satisfaction, and to understand how these associations might vary as a function of levels of current life stress. We examined these associations in a sample of 1,255 U.S. adults in the Biomarker Substudy of wave 2 of the Study of Midlife in the U.S. (MIDUS). Measures included the Spielberger Anger Expression Inventory, the Mood and Symptoms Questionnaire, and the Center for Epidemiologic Studies Depression, Satisfaction with Life, and Perceived Stress scales. Initial analyses adjusted for age and sex indicate that greater AC is linked to better mental well-being (lower depression ( $\beta = -0.22^{***}$ ), lower anxiety ( $\beta = -0.13^{***}$ ), higher positive affect ( $\beta = 0.23^{***}$ ) and greater life satisfaction ( $\beta = 0.19^{***}$ ). Conversely, greater AO and AI are linked to poorer mental well-being (greater depression ( $\beta = 0.19^{***}$ ,  $0.45^{***}$ ), greater anxiety ( $\beta = 0.24^{***}$ ,  $0.40^{***}$ ), lower positive affect ( $\beta = -0.09^{***}$ ,  $-0.30^{***}$ ) and lower life satisfaction ( $\beta = -0.14^{***}$ ,  $-0.30^{***}$ ), respectively. Interaction analyses indicated that observed associations between anger components and depression and anxiety were stronger in those with higher levels of current life stress. Future analyses will focus on additional mental and physical well-being correlates of different forms of anger and expression experience.

**29. *Probing for Intention: Latent Awareness or Metacognitive Reflection?***

**Presenter(s):** Kate Harder, Jake Gavenas

**Advisor(s):** Dr. Aaron Schurger, Dr. Uri Maoz

When making spontaneous movements, people report becoming consciously aware of movement intentions roughly 200 milliseconds before movement itself. However, when intention timing is measured by interrupting people and asking if they intended to move, estimates place intention onset much earlier, at up to 800-1000 milliseconds before movement. It is unclear whether the early timing demonstrates a latent awareness of intention long before movement, or if people simply make a metacognitive judgment in response to the interruption. We will test this by measuring pupil size, which is related to awareness, and taking note of any differences between when people report having an intention versus when they report not having one. Differences before the interruption would suggest that participants were already latently aware of an intention when they were interrupted. No difference before, and only a difference after interruption, would suggest that participants only made a metacognitive judgment after being interrupted, and were not latently aware of intention beforehand.

**30. *Mental Health: a Gendered Issue?***

**Presenter(s):** Stephanie Yanes

**Advisor(s):** Dr. Ann Gordon

Gender influences many of the issues existing in society but often receives little to no attention for the significant role it plays in shaping preconceived notions. Specifically, the issue of mental health has become an increasingly gendered issue, with many preconceived notions forming around the mental health illnesses that women and men experience. Through this article, I examine the relationship between mental illness and gender, and the differing experiences of men and women, and whether specific experiences are normalized or seen as acceptable depending on gender. Relying on the Chapman Survey of American Fears, a representative national sample of U.S. adults, individuals were asked whether they felt sad, blue, depressed, and or whether they felt their mental health was not good and all during the past 30 days. Among the findings of the Chapman Survey of American Fears, I expect to find more women reporting that they felt sad, blue, depressed, and or feeling that their mental health is not good in the past 30 days because it is more normalized and acceptable for women to internalize their feelings and express their emotions of sadness and depression. Whereas it is expected for men to ignore or deal with their mental health problems in silence, with experiences such as alcoholism being a more acceptable problem for men when compared to depression. Overall, through my findings, I hope to start the conversation surrounding gender and mental health in hopes that the future of this issue begins to change.

**31. *Social Support and COVID-19: Changes in Support Over Time and Its Association with Depressive Symptoms***

**Presenter(s):** Amber Rahim

**Advisor(s):** Dr. Brooke Jenkins, Dr. Julia Boehm

Research on emotional and instrumental support suggests they are effective coping strategies. However, little research examines how they change over time and whether or not they are associated with depressive symptoms during the COVID-19 pandemic. We hypothesized that (1) both emotional and instrumental support will decrease over the pandemic and (2) these decreases will be related to more depressive symptoms at the end of the year. An online survey was administered to both undergraduate and graduate students assessing their health, psychosocial characteristics, academics, housing, and finances (N = 170). Both instrumental and emotional support were assessed with the Brief Coping Orientation to Problems Experienced (Brief COPE) scale, which was assessed in May and December 2020 (Carver, 1997). The Center for Epidemiological Studies Depression (CES-D) scale was used to assess depressive symptomology in December 2020 (Radloff, 1977). A paired samples t-test was conducted to compare the amount of instrumental support and emotional support across the two assessments. Participants reported lower emotional support in May (M = 2.41, SD = 0.88) and higher support in December (M = 2.53, SD = 0.78,  $t(170) = 3.03$ ,  $p = 0.003$ ). Instrumental support was also lower in May (M = 2.20, SD = 0.90) and higher in December (M = 2.36, SD = 0.79,  $t(172) = 3.20$ ,  $p = 0.002$ ). Linear regression models then assessed whether changes in emotional and instrumental support predicted depressive symptoms. A significant relationship was found between changes in emotional support and lower levels of depressive symptoms ( $\beta = -0.21$ ,  $p = 0.007$ ). A significant relationship was also found for changes in instrumental support and depressive symptoms ( $\beta = -0.15$ ,  $p = 0.048$ ). Results demonstrate that increases in emotional and instrumental support over time predicted lower levels of depressive symptoms. This research expands understanding of social support by suggesting that both emotional and instrumental support are relevant for depressive symptoms in the context of the COVID-19 pandemic.



**32. *Personality Rigidity and Psychopathology Pre and Post COVID19 Pandemic***

**Presenter(s):** Kiyono McDaniel

**Advisor(s):** Dr. David Pincus

Expanding on the results of Pincus et al 2019 and McDaniel 2020, the current study tests the hypothesis that personality rigidity is adaptive in a low stress environment. However, when stress is higher, a more flexible personality structure may be more adaptive. Personality rigidity will be measured using the shape of inverse power law distributions of response times to two items on the M5-50 (Big 5 Personality) for each participant. The correlations between this measure of rigidity and psychopathology will be compared to a sample of pre pandemic and post pandemic college students. The pre and post pandemic samples will act as pre-stress and post-stress conditions. The significance of this study is to see if stress has a defining impact on those with simpler personality structures, and in turn if those personality structures combined with stress can lead to psychopathology.

**33. *The Effects Of Working Memory Load on Decision Making***

**Presenter(s):** Douglas Magee

**Advisor(s):** Dr. Desiree Crevecoeur-Macphail

The decision that we make on an everyday basis are constantly run through our complicated mental processes, which in turn can be heavily influenced by the context of our environment. The context of a given situation might force a person to focus their attention on one thing and cause their working memory to overlook another aspect of the situation. The idea is best exemplified by the Dynamic Decision Making theory that has been researched by many different researchers and fields for over half a century. Researchers on this topic have spent much time researching how internal processing can actually have an effect on subsequent mental processes but they also focus heavily on how external stimuli affect mental processes. Our methodology was based the Sternberg Memory Scanning task, designed to test subjects working memories, but was altered for the purposes of our study to add price evaluation questions during the task. We expect to see an increase in how often people overestimate the price of an object and by how much they overestimate it while their working memory is occupied with a retrieval task. These finding could have massive impacts on how people market products to general consumers. With external environmental factors playing such a key role in decision it would only make sense that marketers create environments that distract and occupy people's working memories in spending situations.



**ROOM A**

**Art**

**11:30-11:50AM**

***Dice***

**Presenter(s):** Tipton Wolfley

**Advisor(s):** Micol Hebron

This piece is a visualization of anxiety of destruction. The monotone palet used in this piece is both a limiting and intriguing use of light and shadow. By translating a violent and loud moment into a still image on the canvas the moment of extreme energy is captured and examined. This form is contrasted by two dice that are translucent. In some ways, the composition and incorporation of these two symbols create a new relationship and underlying parallels between the two forms. Similar in their power, different in most physical senses.

**11:50AM-12:10PM**

***MARRIAGE***

**Presenter(s):** Eugene Kim

**Advisor(s):** Micol Hebron

MARRIAGE is a 7 minute video/study made from scenes of the Sailor Moon Series. Through data bending and glitch, MARRIAGE tells a greater story than the one shown in the anime: the relationship between colors, sound, and pixels. A glitch indicates a disruption of something that was designed to be "perfect." but a disruption can create something perfect within itself. By extracting the base of what everything digital is made of, there is a unique story told by the relationship of all the pixels in every source of digital media. Sailor Moon is not just about a princess saving the galaxy from evil. It is about the marriage of pixels that intertwines the digital world to reality. This video study frees the colorful squares that were once trapped in between the Sailor Scouts' outlines to create new shapes and relationships. This is no longer Sailor Moon.

**12:10-12:30PM**

***Brainscape ~ Vivian Girls***

**Presenter(s):** Emma Hudler

**Advisor(s):** Micol Hebron

Brainscapes are landscapes of your mind, the typography of your brain. This piece is meant to be a personal brainscape, mixed in with inspiration from artist Henry Darger. Specifically, his epic titled In the Realms of the Unreal. In this epic is a collection of writings and illustrations about the stories of these Vivian girls. Darger is so interesting, these epics were discovered after his death. Giving him a posthumous career, thinking about how he was a custodian at a hospital and no one had any idea was so fascinating. Thinking about the connection between the world Darger was creating in his head, his own personal battles with mental illness as well as keeping this all a secret inspired the idea of a brainscape.

**ROOM B**

**Biochemistry and Molecular Biology**

**11:30-11:50AM**

***The Relationship Between Exosomal Function and Field Cancerization in Breast Cancer***

**Presenter(s):** Tessa Gittings

**Advisor(s):** Dr. Marco Bisoffi

Determining the relationship between exosomal function and field cancerization in breast cancer has the power to open new doors in cancer research, treatment options, and preventative measures. The specific correlation between exosomes and the etiology of field cancerization in breast tissues remains undetermined. This project addresses this gap of knowledge. The first part of the project summarizes the status of the published literature in this field. We then hypothesize that exosomes are involved in the development of field cancerization and tumorigenesis in breast cancer. To test this hypothesis experimentally, we propose to isolate exosomes from the established cancerous human breast cancer cells, MCF-7 and MDA-MB-231, and expose them to the non-cancerous cells MCF-10A, as well as vice versa. The first goal is to determine possible phenotypic effects, including increased or decreased proliferation and migration, which are markers of field cancerization. In these experiments, exosomal action may reveal that the cancerous cells may induce cancer-like qualities in the non-cancerous cells, while the non-cancerous cells may inhibit the cancerous cells. A deeper understanding of such actions will contribute to the prevention of secondary tumors after lumpectomy, a therapeutic procedure focusing on the conservation of breast tissue.

**Environmental Science and Policy**

**11:50AM-12:10PM**

***California Drought Predictions***

**Presenter(s):** Lauren Lynam

**Advisor(s):** Dr. Thomas Piechota

The issue of how future climate projections will affect California's water availability are discussed in this paper. The unimpaired projected streamflows for eleven of California's rivers are compared with their unimpaired historical flows using eight future climate models. Projected drought lengths, quantities, and intensities are statistically tested against historical values to determine variations from past streamflow to future streamflow. The models predict significant differences between historical and projected streamflows in all three categories. Potential impacts of such streamflow variations are also discussed.

**Mathematics**

**12:10-12:30PM**

***On The Structure of Idempotent Semirings and Bunched Implication Algebra***

**Presenter(s):** Natanael Alpay, Melissa Sugimoto

**Advisor(s):** Dr. Peter Jipsen

A distributive lattice-ordered magma (dl-magma)  $(A, \wedge, \vee, \cdot)$  is a distributive lattice with a binary operation  $\cdot$  (dot) that preserves joins in both arguments, and when  $\cdot$  is associative then  $(A, \vee, \cdot)$  is an idempotent semiring. It is shown that in a subvariety of top-bounded dl-magmas the binary operation is determined

by two join preserving unary operations  $p, q$  using the term  $x \cdot y = (px \wedge y) \vee (x \wedge qy)$ . We obtain simple conditions on  $p, q$  such that  $\cdot$  (dot) is associative, commutative, idempotent and/or has an identity element. In previous presentations we gave a complete structural description for finite commutative doubly idempotent semirings where either the multiplicative semilattice is a chain, or the additive semilattice is a Boolean algebra. In the current work we show that the second description can be significantly generalized to the setting where the additive semilattice is a distributive lattice, dropping the assumptions of finiteness, multiplicative commutativity and idempotence in favor of the algebraic condition  $x \cdot y = (px \wedge y) \vee (x \wedge qy)$  for two unary join-preserving operations  $p, q$ . In the case when the distributive lattice is a Heyting algebra, it provides structural insight into some algebraic models of bunched implication logic. We also provide Kripke semantics for the algebras under consideration, which leads to more efficient algorithms for constructing finite models.

## ROOM C

### Health Sciences and Kinesiology

**11:30-11:50AM**

***“Professor Eric Can’t Hear”: Developing and Piloting a Teaching Case Study for an Upper Division Neurophysiology Course***

**Presenter(s):** Lexi Lee

**Advisor(s):** Dr. Caroline Wilson

Inspired by the true story of a Chapman University professor diagnosed with a brain tumor, a teaching case study was developed to help students learn neurophysiology concepts based on Professor Eric’s experiences. After researching the underlying pathophysiology, the professor was interviewed, learning objectives were identified, and a class plan was outlined for an applied human neurophysiology course (AHP 430). The main objective was for students to apply the professor’s real-life symptoms to topics related to hearing, balance, cranial nerves, radiological imaging, and clinical complications. The case study was organized into a jigsaw-style format, where student teams worked on four different scenarios. Three scenarios explored different pathophysiology topics and/or subsequent surgical outcomes. The fourth scenario discussed neurocognitive complications caused by increased computer screen time due to online instruction during the COVID-19 pandemic. The case study was piloted with students in Spring 2021 at Chapman University. Student understanding was evaluated with a brief content assessment (Kahoot) to consider the efficacy of the case study format. Participating students were surveyed to gather insight regarding timing, content, and suggested improvements for the case. Most students (81%) rated the case 5/5 for enjoyment, commenting on the engaging narrative and the opportunity to work as a team. A majority (75%) also rated the effectiveness of the jigsaw-style approach 5/5, although some students felt they missed information presented in the other scenarios. The feedback was utilized to discuss and alter the case prior to submission for publication in the National Center for Case Study Teaching in Science. Professor Eric’s story offers a personalized “why” and “how” to help pre-health students establish the connection between pathophysiology and real-life symptoms. For this student author, developing the case also provided an immense personal connection to understanding her treasured mentor’s condition.

## **Psychology**

**11:50AM-12:10PM**

***Race, Ethnicity, and Insurance: The Association with Opioid Use in a Pediatric Hospital Setting***

**Presenter(s):** Vivian Luong

**Advisor(s):** Dr. Brooke Jenkins

Pediatric opioid-related poisoning and deaths have increased by 268% between 1999 and 2016. One risk factor for these poisonings may be receiving an opioid prescription at a young age. Given the established link between legitimate opioid prescriptions and later misuse in young adulthood, research focused on identifying relationships between sociodemographic factors with opioid and non-opioid prescribing is needed to understand opioid prescribing inconsistencies and promote safe pain management. Of interest, this study examined the association between race/ethnicity and health insurance payer type with pediatric opioid and non-opioid ordering in an inpatient hospital setting. Statistical analyses were performed with cross-sectional inpatient encounter data from June 2013 to June 2018 retrieved from a pediatric hospital (N = 55,944). Physicians ordered significantly fewer opioid medications, but a greater number of non-opioid medications, for non-Hispanic African American children than non-Hispanic Asian, Hispanic/Latinx, and non-Hispanic White pediatric patients. Moreover, patients with government-sponsored plans (e.g., Medi-Cal/Medicare) received fewer non-opioid prescriptions compared with patients with both HMO and PPO coverage. There was also a significant race/ethnicity by insurance interaction on opioid orders. Non-Hispanic White patients with "other" insurance coverage received the greatest number of opioid orders. In non-Hispanic African American patients, children with PPO coverage received fewer opioids than those with government-sponsored and HMO insurance. For non-Hispanic Asian patients, children with PPO were prescribed more opioids than those with government-sponsored and HMO coverage. Overall, these findings suggest that the relationship between race/ethnicity, insurance type, and physician decisions in opioid prescribing is complex and multifaceted. Given that consistency in opioid prescribing should be seen regardless of patient background characteristics, future studies should continue to assess and monitor inequitable differences in care.

## **ROOM D**

## **Political Science**

**11:30-11:50AM**

***Cybersecurity Threats on Voter Fraud: Fact or Fiction?***

**Presenter(s):** Zyer Abdullah

**Advisor(s):** Dr. John Compton

In the age of technology, there has been an increasing amount of hysteria within the public regarding election fraud and the impending possibility of various cybersecurity attacks which seem to threaten the very fabric of the core institutions of US Democracy. This paper will aim to research the various aspects of voter fraud using survey data from the 2020 and 2016 American National Elections Study. After evaluating various research and data on this issue, I have found that there is a lack of understanding on

nuances of voter fraud as there can be different variations of it, be it malware, or denial of service attacks (DOS's). By evaluating the data from the elections studies, I believe that my findings will gauge different variables such as education, gender, and immigration which will ultimately yield to greater answers on whether cybersecurity threats on national elections are viable or simply a result of paranoia.

**11:50AM-12:10PM**

***How Education Impacts the Voting Habits of Different Races***

**Presenter(s):** Jake Steinbock

**Advisor(s):** Dr. John Compton

Research on the voting differences of college educated white voters, black voters, and Hispanic voters has focused on the sole fact that minorities will most likely vote democrat. This has led to a lack of research on the fact that while college educated people vote less republican, college educated minorities vote more republican. While the majority of minorities will vote democrat, in 2016 and 2020 there has been a trend in which the amount of college educated minorities who voted republican was greater than the amount of non-college educated minorities. In fact, college education of minorities does not seem to impact their party preference. This author argues that this could be a very interesting research topic because the education of white voters impacts their voting patterns greatly. The project will research why the minority vote is not affected by education level. Utilizing the survey data from the 2016 American National Election Survey, the author will evaluate how education level and minority status influence voting patterns and specifically why education does not affect the way minorities voted in the 2016 and 2020 presidential elections. This author expects to find that the cultural and political ideals of black and Hispanic voters are not affected by education because of the systemic racial bias combined with growing up in a country as a minority.

**Religious Studies**

**12:10-12:30PM**

***Returning To The Land: Applying The Values of Indigenous Practices to Support The Environmental Movement.***

**Presenter(s):** Carla Frias

**Advisor(s):** Dr. Nancy Martin

Indigenous peoples are socio-cultural religious groups that are profoundly connected with the environment. Among their traditions there is a clear understanding that humans, plants, and animals are part of an interdependent system that work in harmony with each other in order to survive. They respect the sun as a life force that allows their crops to grow; They thank plants for giving them the medicine to heal; And they view animals as more than food sources, but as teachers that have important lessons that can help them grow. Indigenous peoples have studied the details of the natural world, and have created an array eco-centric practices founded on values of creativity, sustainability, and appreciation. As the world faces an accelerating loss of biodiversity, scientists are turning to indigenous wisdom and "ethnosphere" cultures to understand how to create a proper and sustainable evolution of life on earth. This paper will explore the values embodied in traditional indigenous practices and how a holistic understanding about the natural world can help support the environmental movement. I will first describe

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the eco-spiritual traditions and ceremonies of indigenous people and how they maintain connection by working with sustainable agricultural practices. I will then describe the evolution of indigenous belief, and what lessons can be rescued from their culture in order to create a stronger relationship with nature. As more people become aware of the environmental crisis, the Traditional Ecological Knowledge of indigenous people can inspire values of spirituality and sustainability. The environment is not a machine that provides rich resources, but a sacred interconnected web of forces that allows life to exist earth. It is time to respect the true sacred beauty of nature - the place we call home.

## **Biochemistry and Molecular Biology**

### **1. *Computational Design of $\beta$ -Fluorinated Morphine Derivatives for pH-specific Binding***

**Presenter(s):** Angelina Sorensen, Makena Augenstein, Nayiri Alexander

**Advisor(s):** Dr. Matthew Gartner

Opioids are critical pain-relieving drugs but also carry a risk of harmful side effects, including addiction. Opioids are agonists that bind to the  $\mu$ -opioid peptide receptor (MOR) and act via a G-protein coupled receptor (GPCR) pathway to provide pain relief. Morphine, a commonly used opioid, is active in healthy (pH=7.4) and inflamed tissue (pH=6-6.5). Decreasing the pKa of the biochemically-active amine group can promote selective binding in the more acidic conditions of injured and inflamed tissue, reducing harmful side effects of opioids binding within the central nervous system. We aim to maintain the pharmacophore of morphine while altering the binding specificity via molecular dissection and extension. Herein, the impact on pKa of fluorinating carbons beta to the amine binding site is explored as the inductive effects of fluorine will decrease the opiate's pKa. Molecular dissection of several molecular groups from morphine heightens the biological activity of morphine's pharmacophore and reduces adverse side effects. Combining previously studied molecular dissection techniques with molecular extension via fluorination allows for more specific binding in peripheral, inflamed tissue. As a starting point, theoretical pKa values are determined at the M06-2X/aug-cc-pVDZ//SMD level of theory to calculate the  $\Delta G^{\circ}_{aq}$  values for the amine deprotonation reactions. Electronic structure calculations were performed with Gaussian 16 using the Keck Computational Research Cluster at Chapman University.

### **2. *Protein Protection: Characterizing how CowN Protects Nitrogenase***

**Presenter(s):** Emily Wong

**Advisor(s):** Dr. Cedric Owens

Nitrogen fixation occurs in two major processes, the industrial haber bosch process and fixation via a biological enzyme called nitrogenase. The haber bosch process is how most nitrogen used in agriculture is converted into ammonia. However, one major drawback is that this process requires a lot of fossil fuels and is thereby not an environmentally friendly process. With nitrogenase, the enzyme converts dinitrogen into ammonia using biological energy in the form of ATP, making nitrogen fixation a more biologically friendly process. Carbon Monoxide is known to inhibit the function of nitrogenase, meaning that under conditions where CO is present, nitrogen fixation is unable to occur. In order to prevent CO inhibition, cells containing nitrogenase must find a way to avoid these inhibitory conditions. It was found that Nitrogenase seems to be protected by another protein, CowN. This poster describes the mechanism by which CowN protects Nitrogenase. Specifically, CowN binds to either the entrance to a proposed CO channel or near the active site of nitrogenase. Both potential CowN binding locations could prevent CO from reaching the active site and therefore enable nitrogenase to avoid inhibition by CO.

## **Biological Sciences**

### **3. *Swelling Kinetics of Fresh Mucin Vesicles***

**Presenter(s):** Anne Kenney

**Advisor(s):** Dr. Douglas Fudge, Dr. Gaurav Jain, Dr. Noah Bressman

Hagfish produce a large quantity of defensive slime when attacked. This slime is a rapid forming dilute hydrogel comprised of two main components, thread filaments and membrane-bound mucin vesicles. Little is known about the behavior of the mucin vesicles immediately after secretion from the slime gland, as all studies on mucin vesicles have used vesicles stabilized with polyvalent anions. The slime is known to form rapidly after secretion, taking between 100-400ms, however the kinetics of the hydration of the mucus component has not



been quantified. In this study we observed and captured the behavior of mucin vesicles with an inverted microscope when introduced to artificial sea water, a simplified seawater solution, and a NaCl solution. A small dab of exudate was placed onto a slide and then a drop of solution was introduced. The resulting behavior was the rapid swelling and expansion of vesicles seen at high magnification and captured using a high-speed camera. Focusing on the expansion of individual vesicles after contact with solution, the artificial sea water, simplified sea water, and NaCl solution showed the rapid hydration of almost all vesicles. The expansion rate of the mucin vesicles was much faster than any observed slime formation, preliminary analysis averages 60ms hydration times, suggesting that when slime is naturally deployed the mucous gel may be the first component to deploy. These insights on the mucin vesicle hydration speed in fresh exudate will further contribute to research involving the mechanisms for hagfish slime formation.

**4. *Identification and Quantification of Secondary Metabolites in Pignut***

**Presenter(s):** Jordan Farmer, Reis Misaka

**Advisor(s):** Dr. Hagop Atamian, Dr. Matthew Gartner, Dr. Peter Chang

Plants synthesize very diverse types of both primary and secondary metabolites throughout their life cycle. These secondary metabolites have specialized functions such as repelling pests and herbivores, attracting pollinators, and playing roles in different ecological functions. Secondary metabolites help the plant adapt to its specific environment and increase its chances of survival. Ancient records show that humans have been using plant secondary metabolites (commonly known as medicinal plant products) for treatment of diseases and illnesses. There is great interest in identifying functionally diverse secondary plant metabolites since they could aid in drug discovery. In addition, plant secondary metabolites are routinely used in food flavors, fragrances, insecticides, and dyes. The mint plant family (family: Lamiaceae) includes important plants such as basil, mentha, rosemary, sage, savory, oregano, thyme, lavender, and perilla. These plants possess a wide diversity of secondary metabolites which give them their distinctive smells and flavors. The objective of this project was to identify and work on quantifying the secondary metabolites of a plant species within the mint family called pignut (*Hyptis suaveolens*). The pignut is native to Mexico and South America and has been used in ancient times to treat diseases. The secondary metabolites were extracted from leaves of different wild pignut plants grown in our greenhouse using steam distillation method. The analysis of the extract was performed on a Gas Chromatograph Mass Spectrometer (GC-MS) instrument to identify the different compounds and analyze their concentrations. Our analysis showed variation in the quantities of some metabolites among the different wild plants. It would be interesting to further investigate the roles of those metabolites in plant adaptation as well their potential in medicine. The results generated in this project will provide valuable resources to future research aimed at utilizing the diversity of the pignut secondary metabolites for human well-being.

**5. *Uncovering Slime Deployment Mechanisms in Hagfish***

**Presenter(s):** Lucy Chalekian

**Advisor(s):** Dr. Douglas Fudge, Dr. Noah Bressman

Hagfishes are a diverse group of jawless marine fishes that are noteworthy for their ability to produce gill-clogging slime when threatened. The slime exudate ejected by the slime glands is made up of two main components: thread skeins and mucous vesicles. Thread skeins must unravel from their coiled state and provide strength to the slime in the form of a network of silk-like threads. Deployment of mucous vesicles is known to involve the swelling of constituent glycoproteins and their subsequent deformation into a vast mucous network that interpenetrates the slime thread network. Recent theoretical work suggests that thread skein unraveling would be greatly enhanced under conditions where the skein (or a loose piece of thread) is pinned to a solid surface. Our hypothesis states that the skeins staying embedded in the mucus matrix allows them to be loaded in tension, which facilitates unravelling and efficient slime formation. It is also hypothesized

that when the mucus is loaded in tension and starts to deform due to turbulent flow, the skeins start to align in the direction of flow. We have employed a high-speed camera mounted on an Axio Zoom microscope to view a small amount of exudate on a slide in a tank of sea water to observe this process of slime formation in detail. The results are analyzed with ImageJ to track the movement of skeins which also provides insight into the direction of flow. Preliminary results suggest that hagfish slime exudate aligns with the direction of the flow and requires to be embedded in mucus. Most skeins do not remain attached to the slide but move together as the mucus is acted on by exterior forces. In terms of alignment, skeins originally do not have a statistically significant orientation when on the slide but when the water starts to flow over the stationary slide, the skeins that detach from the slide travel through the water in the direction of the flow with the same orientation.

## **Chemistry**

### **6. *Computational Investigation Into the Reactivity of Cooperative H-E (E = Si and H) Bond Activation at M-S Complexes***

**Presenter(s):** Ka'Naysha Scott

**Advisor(s):** Dr. Maduka Ogba

Metal ligand cooperative catalysis involves the use of a transition metal and its coordinating ligand to activate bonds (e.g., H-H, H-Si, or H-B) in chemical transformations. The most common and most researched complexes for cooperative bond activation involve metal-nitrogen bonds. In contrast, synthetic metal-sulfur cooperative catalysts are rarer even though the biological inspiration for cooperative catalysis (i.e., nickel-iron hydrogenases) involve the reactivity at metal-sulfur centers. Moreover, little is known about the factors that control the reactivity of metal-sulfur cooperative activation, limiting our ability to develop more optimal bioreminiscent catalysts. In metal-nitrogen catalysts, different aspects of the catalyst have been investigated and from that, conclusions have been made. The same cannot be said for metal-sulfur catalysts. The purpose of my project is to use computational tools to systematically dissect all the components of known synthetic metal-sulfur cooperative catalysts and reveal the role each component plays in cooperative bond activation. In the first part of my project, I will compare the geometries, energies, and mechanism for H-H bond activation when mediated by iridium-, rhodium-, and cobalt- sulfur complexes to reveal the role of the metal in controlling the reactivity. Next, I will investigate whether the bond activation mechanism changes when activating H-Si bonds as compared to H-H bonds. Lastly, I will investigate the role of ligand chelation on the catalysts' ability to successfully activate both H-H and H-Si bonds. In this poster, my literature search, proposed aims, methodology, hypotheses, and preliminary data will be presented.

### **7. *Spectroscopic Properties of Brown Carbon from Pyruvic Acid Precursor***

**Presenter(s):** Amanda Waterson

**Advisor(s):** Dr. Warren De Bruyn, Dr. Aaron Harrison

Brown carbon (BrC) compounds are organic carbon compounds with chromophoric and photolytic properties that absorb strongly in the near UV from 300-400 nm range. BrC compounds can be formed in the atmosphere from secondary reactions of carbonyls with amine and ammonium precursors that are commonly found in cloud water and aqueous aerosols. To date, there has been research done on BrC compounds formed from methylglyoxal in combination with the amine and ammonium precursors, however there is very little known about BrC compounds that are formed from keto acids precursors instead. This research aims to further knowledge on the photochemical properties of BrC compounds in the atmosphere formed from pyruvic acid, a keto acid precursor. The BrC compounds studied were synthesized from pyruvic acid and ammonium sulfate (PA+AS) and pyruvic acid and methylamine chloride (PA+MA). To study the photochemical properties of these

BrC compounds, spectroscopic data including absorption and excitation-emission matrix (EEM) spectra were collected as a function of solar irradiation time. The absorbance results show decreases in the first 15-20 minutes of solar exposure; however, significant absorption persists in the near UV following 2 hours of irradiation. This suggest that these compounds can accumulate for long periods of time during the day and influence photochemistry and radiative forcing in the atmosphere.

**8. *Silane Substrate Scope in Hydrosilylation Studies by a Carbodiphosphorane Catalyst***

**Presenter(s):** Liam Sullivan

**Advisor(s):** Dr. Allegra Liberman-Martin

The objective of this research is to discover an effective, safe, and low cost catalyst for the hydrosilylation of ketones, which involves the addition of a silicon-hydrogen bond across a C=O double bond. Previous research with Dr. Liberman-Martin determined that our cyclic carbodiphosphorane catalyst may be effective in the hydrosilylation of ketones. It was determined that, through resonance, the pair of C=P double bonds changes to add two lone pairs to the bridging carbon, creating a double ylide resonance form. When in the presence of suitable ketone and silane substrates, this double ylide form can catalyze the hydrosilylation reaction. All synthesis reactions were conducted within a nitrogen atmosphere glovebox and were analyzed using both <sup>1</sup>H and <sup>13</sup>C NMR spectroscopy. Spectroscopic analysis was used to determine completion of the hydrosilylation reaction as well as analyze the structure of products formed. Use of the carbodiphosphorane catalyst as a replacement for toxic heavy-metal containing catalysts would reduce waste and emissions harmful to the environment, while also providing an alternative means for accomplishing the hydrosilylation of ketones. Finding an efficient and low cost catalyst would benefit the organic synthesis industry, as carbonyl hydrosilylation is useful industrially for the synthesis of alcohol products.

**9. *Design and Synthesize of Hybrid Cyclic-Linear Cell-Penetrating Peptide***

**Presenter(s):** Tack Kyung Kim, Sorour Khayatnejad

**Advisor(s):** Dr. Keykavous Parang, Dr. Rakesh Tiwari, Dr. Hamidreza Montazeri

The cell membrane, mainly composed of phospholipids, which creates difficulty in intracellular delivery of cell-impermeable and negatively-charged molecules. The amphiphilic cyclic peptide [WR]5 alternate arginine (R) and tryptophan (W) residues bypasses the endosomal uptake and increase cellular uptake of cell-impermeable compounds. [WR]5 enhanced transporting cargo molecules across the cell membrane. The guanidinium group of arginine interacts with the cell membrane having a better interaction of the peptide with the cell surface and large electrostatic interaction with negatively charged phosphate group of the cell membrane. Designing five hybrid cyclic-linear peptides containing alternative positively charged arginine and hydrophobic tryptophan residues both on the ring and side chain [(RW)5K](RW)X (X=1-5), which is [(RW)5K](RW), [(RW)5K](RW)2, [(RW)5K](RW)3, [(RW)5K](RW)4, [(RW)5K](RW)5 were synthesized through Fmoc solid-phase peptide synthesis method with cyclization in solution phase to compare their molecular transporter efficiency. Using high-resolution MALDI\_TOF, the chemistry structures of final products were confirmed. Final compounds were purified by reversed-phase HPLC. These data show the hybrid cyclic-linear peptides as molecular transporters: (1) Mixture of fluorescent-labeled phosphopeptide and hybrid cyclic peptide [(RW)5K](RW)5 were inhibited by Chlorpromazine and Methyl- $\beta$ -cyclodextrin endocytosis inhibitors after 3 hour incubation in MDA-MB-231 through the clathrin-mediated endocytosis pathway. (2) For intracellular localization in the cytosol, mixture of F'-GpYEEI and [(RW)5K](RW)5 in MDA-MB-231 was incubated for 3 hours in confocal microscopy. These data suggest the potential of this hybrid cyclic-linear peptide as molecular transporters.

**10. Carbodiphosphorane Catalysts for Lactide Polymerization**

**Presenter(s):** Roxanne Naumann

**Advisor(s):** Dr. Allegra Liberman-Martin

Hey you! Wait! Don't let the title scare you! Okay maybe it didn't scare you away, but either way, hear me out. It's just scientific jargon for "we're trying to make biodegradable plastic". It's actually really cool, and whether or not you know anything about polymer catalysis or chemistry at all, you should keep reading. This research investigated nucleophilic carbodiphosphorane catalysts that have shown promise in ring-opening polymerization with various biodegradable ester monomers, mainly racemic and L-lactide. Basically, we took the building blocks of plastics that are known to be biodegradable, and we tried to make them chain together using catalysts that are metal-free because they are cheaper, non-toxic, and more abundant. We had tremendous success using a carbodiphosphorane catalyst both cyclic (CDP) and non-cyclic (ACDP) as well as a phosphorous ylide (PY). <sup>1</sup>H NMR showed up to 96% conversion from monomer to polymer after 30 min and 99% after 24 hr with rac-lactide:CDP at 100:1 and 99% conversion after 30 min with rac-lactide:ACDP at 100:1. Results were equally as promising in 200:1 ratios with ACDP showing 98% conversion after 1 hr and CDP showing 99% after 150 min. PY also showed 96% conversion in 100:1 after 150 min. Dispersity (how consistent the polymer chain lengths are) was also examined via GPC. This work explored new classes of nucleophilic catalysts and their ability to catalyze ring-opening polymerization as we continue to do our best creating biodegradable polymers and saving the world.

**11. Fluorescence Lifetimes of Oil Products in Aqueous Solution: Aging and Quenching**

**Presenter(s):** Rose Albrecht

**Advisor(s):** Dr. Warren De Bruyn

The optical properties of chromophoric dissolved organic matter (CDOM) as well as the UV and visible light-absorbing component of dissolved organic matter (DOM), have been used extensively to determine levels, distributions, identify sources, and track transformations of DOM in Californian coastal waters. Steady state fluorescence techniques like three-dimensional excitation and emission matrix (EEMs) fluorescence spectra have been used extensively to characterize CDOM in these systems. One of the challenges in interpreting EEMS is that fluorescent material from different sources can fluoresce in the same region. For example, both terrestrial organics and oil products can fluoresce in the protein region of a typical EEM making it difficult to use the approach in oil impacted waters. Time resolved fluorescence spectroscopy has the potential to differentiate between these different fluorescent materials. For example, the fluorescence lifetimes of natural dissolved organic material like plant leachates are typically less than 10 ns and the lifetimes of oil products typically have a component greater than 20 ns. To aid interpretation of fluorescent lifetime measurements of coastal waters we have carried out a set of measurements looking at changes in lifetime of a range of oil products as a function of photolysis time in a solar simulator. Initial results suggest that while fluorophores shift and change intensity, lifetimes do not change significantly. We have also looked at the potential for natural ions found in seawater to quench fluorescence and decrease oil fluorescence lifetimes.

**Communication Studies**

**12. The Transitionary Experience of High School Students Entering College During COVID-19**

**Presenter(s):** Brendan Krause, Cristina Molina, Angie Kim, Melissa Pacheco

**Advisor(s):** Dr. Austin Lee

The transition from high school to college is the introduction to freedom, adulthood, and new experiences. This can introduce unique stressors since this is often the first time students are away from home and family. With the introduction of the COVID-19 pandemic, college freshmen are facing unique challenges, such as

making friends and finding a sense of belonging. The ability to use in-person classes and extracurricular activities to make meaningful social connections has been eliminated, which may have drastic effects on students' emotions and first-year experiences. Further research on how remote learning impacts the transition to university for first-year students should be prioritized to reveal and address the short-term and long-term effects on their emotions and mental health. More importantly, results may provide useful information for colleges and universities on which resources their students need and how to make those accessible in a virtual setting. This study evaluates the potential effects of participating in virtual extracurricular activities may have on the emotions of first-year college students living in Chapman University-owned housing during the COVID-19 pandemic.

**13. *The Design of a Card Game Without a Traditional Manual***

**Presenter(s):** Lucas Torti

**Advisor(s):** Derek Prate

I am studying card game design, production, and graphic design by building a novel card game. The central question of this project is what is required to build a card game without the traditional rulebook instructions which are present in most card and board games. The solution utilized is a sequence of card-based rules, with players flipping cards to learn the rules. This is used to facilitate an understanding of the rules in a more straightforward fashion to make the game easier to learn and easier to package. In addition, many of the game's core rules are placed on cards used for play to facilitate a learn-as-you play approach. As noted in Hanna Björkman's thesis titled "Designing a board game rulebook: It is harder than you would think," board game rules require many interactions and much refinement to facilitate the learning of rules. Because this game requires individuals to play it to understand the rules, it is vitally important that said rules may be understood easily. Much of the work on this game has gone into refining the rules such that they can be quickly understood without outside help on the first playthrough. Adobe Illustrator has been utilized in the creation of cards, and the computer programs Table Top Simulator as well as Tabletopia have been used to test this card game remotely in light of pandemic precautions. By the end of this project, I expect to have produced a card game which does not require the use of a rulebook and requires minimal packaging.

## **Environmental Science and Policy**

**14. *Nature Based Solutions: Green Buildings***

**Presenter(s):** Lauren Lynam, Alyssa Berry

**Advisor(s):** Mackenzie Crigger, Dr. Jason Keller

The nature based solution of green buildings will be explored in this paper and will serve as an outline for potential implementation. Nature based solutions provide mitigation to climate change, water management, and promote community sustainability. This paper entails detailed explanations of green buildings and will supply possible implementation options for the city of Costa Mesa. Goals, case studies, and communication techniques will be explored to provide a comprehensive background and foundation for understanding green buildings in the context of climate resilience and disaster preparedness. We hope to identify buildings in Costa Mesa where green roofs could feasibly be located. An outline will be provided describing how green roofs can be most effective. Incentives and examples of why green roofs are so effective will also be provided.

**15. *Nature Based Solutions: Carbon Sequestration***

**Presenter(s):** Juliana Medan, Joanna Falla

**Advisor(s):** Mackenzie Crigger, Dr. Jason Keller

The nature based solution of carbon sequestration will be explored in this paper and will serve as an outline for potential implementation. Nature based solutions provide mitigation to climate change, water management, and promote community sustainability. This paper entails detailed explanations of sequestration and will supply possible implementation options for the city of Costa Mesa. Goals, case studies, and communication techniques will be explored to provide a comprehensive background and foundation for understanding sequestration in the context of climate resilience and disaster preparedness. Carbon sequestration is the active removal of carbon dioxide from the surrounding areas as a way to lower emissions. Any positive sequestration effects of increased urban vegetation implemented should be considered highly successful for Costa Mesa.

**16. *Nature Based Solutions: Green Infrastructure***

**Presenter(s):** Laurel Tamayo, Nikki Heredia

**Advisor(s):** Mackenzie Crigger, Dr. Jason Keller

The nature based solution of green infrastructure will be explored in this paper and will serve as an outline for potential implementation. Nature based solutions provide mitigation to climate change, water management, and promote community sustainability. This paper entails detailed explanations of green infrastructure and will supply possible implementation options for the city of Costa Mesa. Green infrastructure is a nature-based solution that encompasses a sustainable approach to managing stormwater with green materials such as trees, lawns, forests and more. Storm water runoff can transport pollutants to water ways, create flooding, and cause land erosion. Goals, case studies, and communication techniques will be explored to provide a comprehensive background and foundation for understanding green infrastructure in the context of climate resilience and disaster preparedness.

**17. *Nature Based Solutions: Ecological Restoration***

**Presenter(s):** Kyle Bryan, Annie Ng

**Advisor(s):** Mackenzie Crigger, Dr. Jason Keller

The nature based solution of ecological restoration will be explored in this paper and will serve as an outline for potential implementation. Nature based solutions provide mitigation to climate change, water management, and promote community sustainability. This paper entails detailed explanations of ecological restoration and will supply possible implementation options for the city of Costa Mesa. Goals, case studies, and communication techniques will be explored to provide a comprehensive background and foundation for understanding ecological restoration in the context of climate resilience and disaster preparedness. Case studies include community engagement assisting in restoration projects. Ways to create mutual benefits for individuals to create restoration efforts in their private land will also be explored.

**18. *Nature Based Solutions: Urban Green Space***

**Presenter(s):** Alexis Hernandez, Mallory Warhurst

**Advisor(s):** Mackenzie Crigger, Dr. Jason Keller

The nature based solution of urban green space will be explored in this paper and will serve as an outline for potential implementation. Nature based solutions provide mitigation to climate change, water management, and promote community sustainability. This paper entails detailed explanations of urban green space and will supply possible implementation options for the city of Costa Mesa. Goals, case studies, and communication techniques will be explored to provide a comprehensive background and foundation for understanding urban



green space in the context of climate resilience and disaster preparedness. Urban green spaces as a nature based solution will address not only climate change effects in Costa Mesa, but also existing environmental justice and accessibility issues. By using GIS mapping and storyboards we plan to locate areas of need, find viable green space projects that can be used in Costa mesa, and potential sources of funding while centering community need and partnerships.

**19. Nature Based Solutions: Urban Farming**

**Presenter(s):** Laurenz Dodge, Lauren Burokas

**Advisor(s):** Mackenzie Crigger, Dr. Jason Keller

The nature based solution of urban farming will be explored in this paper and will serve as an outline for potential implementation. Nature based solutions provide mitigation to climate change, water management, and promote community sustainability. Our goal is to present the city of Costa Mesa with a proposal about urban farming and gardening that will provide the City with skills for implementation of farms and gardens. Urban farms and gardens help to create healthier environments by improving food security and increasing the health of people within the community and their environment. This paper entails detailed explanations of urban farming and will supply possible implementation options for the city of Costa Mesa. Goals, case studies, and communication techniques will be explored to provide a comprehensive background and foundation for understanding urban farming in the context of climate resilience and disaster preparedness.

**20. Nature Based Solutions: Wildfire Risk**

**Presenter(s):** Steven Gonzales, Jin Young Hong

**Advisor(s):** Mackenzie Crigger, Dr. Jason Keller

The nature based solution of wildfire risk will be explored in this paper and will serve as an outline for potential implementation. Nature based solutions provide mitigation to climate change, water management, and promote community sustainability. This paper entails detailed explanations of wildfire risk and will supply possible implementation options for the city of Costa Mesa. Wildfire risk prevention is to enhance the nature based solutions in the City of Costa Mesa without increasing the risk of spread of wildfires. Due to Costa Mesa being in a low severity level zone for wildfires we are also focusing on the air quality from nearby fires while implementing the use of nature based solutions to lower the pollution levels from being concentrated in the city at unhealthy levels. Goals, case studies, and communication techniques will be explored to provide a comprehensive background and foundation for understanding wildfire risk in the context of climate resilience and disaster preparedness.

**FFC**

**21. Thor and Zeus**

**Presenter(s):** David Ji

**Advisor(s):** Dr. Julye Bidmead

Thor is one of the most prominent gods in Norse mythology. He is famously known as the god of thunder who wields a powerful hammer that could destroy anyone or anything in its way. Similar to Zeus, the king of all Greek gods, Thor is a powerful figure whose strength is unparalleled. They are both guardians of the universe and they are revered in their myths and culture. However, there are several differences between Thor and Zeus. Thor is very impulsive whereas Zeus is more wise, fair, and just. In addition, Thor has a good relationship with his father Odin but Zeus did not have such a good relationship with his father Cronus who tried to eat him. A comparison of these two gods from cultures varying in geographical locations and historical time periods,



can reveal how the Norse and the Greeks conceived ideas of power and strength. This research will examine these two heroes in more depth and see what we can learn from them and how it relates to their culture.

## **Food Science**

### ***22. How Has the Pandemic Affected the Fast Food Industry?***

**Presenter(s):** Jordyn Margolis

**Advisor(s):** Dr. Rosalee Hellberg

In what most experts thought would last a few weeks, the Covid-19 pandemic has lasted well over a year. Aspects such as education and interpersonal interaction have changed in order to limit the spread of the pandemic. Businesses have turned to amazon locker-type food delivery and pick-up to make a contactless ordering of food for both consumers and companies. Burger King, Chick-Fil-A, and Crumbl have turned to contactless ordering and delivery systems. Tablets or restaurant apps allow a customer to order food without ever interacting with an employee. Although this is a positive for consumers, companies are able to cut labor costs in order to adhere to social distancing and safety guidelines. Supply chains have been affected as social distancing has proposed a challenge for employees and production. However, government programs must be put into place in order to avoid substantial price increases for necessities. Changes like these could alter how food ordering and delivery systems execute typical processes in the future. As more and more individuals want fast and safe foods, the supply chains and corporations are obligated to meet the demand.

## **Health Sciences and Kinesiology**

### ***23. Gait Analysis Using Pressure Insoles on Incline Surfaces***

**Presenter(s):** Mirai Manatad, Michael Shiraishi, Amir Memarian, Sarah Mirkhani, Suongyen Jeon

**Advisor(s):** Dr. Rahul Soangra

Knowledge of gait parameters is crucial in determining treatments to address a multitude of gait pathologies. The FScan64 is an in-shoe pressure mapping system used for quick, natural gait analysis. The device measures several gait parameters such as: pressure and force, center of force, cadence, step time, stride time, stance time, and swing time. The main objective of this research is to assess gait parameters using FScan64 and compare its validity with traditional motion capture and force plates methods. We expect pressure data collected from the system will show reliability with existing laboratory measures utilizing motion capture and forceplates. The materials used in this study are two FScan 64 insole sensors, reflective markers placed throughout the body, a walking platform with two embedded Bertec Forceplates, and motion capture. Previous studies have reported a high correlation between the force measures collected from Fscan sensors and the force platform ( $r=0.93$ ) (Mueller & Strube, 1996). We propose to test reliability on inclined surfaces and during toe walking. Five participants will perform toe walking on three (3) different inclined surfaces. Participants will perform three heel raises to synchronize the data from the FScan sensors with motion capture and force plates. The data from the FScan 64 devices, motion capture, and force plates will be compared to determine the reliability and validity of the FScan 64 insoles.

## **Physics**

### ***24. Enhancing Optical Metrology Through the Manipulation of the Directional Asymmetry of Polarizers***

**Presenter(s):** Abby Bechtel, Lorrain McKaig

**Advisor(s):** Dr. Jerry LaRue, Dr. Justin Dressel

We design and characterize an optical interferometer that uses the broken directional symmetry of a series of imperfect polarizers to magnify small changes in linear polarization. Using a virtual prototype coded in python, we numerically explore the parameter space to optimize the design for inexpensive laboratory hardware. We anticipate that introducing electro-optical components into this design will enable the precise measurement of a wide range of phenomena.

## **Political Science**

### ***25. Political Affiliations and the Coronavirus Pandemic***

**Presenter(s):** Dylan Hartanov

**Advisor(s):** Dr. Ann Gordon

In 2020 and 2021 we have been faced with a global pandemic that has reshaped our own reality, changing the way we normally do things like going to the store and sporting events. Many lines of red tape have been outlined for us to follow giving new expectations, fears, and worries about the current global pandemic of the COVID-19 virus. In this study, the focus of research will be the correlation of coronavirus fears, worries, and concerns with an individual's party affiliation. This will be done to see if people from either side of the aisle have similar or different thoughts and beliefs about the pandemic. In this study the Chapman fear survey and other related articles and studies will be used to collect information and data to come to a conclusion. In the United States of America those who are more right leaning or Republican have less fear and worry about the coronavirus pandemic and are more inclined to continue everyday activities. On the other hand those who are left leaning or identify as Democrat have more fear and concerns about the coronavirus and are less inclined to go outside and would rather stay at home. Today the plans and ideas of how to deal with the global pandemic has become so entwined with political beliefs that they now come hand in hand. The American political spectrum has become more polarized than in any other time in its history. Many things such as news sources, candidates, and personal beliefs have contributed to this polarization. This study will show the polarization with COVID-19 beliefs with party affiliations as well as varying geographic areas.

### ***26. The Fear of Oil Spills***

**Presenter(s):** Noah Smith

**Advisor(s):** Dr. Ann Gordon

This paper will compile demographic data on individuals and analyze their correspondence with fear of oil spills in order to fabricate a profile of individuals that see oil spills as a risk. I will be using the Chapman Fear Survey as the central data collection device from participants, and use that data and additional studies to create my profiles. Oil spills are an environmental issue that causes a release of harmful crude or refined oil into the environment along the spill, poisoning the landscape and having catastrophic effects on the surrounding area. The independent variable being tested is the fear of oil spills. Dependent upon this is the answers to demographic data such as what news they consume, what political party they belong to, what is their income level, whether they belong to a metro center, and which census region they occupy. I expect to find that those concerned with oil spills will be more likely to belong to the democratic party, and less likely to consume fox news. I also expect them to have a lower income level, be less likely to belong to a metro center, and exist in census regions that have a higher density of oil pipelines, something I will cross examine.

**27. *Fear of Corrupt Government Officials and the Impact of Mass Media***

**Presenter(s):** Eva Jones

**Advisor(s):** Dr. Ann Gordon

Fear and distrust of corrupt government officials in the United States by individuals in the public is influenced by mass media. This paper will analyze and observe the media in relation to corrupt government officials and the impact it has on its audience, their fears, and trust of the governmental system and its officials. Relying on the Chapman Survey of American Fears, a representative national sample of U.S. adults that asks how afraid is one of the following, corrupt government officials and how often one gets news from social media. The relationship between mass media, corrupt government officials, the public's fears and distrust are untested to some extent. Using an original survey, it will consist of questions to ask the public about their fears and distrust in the governmental system in relation to the media. Along with analyzing different sub-factors of government and media including, false news, historical events linked to corrupt government, and the impact of social media. The expected results are that mass media have a significant impact on Americans' fear of corrupt government officials. It is also found that there are other external factors that may lead to the contribution of American's fear of corrupt government officials. The effectiveness and influential notion of mass media bringing awareness to corrupt government officials is explored. The United States without corrupt government officials is an impractical goal, mass media plays a factor into Americans distrust in government and questions our country's moral character and behavior as a whole.

**28. *Media Frames and their Impact on Support for Immigrants and Immigrant Policies***

**Presenter(s):** Lisbeth Rosales

**Advisor(s):** Dr. Ann Gordon

In this paper we will examine how media framing and types of frames used influence support for immigrants in the United States. I examine how likely a potential voter is to support immigrants and immigrant policies based on the information they are presented in the media, paying special attention to the use of equivalency frames, policy frames, episodic and thematic frames. The influence these frames have varies, depending on how they are used and what specific groups they target. It was also discovered that political ideology and location does influence the support or opposition for immigrants and immigrant issues. Relying on the Chapman University Survey of American Fears, a representative national sample of U.S. adults, I was able to observe how many U.S. adults have a fear of immigrants. This presents a possible correlation between the way immigrants and immigrants issues are presented in the media and the fear U.S. adults develop based on the media they are exposed to. As a result of this study we have found data that points to media framing as a significant influencer of American popular opinion on immigrants and immigrant issues. While there are a lot of factors that vary, immigration framing plays a very vital role when it comes to passing policies regarding immigrants.

## **Psychology**

**29. *How COVID19 has Impacted Students Nutrition and Eating Habits with the Abrupt Closure of Restaurants and Campuses.***

**Presenter(s):** Chloe Sermet

**Advisor(s):** Dr. Desiree Crevecoeur-Macphail

It's no surprise that college students often overlook their nutrition to prioritize their work, money, and social activities. College students often rely on restaurants, cafeterias, fast food chains on campuses, and other quick methods of food delivery throughout their school year. With COVID-19 causing college campuses and

restaurants to close, there has been an increase of students finding themselves having to return home and no longer being able to depend on their campus' food resources. This has caused many students to struggle with their nutrition and their ability to properly feed themselves. Not only is nutrition education important to understand the vital nature of food as fuel but also to learn how to maintain these fundamental habits in times of crisis. Supported by the social learning theory, this study evaluated the effect of COVID-19 on college students and where being educated in the field of nutrition makes a difference. This study compared Chapman University nutrition minors and non-nutrition minors to look at how educating individuals on the topic of nutrition directly relates to their own nutrition. It was expected that nutrition minors made healthier food choices than non-nutrition minors. The students' living situation was also investigated, whether students lived at home or not. It was expected that students living at home improved student's nutrition. The impact of social pressures along with COVID-19 was also examined.

**30. *Reading Comprehension in College Students: Does Lo-Fi Music Help or Hinder Reading Abilities?***

**Presenter(s):** Marina Carr

**Advisor(s):** Dr. Julia Boehm

This study analyzes college student's reading comprehension abilities while listening to music. Our main focus falls in the category of low fidelity music, a category of music that does not have much prior research completed. Low fidelity music, or lo-fi music, is music that allows for songs to maintain any impurities or background sounds in the track. This creates a more ambient listening experience. We hypothesized that those who listened to low fidelity music without words would complete a College Board SAT reading section with questions more accurately than those who heard low fidelity music with words, and those who did not hear any. One hundred and seventy-four undergraduate university students completed the experiment online and were randomly assigned to one of three groups: low fidelity music with words ( $n = 57$ ), low fidelity music without words ( $n = 57$ ), or the no music control ( $n = 60$ ). Most of the participants were close in age with a mean age of 19.44 years ( $SD = 2.32$ ). The number of correct responses to the reading comprehension questions were analyzed in a One-way ANOVA. Results indicated that there is no significant difference between groups ( $p = 0.275$ ). Although this study shows no significant results through the one-way ANOVA, the means from each experimental group seem to trend in favor of the study hypothesis, showing a lower accuracy in the lo-fi music with words group as compared to the control and lo-fi without words group. The power in this study was not strong due to the small sample size, also limiting the results of this study. Ideally, further research would use a large and diverse population in order to be able to generalize results regarding low fidelity music and studying.

**31. *Coronavirus-19 Pandemic: Examining Whether Loneliness During Quarantine Relates to Issues with Sleep***

**Presenter(s):** Dalia Jaafar, Lauren Jufiar, Harshitha Venkatesh

**Advisor(s):** Dr. Brooke Jenkins, Dr. Julia Boehm

The global coronavirus pandemic has brought forth unprecedented changes to society's daily functions. While previous research has linked loneliness to depression and anxiety among older adults and the elderly, it is important to consider the effects of the pandemic on younger populations. Therefore, we suggest the need to study the impact of loneliness on factors of sleep such as problems with sleep, restlessness, and change in sleep during the pandemic. In the present study, we recruited a total of 292 students from Chapman University. Participants were asked to complete a questionnaire the week of April 20th of 2020, and subsequently every 2 months until December 2020 that assessed psychosocial and health measures. For the purposes of the present study, we used loneliness at baseline to predict sleep four months later. We hypothesize that higher loneliness will be associated with issues with sleep. Implications of loneliness during quarantine will be discussed in the context of sleep.

**32. *The Impacts of Social Support and Loneliness on the Physical Health and Coping Styles of College Students during COVID-19***

**Presenter(s):** Helen Lee, Harshitha Venkatesh

**Advisor(s):** Dr. Brooke Jenkins, Dr. Julia Boehm

Since the beginning of the COVID-19 pandemic, there has been an increased mental health risk among college students. Recent studies have suggested that this concerning phenomenon can be attributed to social isolation and loneliness caused by preventive measures including social distancing. Being socially isolated can also have harmful effects on one's physical health, such as a weakened cardiovascular system. Furthermore, existing literature reported that social support can promote more active coping strategies, which is associated with better psychological adjustment. Nevertheless, there hasn't been any research on the influence of social factors and loneliness both on students' health and their coping styles during the pandemic. The purpose of the present study is to investigate how loneliness and perceived social support are associated with the physical health and coping styles of college students during COVID-19. As for the coping measure, the study will look specifically at two types of coping strategies: active coping and self-distraction. The variables were measured through an online survey administered across five different time points in 2020 with students enrolled in Chapman University. The study will focus on the first two waves of the survey, which took place in May and July of 2020. Social support and loneliness in May will be used to predict physical health and coping styles in July. It is hypothesized that students who reported higher levels of perceived social support would show better physical health and use active coping more than self-distraction. It is also predicted that those who feel higher levels of loneliness would report poorer physical health and engage more in self-distraction than in active coping. This study may contribute to the necessary endeavor to improve the physical and psychological well-being of college students during the global health crisis by promoting higher social support and alleviating the sense of loneliness.

**33. *Perturbing the Sense of Agency Using TMS***

**Presenter(s):** Emma Chen, Gabriella Corsino, Leyla Rakshani, Joanna Pak

**Advisor(s):** Dr. Uri Maoz, Alice Wong

The goal of this study is to test a model of the sense of agency, intention, volition, and causality in order to examine the time course of the sense of agency associated with voluntary and involuntary movements. We examine the roles of context, expectation, and sensory feedback in the feeling of agency as well as examining the aspects of volition in different kinds of decisions. This study involves non-invasive, transcranial magnetic stimulation (TMS) which is a method of brain stimulation that relies on electromagnetic induction using an insulated coil placed on the scalp to elevate brain function. The TMS coil is placed above the scalp in a position that triggers a slight hand movement; the subject will then be instructed to make the same movement at will. It is expected that the participant will report ambiguity when asked whether the movement was due to them or the TMS. Resultantly, there should be an effect on the sense of agency by the TMS, especially when it is close to the voluntary movement. Here, we present preliminary data illustrating the range and types of precept that emerge among the participants' self-reported levels of agency.

**34. *Covert Attention and Deliberate Decisions***

**Presenter(s):** Nancy Zhu, Amber Hopkins

**Advisor(s):** Dr. Aaron Schurger, Dr. Uri Maoz

Attention seems important to the decision-making process. Previous studies have shown that directing overt attention, which involves moving the eyes, can influence the choices people make (Shimojo et al., 2003). However, it remains unclear whether or not directing covert attention, which involves an effortful internal neural adjustment of attention in space while keeping the eyes fixated in one spot, will impact choice. Even

more, directing impact on deliberate—reasoned, purposeful, and bearing consequences—decisions (Ullmann-Margalit & Morgenbesser, 1977; Maoz et al., 2019). Thus, the proposed study aims to investigate whether or not directing covert attention will impact choices made in a deliberate decision-making context. Subjects will be prompted to choose between non-profit organizations (NPOs) while their overt or covert attention is directed to one option more than to the other. We predict that subjects will be more likely to choose NPOs that they attended to for longer. We hope that this research will contribute to our understanding of the role of attention in decision-making and decisions and how decisions can be influenced.

**35. *The Relationship Between Perceived Neighborhood Disorder and Type 2 Diabetes Risk Across Different Racial/Ethnic Groups***

**Presenter(s):** Min Yu

**Advisor(s):** Dr. Jennifer Robinette

Approximately 32 million Americans have Type 2 Diabetes and that number is growing rapidly. Type 2 Diabetes is sensitive to environmental factors, and higher prevalence rates are often observed in disordered neighborhoods (i.e., those with more trash and vandalism). Through discriminatory practices such as redlining, racially restrictive covenants, urban renewal, and gentrification, marginalized racial/ethnic groups are more likely to live in disordered neighborhoods compared to non-Hispanic Whites. These disparities may also contribute to similar disparities in Type 2 Diabetes rates. Yet, research indicates that there may be racial/ethnic differences in the interpretation of neighborhood disorder as a threat to health and well-being. In the current study, Health and Retirement Study data were used to examine whether the relationship between perceived neighborhood disorder and Type 2 Diabetes risk differs across racial/ethnic groups. Participants reported their perceptions of disorder in their neighborhoods and whether or not they had been told by a physician that they had Type 2 Diabetes. A weighted logistic regression model was used to predict Type 2 Diabetes risk by perceived neighborhood disorder, race/ethnicity, and their interaction. Individual factors that may influence the development of Type 2 diabetes, such as education status, household wealth, sex, and age, were included as covariates. Results from the model indicated that non-Hispanic Blacks, Hispanics, and non-Hispanic Others had higher Type 2 Diabetes risk compared to non-Hispanic Whites. In addition, more disorder was related to heightened Type 2 Diabetes risk. However, the null interaction suggested that the relationship between Type 2 Diabetes risk and perceived neighborhood disorder was consistent across the different racial/ethnic groups. These findings demonstrate that intervention programs designed to reduce disorder in neighborhoods may slow the increasing prevalence of Type 2 diabetes for diverse populations.

**36. *Cultural Influences on Exercise Type and Body Confidence in Women***

**Presenter(s):** Skye Sakashita

**Advisor(s):** Dr. Desiree Crevecoeur-Macphail

This study examined cultural influences on exercise habits and body confidence in women, specifically between ethnic minority and white women. Past research has indicated that Asian women often feel more cultural pressure than their White counterparts. This study wanted to examine further and see if an individual's parent being an immigrant differs in amount of cultural pressure. Another aspect that this survey examined is motivation for exercise. Past research found that women who felt greater dissatisfaction with their physical appearance were more likely to list factors such as appearance or weight as their reasoning for exercise rather than for health reasons. The theory driving this study is social identity theory, which explains how individuals identify with certain social groups in relation to other social groups available. Participants in this study were recruited through SONA and social media platforms and surveyed using the Multigroup Ethnic Identity Measure-Revised (MEIM-R) (Phinney & Ong, 2007), the Social Attitudes Towards Appearance Questionnaire-4 (SATAQ-4) (Schaeffer et al., 2015), and the Reasons for Exercise Inventory (Silberstein, Striegel-Moore, Timko,

& Rodin, 1988). The data results were analyzed using ANOVA, chi square, and t test analyses. The expected results are that female participants who identify as ethnic minorities will report more cultural influences on their exercise habits and body confidence. Specifically, ethnic minority women will report experiencing more family pressures and commentary on their appearance than White women.

### **World Languages and Cultures**

**37. Genderlect Theory in Paloma Pedrero's "*La llamada de Lauren*" and Sabina Berman's "*Entre Villa y una mujer desnuda*"**

**Presenter(s):** Thomas Tsai

**Advisor(s):** Dr. Polly Hodge

Created and popularized by Deborah Tannen, the Genderlect Theory explains how through social contexts, men and women have different ways of communicating. According to Tannen, men focus more on status, while women focus more on forming connections. On the other hand, there is also machismo, the behavior and attitude men partake to show that they are "manly" or "superior" to women and others they deem as inferior. Through the literary theatrical works, "*La llamada de Lauren*" by Paloma Pedrero and "*Entre Villa y una mujer desnuda*" by Sabina Berman, we can see similarities and differences in the Genderlect Theory and patriarchy in society. The Genderlect Theory is essentially a guide of expected gendered communication patterns; however, there has been some criticism since the creation of this theory, as some of the ideas ultimately portray stereotypes. Both Genderlect Theory and patriarchal culture are formed by social norms and individuals sometimes do not conform to these norms. Members of a society often feel pressured to fit in and follow what is expected of them based on established norms. We see that in "*La llamada de Lauren*" and "*Entre Villa y una mujer desnuda*," the characters struggle internally with the pressure to conform to societal norms and debate how much of their individual wants and needs they are willing to neglect. Additionally, people have unique identities and are affected by the era they live in. In "*La llamada de Lauren*," Pedro adapts to expectations of being a "man," but in reality, wants to live his life true to his homosexual identity. Rosa, his wife, is dedicated to having a conversation with Pedro to discuss and work on their relationship. In "*Entre Villa y una mujer desnuda*," Adrián acts as a macho man idolizing the famous Mexican revolutionary leader, Pancho Villa, and Gina is an independent woman, but partially conforms to the stereotypical submissive, female role in the beginning of the play until she realizes what she truly wants.



**ROOM A**

**Art**

**9:00-9:20AM**

***How to Navigate Womanhood Within the Patriarchy***

**Presenter(s):** Hannah Scott

**Advisor(s):** Micol Hebron

In medical journals and articles, a woman is not considered a woman until she has started menstruating, and she is no longer a woman when she reaches menopause (Hill, 2020). In this work, the ideas of life development as a woman from the perspective of the patriarchy are analyzed. "How to Navigate Womanhood Within the Patriarchy" is a quilt made from women's underwear. Each section of underwear represents a different aspect of a woman's life as stated by medical journalist, Yuko Takeda. Each stage is marked by something damaging or useful, such as mental health issues, sexual assault, child-rearing, etc., emphasizing that the experience of being a woman is fraught with suffering and that women are only valuable if they are of use. With the Scholarly and Creative Grant that I was awarded by Chapman University, I was able to expand on existing work to make a life-sized quilt. Taking inspiration from the quilts of the Underground Railroad, I have created a map of what to expect on the journey through womanhood within the patriarchy. The materials used in this piece include twelve pairs of women's underwear, fabric pieces from the underwear, light-pink cotton fabric, thread, period blood, fabric glue, lotion, and a condom. The underwear has been placed in a roughly 6" x 6" pattern onto a large sheet of pink fabric. In darkly kitsch design, women are meant to serve their purpose as child-bearers and suffer the consequences of being born into their own sex. "How to Navigate Womanhood Within the Patriarchy" emphasizes how the outline and pressures of a patriarchal society do not allow room for women to follow their own path through life. Women's lives are mapped out for them by men.

**9:20-9:40AM**

***Seeing Mirror***

**Presenter(s):** Curren Taber

**Advisor(s):** Micol Hebron

Seeing Mirror (2021) is an interactive art installation that explores the modern definition of self, as seen through everyday digital devices. It raises the question of how our devices "view" us and serves as a physical representation of face recognition features found on social media. A user standing in front of the mirror will see a digital overlay framing their face and tracking along with their movement. As a third-year computer science student with a minor in studio art, I took on this project to develop my programming skills while still utilizing my creative expression. My research forced me to demonstrate problem-solving skills and introduced me to the field of machine learning through facial recognition. I used this grant as an opportunity to apply my artistic talent, learn new skills, and create meaningful dialogue around digital identities. The mirror build consists of an LED monitor sitting behind a two-way mirror, blurring the line between natural reflections and a digital interface. It uses an onboard camera, paired with Google's AIY Vision Kit, to track the digital border with viewers' faces. Since the monitor sits behind a two-way mirror, only its brightest areas appear on the reflective side. Google's API allowed me to program the display to

remain black in all regions except the white border. This project is ultimately a visual experience that creates a dialogue around privacy, machine learning, and online presence. Working on this project helped me gain technical knowledge by working with emerging facial recognition technology.

## **Political Science**

**9:40-10:00AM**

### ***Media Matters: Media's Effect on Negative Partisanship in the 2016 Election***

**Presenter(s):** McKenna Etheridge

**Advisor(s):** Dr. John Compton

According to the Pew Research Center (2016), negative feelings of the opposite party, based on the American Republican-Democrat two-party system, have significantly increased since 1994. The literature, as of now, focuses more on the fact that there is a disparity between the feelings towards the parties; it does not, however, thoroughly explain why this disparity exists. My argument for this study is that the media plays an important role in the feelings of animosity between the two major parties in the United States, and I focus specifically on the respondent's news media choices: traditional sources, including television and newspaper; talk radio and radio news; and Internet sites and social media. To test this, I utilize the American National Election Survey (ANES) for the 2016 Election, focusing on the variables of party identification, time spent taking in news media, and media choices as my independent variables; and the feeling thermometers for the Republican and Democrat parties as my dependent variables. I expect to find that traditional media sources will have an impact on both parties, while social media will have a more extreme impact on Democrats' feelings of animosity towards Republicans, and radio news media will do the same for Republicans towards Democrats.

## **ROOM B**

## **Political Science**

**9:00-9:20AM**

### ***Anti-intellectualism and American Fears: An Analysis of Social and Political Factors that Influence Distrust in Scientific Authority***

**Presenter(s):** Naomi Hill

**Advisor(s):** Dr. David Shafie

This study will look at public opinion on a variety of anti-intellectual views. The main question this research is attempting to answer is what are the political and social correlates of anti-intellectualism? The data I will be using to test this question is the 2021 Chapman University National Survey on American Fears. I will be looking specifically at questions within the survey that address public stances on climate change, vaccinations, and mask-wearing (during the COVID-19 pandemic) along with the demographic characteristics of each response group. I plan on running a variety of tests on the data provided within the survey to check for any correlations between the level of fear expressed and demographics for each question. After completing this work, I hope to find support for which social and political categories are

more likely to subscribe to anti-intellectual beliefs like climate change denial, anti-vax, and anti-mask. Through this analysis, I can paint a better picture of which political and social groups within the United States maintain these anti-intellectual views and distrust scientific authority. Furthermore, understanding the conditions which influence public perceptions of scientific issues and authority can allow us to more successfully implement scientifically-backed policies in the future.

**9:20-9:40AM**

***Explaining the History and Rise of the Republican Latino Vote***

**Presenter(s):** Alberto Cruz

**Advisor(s):** Dr. John Compton

Latinos have, in the past, voted overwhelmingly Democrat; however, recently, more Latinos than ever before have been voting Republican, likely signaling integration into a previously opposing party. There have been many examples of the integration of immigrants in the history of the United States, historically, most of them coming from European countries. In recent times, however, Latinos have been growing rapidly as a population and as a minority in the United States. The Latino population has had a history of voting towards Democrat politicians all over the US, and this seems to be a trend towards integrating into American culture by consistently voting in the elections. This premise, however, has begged the question of whether or not Latinos have been integrating into American culture, and if so, is there a generational effect, with second and third generation immigrants becoming more politically conservative? Currently, the evidence to explain these voting patterns have not taken into the account the 2016 or the 2020 elections, which have a lot of information about the changing patterns. I argue that these patterns will demonstrate an expansive distribution between certain ethnicities and nationalities as they vote either mostly Republican or Democrat depending on their personal identity. Using data from the American National Election Study from the years 2016 and 2020, we evaluate the voting patterns of Latinos and what compels them to vote that way.

**9:40-10:00AM**

***Religion: The Perpetually Forgotten, and Underestimated Group Influencer in 21st Century Politics***

**Presenter(s):** Madison Mercer

**Advisor(s):** Dr. John Compton

Within the realm of politics and religion, research tends to fall victim to the same undeveloped understanding of world religion in general. This fear and misunderstanding of religion as a group identity is detrimental to research of the relationship between religion and politics. Not to mention detrimental to the understanding of how classifications, such as religion, affect social movements, policy decisions, and voting habits. Within the realm of modern religion, it can be difficult to nail down accurate numbers, with religion becoming more malleable and less structured overtime, distinct and specific measuring becomes critical. I will research and analyze self-described religion and church attendance for my theory. I will be using various data sources, including studies from the 2007 World Survey of Religion and the State. Additionally, I will be using data from the 2020 American National Election Studies, to understand religion identification in reference to views on several contemporary political matters such as abortion policy, position on gay marriage, and position on protestor actions. I hypothesize that religiosity, as

measured by the frequency of church attendance and self proclaimed religion, is positively correlated with more traditional views on the above policies. Additionally, I hypothesize this research will show religiosity has become progressively important to modern voters, and even more important than other very strong group identifiers.

## **ROOM C**

### **Biochemistry and Molecular Biology**

**9:00-9:20AM**

#### ***Characterization of the Chia WRKY Family***

**Presenter(s):** Megan Shieh, Harshitha Pandian, Cailyn Sakurai

**Advisor(s):** Dr. Hagop Atamian

*Salvia hispanica* (chia) is an herbaceous plant from the mint family widely for its highly nutritious seeds. Similar to other agricultural plants, chia plants are subjected to various environmental stresses. The chia plant has been reported to have low salt tolerance, poor cold tolerance, and susceptibility to insect infection. A potential strategy for limiting the effects of various stress factors on plants is to optimize the plants' defenses. This can be done by breeding plants with more defense-related proteins, such as the WRKY transcription factor family. This research project's main objectives are to identify and categorize WRKY genes in the chia genome and analyze differential gene expression of WRKY genes in stressful environments. Ninety-one putative WRKY genes were found in the chia genome. A maximum-likelihood phylogenetic tree was constructed to sort these genes into three well-established groups (I, II, III). Motifs were found in the amino acid sequence using the Multiple Em for Motif Elicitation (MEME) online tool. Using qRT-PCR, differential gene expression in chia leaves was measured for selected WRKY genes after application of the following treatments: salicylic acid (SA), jasmonic acid (JA), abscisic acid (ABA), and cold. Overall, these results represents the first time that the chia WRKY family has been characterized.

### **Communication Studies**

**9:20-9:40AM**

#### ***Personality Predictors of Public Support for Racial and Sexual Diversity in the Media***

**Presenter(s):** Caitlin Neuville, Sixtine Foucaut, Sara Morgan, Andrea Torres, Angela Poerschke

**Advisor(s):** Riva Tukachinsky

The study examines the relationship between various personality traits (openness and empathy) and feelings towards racial and sexual diversity to establish a sense of public support to interact with diverse media. A total of 272 participants were recruited from an online survey crowdsourcing market place, MTurk. All the participants were U.S. American and from various racial and sexual backgrounds. A survey was used to measure all variables through several questions presented on a Likert scale and results were then coded in such that higher scores indicate a higher ranking on a given variable. Both openness and empathy were predictive of (1) participants support for media diversity policies within the world of film and television and (2) participant's intention to consume media content that includes a range of diverse characters. The effects were largely mediated by the motivation to expand the boundaries of one's self-

concept by gaining an understanding of outgroup members' realities and assuming identity of others, rather than by the social justice views they hold. These findings inform how implementing diverse roles and diversity regulations in media can be utilized to gain wider public support. In addition to finding support for implementing diversity the study also analyzes the notion of self-expansion and the relative relationship with media enjoyment, providing, insight into the relationship between motivations of self-expansion and the media an individual chooses to consume. Moreover, the results suggest that diversity in the media is not likely to alienate majority group audiences, even if they do not personally value media diversity.

## **Biochemistry and Molecular Biology**

### **1. *Investigating Potential Biomarkers for Methotrexate-related Neurotoxicity in Pediatric Acute Lymphoblastic Leukemia***

**Presenter(s):** Edena Khoshaba

**Advisor(s):** Dr. Marco Bisoffi

Methotrexate (MTX) is an essential chemotherapeutic agent used in treatment of pediatric acute lymphoblastic leukemia (ALL), the most common malignancy in children. However, MTX is associated with neurotoxicity, which may result in treatment disruptions and jeopardize treatment efficacy. As understanding central nervous system (CNS) metabolic processes in response to MTX therapy may yield new insights into the pathways underlying neurotoxicity, we used a global metabolomic approach to identify novel biomarkers of MTX-related neurotoxicity in cerebrospinal fluid (CSF) samples. Patients diagnosed with pediatric ALL (2012-2017) were prospectively followed for the incidence of MTX-related neurotoxicity, defined as neurologic events (e.g., seizure, stroke-like symptoms, aphasia) occurring within 14 days of intrathecal or intravenous MTX therapy. We conducted global metabolomic profiling of CSF samples obtained during therapeutic lumbar punctures using both gas chromatography(GC)-mass spectrometry(MS) and ultra-high-performance liquid chromatography(UHPL)-MS/MS. Metabolites associated with neurotoxicity ( $p\text{-value} < 0.05$ ) in a discovery cohort of 12 neurotoxic cases and 22 controls, were evaluated in an independent replication cohort of 14 cases and 29 controls. Analyses accounted for potential confounders, including age at diagnosis, BMI category, and ethnicity. Overall, study participants were mostly male (54.5%), Hispanic (48.1%), and treated on high or very high-risk protocols (88.3%). A total of 314 metabolites were identified in the CSF of the discovery cohort, of which eight were associated with neurotoxicity. Seven were evaluable in the replication cohort, including one that replicated: maleate (Fold Change: 1.12,  $p\text{-value} = 0.0069$ ). This study identified a novel biomarker of MTX-related neurotoxicity, which was detectable in the CSF of patients prior to the clinical onset of symptoms. These results provide insight into potential mechanisms of MTX-related neurotoxicity, possibly through maleate's suspected role in glutathione depletion and resulting oxidative stress.

### **2. *CowN Shields Nitrogenase from Carbon Monoxide***

**Presenter(s):** Michelle Jin, Chloe Garcia, Emily Wong, Kiersten Chong, Ruchita Kharwa, Terrence Lee

**Advisor(s):** Dr. Cedric Owens, Max Strul

As society continues to progress, there is an increasing demand for agricultural crops. Constantly growing agricultural products results in nutrients deficit in the soil that is replenished by fertilizers. Production of these fertilizers requires large amounts of energy, create pollution, and can cause further nutritional deficiencies in the soil. Overall, fertilizers are not sustainable for continuous agricultural practices. An alternative to using fertilizers is biosynthesis by bacteria. *Gluconacetobacter diazaotrophicus* is an agriculturally relevant bacteria that produces "biological fertilizer." *G. diazaotrophicus* has an enzyme, Mo-nitrogenase, that catalyzes nitrogen fixation to break down dinitrogen gas ( $N_2$ ) into ammonia ( $NH_3$ ). An inhibitor of nitrogenase is carbon monoxide (CO). A second protein, CowN, protects nitrogenase from the inhibition by CO. Although we know CowN protects Mo-nitrogenase from CO, we do not know how, and do not know if there is an interaction between the two proteins. Therefore, our lab aims to understand if the interaction between CowN and Mo-nitrogenase occurs and if it is specific. Our lab determined that CowN directly interacts with Mo-nitrogenase and exhibited hyperbolic kinetics when the dosage of CowN increased. The binding affinity between the two proteins is approximately 1  $\mu M$ . Furthermore, CowN restores nearly all of the nitrogenase activity at a CO concentration up to 0.001 atm. Overall, this work allows us to conclude that the protein interaction between CowN and nitrogenase is specific, and it enables nitrogenase to remain active in the presence of CO.

**3. *Characterizing the Interaction between Nitrogenase and CowN***

**Presenter(s):** Terrence Lee, Michelle Jin, Ruchita Kharwa, Sophia Kelsey, Emily Wong, Max Strul

**Advisor(s):** Dr. Cedric Owens

Biologically available nitrogen is vital for agriculture, however most nitrogen exists as nitrogen gas. The industrial method to convert or “fix” nitrogen gas into biologically usable nitrogen in the form of ammonia is achieved using the Haber-Bosch Process under harsh conditions. Meanwhile, bacteria can also fix nitrogen gas into ammonia and can do so under ambient conditions. Bacteria such as *Gluconacetobacter diazotrophicus* rely on the enzyme Mo-Nitrogenase to fix nitrogen. Mo-Nitrogenase is the key player to produce ammonia biologically. Studying this enzyme opens up prospects for more sustainable ammonia production. However, Mo-Nitrogenases are highly sensitive to inhibition by carbon monoxide. Only small amounts of CO drastically reduce ammonia production. Yet, organisms are still able to grow under CO when Mo-Nitrogenase is inhibited. This is thanks to another protein, CowN. Neither its structure nor its method of protecting Mo-Nitrogenase from CowN have been studied in detail. This work explains how CowN protects Mo-Nitrogenase. In vitro enzyme kinetics reveal that Mo-Nitrogenase is inhibited by CO through a mixed-inhibition model. Adding CowN increases CO’s  $K_i$ , helping Mo-Nitrogenase tolerate more CO. CowN specifically decreases the affinity of CO binding since nitrogenase substrates still turn over. These results reveal how Mo-Nitrogenase tolerates CO that is present in the environment.

**4. *Analyzing Interaction of Nitrogenase’s Activator (NifA) with DNA***

**Presenter(s):** Lois Kim

**Advisor(s):** Dr. Cedric Owens

Nitrogenase is an enzyme that converts dinitrogen ( $N_2$ ) gas into ammonia for plants to use as a nitrogen source. The protein NifA is a transcription factor which binds to DNA via its DNA binding domain (DBD) to activate the transcription of nitrogen fixation genes. NifA is sensitive to its environment, and only activates nitrogen fixation when enough reducing equivalents are available to support nitrogenase. However, it is currently unknown how NifA senses the reducing conditions. In this study, we examine two cysteines which are placed upstream of the DBD. We want to determine if they are able to sense the redox conditions through disulfide bond formation and breakage. Our hypothesis is that there will be a DNA higher binding affinity under reducing conditions than oxidizing conditions. To test our hypothesis, the two constructs of NifA’s DBD, one which contained both cysteines (2C) and the other which contained no cysteines (NC) were created. The affinity of the protein samples towards their DNA targets were analyzed using fluorescence anisotropy. The fluorescence anisotropy values for 2C oxidized and 2C reduced were similar indicating that the data did not support our hypothesis and that the redox state of NifA’s DBD cysteines does not affect DNA binding affinity. Using Ellman’s assay, we further showed that two cysteines from the 2C construct do not make a disulfide bond, offering an explanation as to why they are not used in redox sensing. Although this study did not reveal the redox sensing mechanism of NifA, it helped narrow down the possibilities. We will now turn our attention to other Cys in NifA that may work as redox sensors.

**5. *Fundamental Causes of Racial and Ethnic COVID-19-Related Health Disparities***

**Presenter(s):** Hana Neutz

**Advisor(s):** Dr. Jason Douglas

Underserved low-income communities of color in the U.S. have endured an unequal burden of COVID-19 morbidity and mortality. This pattern of pandemic-related health disparities has been pervasive throughout history. Yet, no known studies have simultaneously examined social and biological factors that contribute to these concerning health disparities. Therefore, this paper aims to bridge the gap by employing a scoping literature review of (1) the deleterious impacts of systemic racism on COVID-19-related outcomes; and (2) the



cellular and molecular mechanisms connecting COVID-19 and hypertension (a comorbidity known to exacerbate COVID-19 severity). My findings indicate that systemic racism manifests in inequitable access to education, which is a major driver of COVID-19-related racial and ethnic health disparities. Further, policies and practices stemming from systemic racism and associated allostatic load may contribute to the increase of hypertension among racial and ethnic minority communities, thus further contributing to COVID-19 severity within these populations. In addition, my scoping literature review revealed that common anti-hypertensive drugs (ACEI and ARBs) did not increase the chances of contracting COVID-19 or increase its severity. These drugs increase the amount and improve the efficiency of the ACE-2 receptor, the same receptor that COVID-19 uses to gain access into human cells. The drugs do not increase the efficiency of the receptors in the respiratory system where COVID-19 infects. It is concluded through this review that these health disparities do not stem from the connection between hypertension and increased risk of COVID-19 contraction for people of color, instead racial and ethnic COVID-19 related mortality and morbidity disparities are a function of systemic racism. We must now shift our focus and research to the inequality that systemic racism has caused in this pandemic. Policies must be enacted that provide equitable access to education to improve the health outcomes in low-income communities of color.

**6. *The Role of CD11c+ B Cells in Human Health and Autoimmune Disease***

**Presenter(s):** Kristina Nguyen

**Advisor(s):** Dr. Jennifer Totonchy

The central focus of this project is to investigate the role of CD11c+ B cells in human health and autoimmune diseases through an extensive literature review of primary research articles. The results of this project are expected to contribute towards studies for the treatment of autoimmune diseases such as common variable immune deficiency (CVID), rheumatoid arthritis (RA), systemic lupus erythematosus (SLE), and multiple sclerosis (MS). This project aims to provide a potential mechanistic explanation for increased autoimmune disease severity by the characterization of CD11c+ B cells that are associated with more severe disease phenotypes and resistant to disease-modifying treatments. Through these findings, current clinical therapies for autoimmune indications could be improved towards the responsiveness from this B cell population. The primary research articles of intended focus in this systemic review include those studying the phenotypic and functional characteristics of the CD11c+ B cell population in various settings of health and autoimmune disease. Although B cells are known to play an essential role in the adaptive immune system through antibody secretion, antigen presentation, and immune regulation, the differentiation and expansion of CD11c+ specific B cells have been implicated in several autoimmune diseases. CD11c+ B cells are hypothesized to contribute to autoimmune pathology by representing a tissue-homing B cell subset that is recruited to local sites of inflammation for activation and expansion by inflammatory mediators.

**7. *Utilizing MLLI to Assess the Experiences in REActivities Organic Chemistry Labs***

**Presenter(s):** Daisy Haas

**Advisor(s):** Lauren Dudley

REActivities has aimed to transform the undergraduate organic chemistry lab experience through the creation, adoption, and evaluation of innovative learning materials that improve student engagement, foster critical thinking skills, and develop confidence in the undergraduate organic teaching lab. Assessment of our goals required the Meaningful Learning in the Laboratory Instrument (MLLI) which measures students' cognitive and affective responses before beginning organic chemistry lab (pre) and again at the end of their lab experiences (post). Individual questions were analyzed to gauge student-reported changes in confidence for problem-solving skills and analyzing data when enrolled in an organic lab utilizing REActivities. Significant changes in

post survey data between first semester and second semester MLLI responses indicate improved confidence for data analysis.

## **Biological Sciences**

### **8. *Spatial and Temporal Patterns of Forest Water-Use Efficiency in Switzerland***

**Presenter(s):** Brandon Bernardo

**Advisor(s):** Dr. Gregory Goldsmith

Plant water-use efficiency (WUE) is defined as carbon gained via photosynthesis per unit water lost through transpiration. Given that WUE captures the coupled patterns in both carbon and water cycling, it has the potential to serve as a compelling measure of plant function in response to both current and future environmental conditions. Our ability to effectively measure WUE over time and space has historically been limited by the intensive nature of available methods. However, advances in remote sensing instrumentation have created new opportunities to observe WUE. NASA's new ECOSystem Spaceborne Thermal Radiometer Experiment on Space Station (ECOSTRESS), provides estimates of water-use efficiency at 70 m resolution every few days. We used these advances in available WUE data to determine 1) how WUE varies across space and time and 2) test for relationships between WUE and environmental factors. We ask these questions in Switzerland, a country where nearly all of its forests are closely managed for timber production; thus, measures of plant function that can inform management are a high priority for decision makers. In particular, we studied how WUE varies during the summer growing seasons (2018-2020) among forests that varied in temperature, precipitation, elevation, and anthropogenic nitrogen deposition. To do so, we used ground-based observations from 182 sites that are part of a long-term forest monitoring program. Sites with higher mean annual temperature and lower mean annual precipitation at lower elevations demonstrated significantly higher inter- and intra-site variability in WUE. This corresponded to differences in the WUE of the predominant tree species at different sites; evergreens had higher WUE than deciduous broadleaf trees. Surprisingly, WUE did not vary with nitrogen deposition, which has changed significantly in recent decades due to anthropogenic pollution. Our results are consistent with observations that changes in climate are likely to exert control over future WUE.

### **9. *Locomotion of Atlantic Hagfish: Burrowing in Sand***

**Presenter(s):** Luke Arnold

**Advisor(s):** Dr. Douglas Fudge

Hagfishes are elongate, eel-shaped marine organisms notorious for their ability to produce large volumes of slime as a defense mechanism against predators. They are commonly found in the depths of the ocean, where they act as scavengers. Hagfishes have been known to squeeze through tight spaces and burrow in a variety of substrates, including sand, mud, and large animal carcasses, but the specific mechanisms of hagfish burrowing have not been widely researched. In this project, we studied the behaviors of the Atlantic hagfish (*Myxine glutinosa*) burrowing in sand. This was accomplished by observing an Atlantic hagfish in a tank partially filled with sand and artificial sea water and filming with a mounted camera. Videos were used for kinematic analysis of tailbeat frequency, instance and direction of body rotation, and behavioral patterns. It was found that Atlantic hagfish sand burrowing is a specialized behavior that occurs in two sequential phases: the first phase began with the hagfish entering the substrate head-first, followed by lateral tail beating that had an initial increase in frequency, followed by a gradual decrease and rotational movements of the body. This persisted until the hagfish was partially submerged in the sand; the second phase began with a gradual lurching where the body would enter the substrate in a saltatory pattern over a longer period of time. These findings are significant within the context of vertebrate evolution as well as bettering our understanding of the diversity of Atlantic hagfish locomotor behaviors. A biphasic burrowing strategy has also been noted in burrowing and sand

diving Osteichthyes, indicating that the lack of a vertebral column and the presence of an elongate body form of hagfishes does not impede, and may even functionally enhance, the burrowing lifestyle of myxiniids.

## **Business**

### ***10. The Effect of Influencer Reach on Consumer Engagement and Persuasion Knowledge***

**Presenter(s):** Kimia Abolhoda, Khushi Patel, Shaan Parol

**Advisor(s):** Dr. Charlene Chu, Dr. Cristina Nistor

Influencer marketing is being used more and more as brands attempt to engage consumers across the world. Social media influencers create organic and sponsored content that engages and attempts to persuade their followers about brands and products. We use three novel datasets to analyze the effect of influencer reach on consumer engagement and persuasion knowledge. Our results indicate that the number of followers (the influencer's reach) affects the consumer engagement with the content created by the influencer. We find that smaller influencers are able to engage consumers more deeply than large influencers. Moreover, influencers with a larger reach are less likely to be regarded as credible in sponsored posts, suggesting that persuasion knowledge plays a key role in the ability of smaller influencers to engage consumers more deeply. The managerial implications are notable: influencer advertising is an effective promotional tool, but the reach of the influencer is an important consideration for marketing managers as the level of engagement and perceived credibility of the source and message depend on the reach of the influencer.

## **Chemistry**

### ***11. A Computational Investigation of the Molecular Descriptors of Tyrosine Kinase Inhibitors***

**Presenter(s):** Robby Jones

**Advisor(s):** Dr. Maduka Ogba

Drug discovery can cost 0.5 to 2.6 billion dollars and take 10-20 years to develop a single, viable drug for humans. This process necessitates strategies for identifying and mitigating bottlenecks in the timeline. The most significant bottleneck, synthesizing and testing drug candidates, is expensive, time-consuming, and without a guarantee of a successful compound. Computational chemistry techniques, especially with the rise of machine learning algorithms, have proven to help alleviate the costs associated with the drug discovery process. Using these tools, drug candidates can be rapidly identified and compared to existing drugs. However, the accuracy of machine-learning algorithms in generating viable drug candidates depends on molecular descriptors gathered via computations. Our group seeks to develop a computational checklist for generating, identifying, and weighing high-accuracy molecular descriptors for machine-learning-based drug discovery. This presentation focuses on small-molecule tyrosine kinase inhibitors (TKIs) for c-Src and BCR-ABL kinases, targets in cancer treatment. We use high-accuracy quantum mechanical calculations to explore the potential energy conformational space and three-dimensional molecular descriptors of several TKIs that are FDA-approved or in clinical trials. We compare descriptors from the computed conformational space of these drug molecules to those in the bound inhibitors' crystal structure geometries. This presentation will highlight emerging trends from our data, revealing the molecular descriptors that may govern tyrosine kinase inhibition.

**12. Theoretical Study Revealing, in Molecular Detail, How A Calcium Salt Activates Strong Sulfur-Fluorine Bonds in the Synthesis of Medicinally-Relevant Nitrogen-Containing Sulfur(VI) Compounds**

**Presenter(s):** Brian Han

**Advisor(s):** Dr. Maduka Ogba

Nitrogen-containing sulfur(VI) compounds are commonly used in the pharmaceutical industry to combat bacterial infections. Synthesis of these compounds is typically facilitated by nucleophilic attack of a sulfur(VI) chloride precursor by an amine nucleophile. However, the relative instability of sulfur(VI) chlorides makes selective synthesis challenging in the presence of competing nucleophiles, and hence limits our ability to perform late-stage functionalization of complex natural products. Sulfur(VI) fluorides have become attractive alternatives to the chloride analogs given the increased selectivity achieved with these precursors. However, the increased stability of sulfur(VI)-fluoride precursors and the instability of the resulting fluoride ion byproduct necessitate the incorporation of Brønsted or Lewis acids into the reaction flask. Recent reports show that calcium triflimide activates sulfur(VI) fluorides toward the synthesis of nitrogen-containing sulfur(VI) compounds under mild condition and in the presence of amine nucleophiles and bases. This contrasts conventional methods where strong bases/nucleophiles with elongated heating process were required. However, the mechanism in which calcium triflimide facilitates this process remains to be elucidated, hindering further catalyst optimization. In my research project, we used computational approaches to uncover the likely mechanism for calcium triflimide-mediated sulfur(VI)-fluoride activation. We show that sulfur(VI)-fluoride activation requires ligation and stabilization of the sulfur-bound fluorine to the calcium center during the key nucleophilic substitution step. We uncover why adding DABCO, a bicyclic amine, to the flask facilitates the chemical reaction at lowered temperature and reduced reaction time. In this poster, our complete mechanistic insights on this calcium triflimide-mediated reaction will be presented.

**13. Mechanistic Insights into Hypochlorous Acid (HOCl)-Sensing at a 4 Cysteine Zinc Complex Implicated in Bacterial Redox Sensing**

**Presenter(s):** Dylan Arrazati

**Advisor(s):** Dr. Maduka Ogba

Zinc finger domains, tetrahedral complexes with coordinating histidine and cysteine residues, provide structural rigidity in proteins, mediate protein/DNA interactions, and act as redox switches. As redox switches, these domains detect biological oxidants produced by host systems and hence play an essential role in bacterial defense against oxidative cell death. Despite this crucial role, molecular insights into how these zinc fingers sense hypochlorous acid (HOCl) – one of the most potent biological oxidants produced during inflammation – is still in its infancy. This work incorporates computational techniques to investigate the HOCl-sensing mechanism of a [Zn(Cys)<sub>4</sub>] model for the holdase chaperone Hsp33 protein. The overarching goal is to elucidate the role of the zinc-complex in mediating the reactivity at the cysteines toward HOCl oxidation and compare these results to other HOCl-sensing zinc finger domains previously explored in our lab. Progress made toward these efforts so far will be presented.

## **Communication Studies**

**14. A Shift in Motivation: How Online Dating has Changed During the COVID-19 Pandemic**

**Presenter(s):** Samantha Jabour, Alexis Hill, Alix Lennon, Hannah Lee, Ava Marinelli

**Advisor(s):** Dr. Austin Lee

COVID-19 has generated mass changes all over the world. These changes have impacted the way individuals today interact with one another. With interactions shifting due to the pandemic, the world of dating has also

been affected. We will work to determine how COVID-19 has promoted change within the motives of online dating application users. Previously, some potential motives included: love, casual sex, and more. The online dating app, Tinder, reported a growth in its user base by 15% since 2019 (Bary, 2020) and 60% of new members joined Tinder “because they felt lonely and wanted to connect with ‘new and different people.’” (Tinder, 2021) We expect with the pandemic restricting an individual's ability to meet a potential partner, there will have been a shift now in motives by online dating users — specifically, the motive of physical intimacy. Therefore, this leaves for more growth in motives that do not require physical interactions, specifically companionship. As a group, we hypothesize that COVID-19 increased the motivation for companionship among online dating users. Our research will adapt the Uses and Gratification Theory as a framework to understand how individuals satisfy their relationship-seeking motives through online dating applications. The uses and gratification theory is a socio-psychological communication theory developed by Elihu Katz et al., that focuses on mass media. This theory posits people have a motivation behind consuming media, it describes media as a product that individuals become consumers. Applying the Uses and gratifications theory allows us to understand why online dating users are seeking out these applications. In our research, the “why” will be determined through the specific motivations of online dating users. For example, our survey will depict dating application users as consumers of non-traditional media and reveal how their motivations for consumption have shifted since COVID-19. By asking participants whether or not they had previously downloaded dating applications and also asking for their motivations.

**15. *How Mental Health and Relationships are Affected by COVID-19***

**Presenter(s):** Abby Gikas, Emma Keller, Lauren Label, Caroline Brown, Jenny Bedell

**Advisor(s):** Dr. Austin Lee

Studies have shown both a positive and negative correlation in mental health and interpersonal relationships from the restraints of the COVID-19 pandemic. According to similar studies, the negative effect is larger than the positive. We will be examining whether the COVID-19 stay-at-home orders were associated with suffering or improving interpersonal relationships in young adults (ages 18-35). Depending on this information, we can assess whether that negatively or positively affects one's mental health. In a previous study, Anne Krendl and Brea Perry examined the impacts of the COVID-19 pandemic and stay-at-home orders on older adults' social and mental well-being. The results found that older adults' mental health was negatively affected by the pandemic. The findings also provided that the adults had greater depression than before the pandemic, especially those that felt disconnected from their social networks. This information is relevant to our study on relationships and mental health in young adults as it provides the perspective of older adults. It allows us to measure similarities and differences between the two which we find to be significant. Due to the unprecedented times of the COVID-19 pandemic, many people have experienced negative impacts on their lives. Because of the government-issued stay-at-home orders, individual's personal relationships have suffered (IV). Not being able to see family members or friends has led to feelings such as loneliness, detachment, and confusion. Experiencing a lack of social interaction and losing a sense of closeness with people can cause one's mental health to suffer (DV). Positive mental health is important to maintain however, the pandemic challenges that in many ways. These feelings of isolation while being separated from family and friends can heighten mental health struggles such as anxiety and depression.

## **Computational Science**

### **16. *Circulatory Resistivity Increases Costs of Circulatory Transport in Peristaltic Systems***

**Presenter(s):** Ivan Orlovic, Ryly Yee, Brian Kim

**Advisor(s):** Dr. Lindsay Waldrop

Peristalsis represents one way that animals can drive circulatory flow. Tubular hearts that drive flow peristaltically are present in many invertebrate circulatory systems, as well as early embryonic vertebrates. Although peristalsis is a well-studied system in many contexts, very few studies have examined the performance of peristaltic systems with different resistive circulatory systems. In this study, we examine the performance of peristaltic hearts with circulatory systems of various resistance through a computational fluid dynamics modeling. Two peristaltic mechanisms were used, opposing sine waves and opposing sharp Gaussian peaks, which allowed for investigating the role of heart tube flexibility. We found that increasing circulatory resistivity decreases flow rates and greatly increases the cost of transport. Additionally, flexibility of the heart tube allowed for greater flow speeds within the circulatory system and more consistent flows in additional resistivity. This provides potential insight into the action and physical limits of peristaltic pumps in terms of driving flow in resistive circulatory systems.

### **17. *A Case Study on the Impact of the COVID-19 Shutdown on Campus Air Quality at Chapman***

**University: *Measuring PM1.0, PM2.5, PM10, CO, O3, NO2, and SO2 levels***

**Presenter(s):** Thomas Rocha, Miryam Fhima

**Advisor(s):** Dr. Aaron Harrison, Dr. Wenzhao Li

The COVID-19 pandemic has presented a unique opportunity to study the effects of human activity on air quality. In the present work, the impact of campus closure on the local air quality at Chapman University is studied using a low-cost particulate matter (PM) sensor to analyze the changes in PM concentrations (PM1.0, PM2.5, and PM10) on campus prior to and after campus closure. Common pollutants (CO, O3, NO2, and SO2) are also being analyzed using the TROPOMI Sentinel-5P satellite. Data collected between Feb 1 and Feb 29, 2020 was designated as the time period representing conditions before campus closure while data collected between April 1 and April 29, 2020 was used for the period following shutdown. These data show that, on average, the measurements before campus closure showed higher amounts of all PM sizes with the amount of PM decreasing by approximately 32% following campus closure. In terms of PM2.5, the measurements prior to campus closure not only showed higher averages of PM2.5 but also recorded a larger number of instances where the PM2.5 concentration exceeded the EPA's 24-hour federal standard of 35  $\mu\text{g}/\text{m}^3$  by comparison to the time period after closure. During campus shutdown, the PM2.5 concentration never rose above 30  $\mu\text{g}/\text{m}^3$ . Between the time periods, CO and O3 concentrations increased while NO2 and SO2 reported a decreased concentration. These changes in CO, O3, NO2, and SO2 levels are however not believed to be related to human activity as these trends were also observed during the same time period in 2019 when there were continual normal levels of activity. Further studies and data analysis are needed to confirm whether or not these changes in pollutants (both PM and common pollutants) are a result of human activity or annual patterns.

## **Computer Science**

### **18. *Demonstration of the Mølmer-Sørensen Gate for Bus-Coupled Superconducting Qubits***

**Presenter(s):** Jack McGrath

**Advisor(s):** Dr. Justin Dressel

With the field of quantum computing quickly progressing, there has arisen a need for high-fidelity two-qubit entanglement gates as the foundation for constructing a universal quantum computer. The Mølmer-Sørensen



entanglement gate has been shown to work with high-fidelity on trapped-ion systems, however such a gate is still being developed and optimized for superconducting qubits. Here we will present a detailed simulation of the Mølmer-Sørensen gate on bus-coupled superconducting qubits, specifically transmons, with Julia using the QuantumOptics.jl library.

## **Data Analytics**

### ***19. How can Health Data be Used to Provide Better Emotional Assistance to Children with ADHD?***

**Presenter(s):** Christopher Youn

**Advisor(s):** Dr. Franceli Cibrian

Attention Deficit Hyperactivity Disorder (ADHD) is the most prevalent childhood psychiatric condition in the U.S., and children with ADHD can display symptoms of inattention and hyperactive or impulsive behaviors that often require the support from caregivers and treatments such as medication or behavioral interventions. To further assist children with ADHD in regulating their emotions and behavior, the use of wearable assistive technology like smartwatches is being explored, and various applications have been shown to help children and adults with intellectual disabilities in regulating their emotions and behavior. One type of application that is not well documented in current scientific literature is the use of health-related data like the user's heart rate collected by the smartwatch in providing better and more timely behavioral and emotional interventions for children with ADHD. In this project, we are analyzing the data from 12 children with ADHD including heart rate, energy expenditure, and time asleep. Currently we found that 9 out of the 12 children wore the smartwatch regularly, and their average heart rate was  $90.651 \pm 24.007$  bpm. For future work, we will continue similar exploratory analysis and ultimately use the health data to classify key events for the child and determine when and what kind of emotional assistance should be provided by the smartwatches.

## **Environmental Science and Policy**

### ***20. Nature Based Solutions: Urban Forestry***

**Presenter(s):** Monroe Roush, Sereena Gee

**Advisor(s):** Mackenzie Crigger, Dr. Jason Keller

The nature based solution of urban forestry will be explored in this paper and will serve as an outline for potential implementation. Nature based solutions provide mitigation to climate change, water management, and promote community sustainability. Urban forestry is a nature-based solution that focuses on planting and managing trees in urban areas. Through urban forestry, cities can manage the urban heat island effect and increase biodiversity. This paper entails detailed explanations of urban forestry and will supply possible implementation options for the city of Costa Mesa. Goals, case studies, and communication techniques will be explored to provide a comprehensive background and foundation for understanding urban forestry in the context of climate resilience and disaster preparedness.

## **FFC**

### ***21. Dual-Pantheons: Nature and Non-Nature Deities in Norse and Greek Mythology***

**Presenter(s):** Emma Brandel

**Advisor(s):** Dr. Julye Bidmead

The Norse and the Ancient Greeks were both prolific civilizations with rich mythological histories. Something to note about both cultures is that they worshipped more than one group, or pantheon, of gods. These groups can often be split quite neatly into Nature and Non-Nature pantheons; The Norse worshipped the Vanir and



the Aesir, and the Greeks worshipped nature spirits like Nymphs and River Gods, as well as the famous Twelve Olympians. In Norse mythology, the Vanir (Nature deities) and the Aesir (Non-Nature deities) lived in separate worlds, but intermarried and acted as extended family. The Greek Olympians were similar, with the gods Zeus and Apollo famously pursuing minor deities such as wood-nymphs. The Greek God Dionysus was famous for his non-human followers, such as the raucous Satyrs and the crazed Nymphs who worshipped him. While these distinct Dual-Pantheons are well documented, I would like to learn more about how they came to be. Were the Vanir and the Aesir once the pantheons of separate Norse tribes? Are these nature-deities the remnants of earlier Greek societies, before belief in the Twelve Olympians spread across the Ancient Greek World? I would like to explore these questions to better understand the rich mythologies of both of these cultures.

**22. Examining Comparison**

**Presenter(s):** Amara Warren

**Advisor(s):** Dr. Julye Bidmead

In Middle Eastern culture there are many identities that have myths. The myth in which I will discuss is The Osiris myth (an Egyptian myth). I want to compare the myth of Osiris to the Greek character Thanatos in some way, or to the death of Odysseus which takes place in the Odyssey. After I compare this myth to another myth or character, I plan on going into detail on pharaohs; how they were buried, in order to give more cultural background to the comparison between Egyptian and Greek mythology. Before providing the viewer with this information, as an introduction I want to compare the creatures and Gods in mythology to Greek and Middle Eastern mythology to define differences and similarities the two may or may not have before diving into the two myths. I aim to progress this idea gradually, with a powerful avenue that will ring true to the audience. The theme of this paper will mainly be death, and the following symbolic meanings that resonate with it. In the Osiris myth, Osiris was either drowned or slain by his enemy titled Seth. He tore Osiris' body into 14 pieces and flung them across Egypt. The story is morbid and a bit violent. In Greek mythology death seems to be more respectful and paraphrased with less graphic detail. For the Thesis I will tie in forgiveness, and acts of kindness that could have taken course instead of death. Once the paper is finished, I would like viewers to learn to apply their knowledge not just through other myths outside of the Greek world of mythology, but also to apply the themes and such I will be going over towards other cultures, to examine these myths in comparison to their personal identities as well as to the modern world.

**23. How to Deal with Death: Ancient Egypt vs. Ancient Greece**

**Presenter(s):** Emily Farrington

**Advisor(s):** Dr. Julye Bidmead

Death is one of the only things surely promised to us in life and ancient civilizations waste no time in interjecting their interpretation of it. Ancient Egypt and Ancient Greece both possess a destination to attend in the afterlife. After of course attributing worship, sacrifice, and belief in an array of gods that bless them in the duration of their life. The general idea that encompassed Greek life was that all things are recurring, it is a cycle of both creation and destruction that breeds new life. On the other hand, the Egyptians believed in an eternal soul that went beyond the chains of mortality when death came. The goal wasn't to live, but in fact reach that enlightenment brought forth by death, whereas the Greeks celebrated life with unmatched tenacity. The afterlife wasn't entirely kind, as represented by the Underworld and the realm of the Duat. The soul went through judgment in both places, at the hands of the gods themselves, determining their purity. The Underworld remained the final destination but in the Duat, depending on the soul verdict, one could transcend to everlasting, immortal life, among the gods. Any man could achieve immortality in ancient Egypt, yet mortals

always inevitably ended up in the Underworld, sans distinction. Ancient Greek mythological gods maintained judgment in the length of someone's life, and ancient Egyptian mythological gods maintained judgment afterward.

## **Health Sciences and Kinesiology**

### ***24. Literature Review: Relation of Fatty Acid Composition in Human Milk to Human Health Outcomes***

**Presenter(s):** Olivia Doucette

**Advisor(s):** Dr. John Miklavcic

Essential fatty acids play a vital role in human health. Previous research suggests important correlations between fatty acid composition of human milk and infant health outcomes. This research helps establish a recommended dietary intake for essential fatty acids. Babies who do not consume human milk due to a variety of reasons including insufficient milk supply, maternal illness, and/or disease rely on infant formulas for nutrition. Formulas are currently a suboptimal substitute for human milk, and improvements to formulations will lower the disparity in health outcomes between babies fed human milk compared to formula. The literature review summarizes findings of 21 studies from 2005-2020. Studies were selected if they measured healthy term babies in any time span from 0-5 years old, fatty acid content in human milk was measured and related content to infant health outcome and an English copy was available. Fatty acid relations were reported for docosahexaenoic acid, eicosapentaenoic acid, alpha-linolenic acid, arachidonic acid, omega 6, omega 3, and linoleic acid with the following health outcome topics: body composition, skin, neurodevelopmental, psychomotor, and gastrointestinal. Results show better health outcomes for infants fed milk with higher concentrations of total omega 3, docosahexaenoic acid, eicosapentaenoic acid, and alpha-linolenic acid. Negative health outcomes are associated with higher levels of arachidonic acid, linoleic acid, and total omega 6 concentrations. Infant formula companies can use this research to create formulas and milk fortifier products that best emulate human milk.

## **History**

### ***25. Transitioning to a Postwar Era: The Intergenerational Impact of the Holocaust on Survivors and Their Children Upon Settling in Israel***

**Presenter(s):** Giselle Nissenbaum

**Advisor(s):** Dr. Jeffrey Koerber

The end of the Holocaust marked a point of transition from death to rebirth for Jewish communities around the world. After liberation, Jewish Holocaust survivors became refugees seeking solace and opportunity to rebuild their lives. Following the establishment of the State of Israel in 1948, many survivors urgently sought refuge in their new homeland. This modern Jewish state allowed a new narrative to form for Holocaust survivors, a post-war experience unique within itself. Survivors were confronted with the difficulty of acclimatizing while they grappled with integrating their past life and traumatic memories into a new narrative for the future. With little understanding of normalcy in everyday life, survivors who settled in Israel managed to continue prospering in their own lives, engaged in relationships, and had families. Within this framework, I seek to explore how survivors sought to rebuild their own lives and families in the new State of Israel despite experiencing past atrocities and trauma. To be more specific, this paper will examine long-term familial struggles that emerged for both survivors and their children in their endeavor to rebuild, coupled with exploring how the war's lasting effects shaped survivors' interpersonal relationships and attachment style, ultimately complicating Holocaust survivors' relationships with their own children.

**26. *Surviving Through the Lessons of Sports***

**Presenter(s):** Ryan Fabre

**Advisor(s):** Dr. Jeffrey Koerber

In the years before World War II, young Jewish athletes in Nazi Germany as well as German-occupied Austria and Czechoslovakia pursued individual and team competitions in the face of state-sponsored persecution. This research project seeks to understand how Jewish athletes organized and competed under the Nazi regime prior to the outbreak of war, and how their prewar experiences of athletic competition and team cooperation shaped their survival in ghettos and concentration camps during the Holocaust. Years before the Nazis took power in Germany, sporting clubs were established within the context Zionist and other Jewish organizations. Young Jews, who originally wanted to build stronger bodies, sought escape from mounting persecution by turning to sports. Athletics became effective at life lessons, teaching values such as team building and perseverance. Based on primary source interviews with Jewish Holocaust survivors, this research will examine how these young people endured a range of difficult situations during the unfolding stages of genocide under the cover of war: separation from family and friends, confinement in ghettos and concentration camps, backbreaking slave labor. Others, however, were able to go into hiding, yet here too they faced circumstances with their own physical and mental challenges. The research will seek to answer how their prewar athletic ability and reliance on comradeship contributed to survivability.

**27. *Ableist Ideology and the Law: Nazi Germany's Genocide of People with Disabilities***

**Presenter(s):** Taylor Hein

**Advisor(s):** Dr. Marilyn Haran

For the past two decades, scholarship on the Nazi genocide of people with disabilities has primarily focused on Nazi racial policies. Consequently, analysis of the ableist ideological causes of the persecution of the disabled has been relegated to a second-class area of study. Much research remains to be done on the trans-Atlantic socio-cultural and legal antecedents which provided the critical foundation for the Nazi persecution of the disabled. The disability studies approach utilized in this project highlights how ableist ideology, driven by the international eugenics movement and enshrined in law, shaped the progressive Nazi persecution and ultimate genocide of people with disabilities. Two central ideological underpinnings of Nazi Germany's socio-cultural perceptions of disability were 1) that the disabled are unproductive and fail to contribute to society, thereby constituting an economic burden to the nation and 2) the disabled are weak, sick, defective, stupid, and diseased and therefore represent a threat to the health of the German body politic. Nazi ideology used these age-old ableist myths to justify mass sterilization of the disabled in an effort to prevent the procreation of "useless eaters" that would cause the degeneration of German society. To enforce this ideology, the Nazis drew particularly upon Buck v. Bell (1927) as a judicial model for sterilization policy to create and enact the 1933 Law for the Prevention of Hereditarily Diseased Offspring and later the 1935 Marriage Health Law. Whereas Buck v. Bell constituted the end point for American eugenic policy, Nazi laws and policies went far beyond this step to authorize the murder of those deemed disabled. Understanding the role of ableist ideology in shaping Nazi policy provides a fresh perspective on how the sterilization of people with disabilities developed into genocide and how such ideas continue to influence socio-cultural attitudes toward people with disabilities today.

**28. *Aryanization and Theft: The Nazi Targeting of the Jewish Fashion Industry***

**Presenter(s):** Will Hoskin

**Advisor(s):** Dr. Marilyn Haran

In the 1920s, a city square in the middle of Berlin called Hausvogteiplatz constituted the beating heart of a vibrant fashion industry that rivaled Paris in its glamour, appeal, and profitability. Roughly half of these Berlin

fashion houses were owned by German Jews, including Herman Gerson, Geb. Wolff, Nathan Israel, and Sigmund Braun. The discreet labels sewn into their products testify to the prominence of those who designed and created them. The Nazis would end that prominence. Stores that carried these designs were boycotted and vandalized while Jewish designers and manufacturers were stripped of their ownership. The government enabled “true Germans” to expropriate these Jewish companies. Soon after Hitler took power in 1933, an organization called ADEFA-- The Association of German-Aryan Garment Producers -- launched a messy, slow, yet eventually ruthlessly successful campaign that resulted in the liquidation of 60-70 percent of Jewish fashion by 1938. These labels chronicle how emancipated Jews in large part pioneered the designer ready-to-wear fashion industry in Berlin while those that bear the name “ADEFA” speak to the Nazi effort to obliterate their success. So-called “Aryan” manufacturers removed Jews from all aspects of production – from Zwischmeister (production manager) to Heimarbeiterinnen (home-seamstresses) and demonstrated their allegiance to Nazism by using the ADEFA label. Today some labels continue to speak to a collective amnesia that allowed non-Jewish Germans to purchase at a pittance Jewish fashion houses that have still not been returned to their rightful owners. Some fashion houses which had been aligned with the Nazis continued to flourish in the post-war era and beyond. Companies such as Horn and Hugo Boss are two examples of companies that benefited from the destruction of the German Jewish fashion industry.

## **Pharmacy**

### ***29. Tumor Targeted Delivery of siRNA via Fatty Acyl Conjugates of Cell-Penetrating Peptides***

**Presenter(s):** Shun Kato

**Advisor(s):** Dr. Rakesh Tiwari

Although chemotherapy comes with a multitude side effects, it is still the mainstay approach to treat cancer. Consequently, alternative treatments are being sought out aggressively. Small interfering RNA (siRNA) is an emerging therapeutic option that acts by interfering the overly expressed target protein's synthesis in cancer cells. Despite its' promise, there are still some challenges in the delivery of siRNA to the target site. Our lab is interested in developing a delivery tool to effectively use siRNA for cancer treatment, particularly in breast cancer. Fatty-acyl conjugated cell-penetrating peptides have shown much promise as an intracellular delivery agent, but have not been tested with siRNA. The aim of our study is to investigate the ability of fatty-acyl conjugated cell penetrating peptides (HR)<sub>4</sub> to deliver and silence kinesin spindle protein (KSP) and janus kinase protein (JAK-2) that are overly expressed in breast cancer cells. First, we investigated the binding affinity of the conjugate with siRNA, followed by testing the cytotoxicity profile of peptide-siRNA complexes in MCF-7 cells and MDA-MB-231 breast cancer cell lines. Thereafter, we checked the serum stability of the peptide-siRNA complex using 25% FBS. Finally, we determined the effectiveness of the conjugate in delivering siRNA intracellularly. Our lab successfully synthesized and purified six fatty acyl cell-penetrating peptides (C18-(R)<sub>n</sub>-(HR)<sub>4</sub> where n = 0,1,2,3,4 or 5). All of the peptides showed significant binding to siRNA at N/P ratios  $\geq 2$ . The MTS assay showed all of the peptides are safe until 30  $\mu$ M, where the siRNA concentration in the complex was 38 nM. 1% agarose ethidium bromide gel retardation assays revealed peptide conjugates protect the siRNA at N/P ratios  $\geq 20$ . Lastly, the FACS Flow Cytometry data indicates that increasing the number of arginines significantly enhances the cellular uptake by 600-fold in MCF-7 and MDA-MB-231 cell lines, as compared to free siRNA.

## **Physics**

### ***30. Simulation of Error and Trajectories in Quantum Circuits***

**Presenter(s):** Trevor Kling

**Advisor(s):** Dr. Justin Dressel

To make use of the proposed benefits of quantum computing, accurate and scalable computation architecture is required. In this project, we present quantum circuit simulation software for the development and optimization of one such architecture, the quantum circuit model. A “quantum circuit” is constructed from a superconducting electronic circuit, and is among the most commonly used implementations for a quantum computer. Such systems have produced convincing results on small experiments, but greater fidelity in the basic operations of the computer, called “gates,” is required to scale the systems to modern problems. In prior projects, we developed tools for the simulation of basic, idealized circuits for the optimization of a two-qubit entangling gate, the cross-resonance gate. Now, we move closer to the physical reality of these circuits by adding potential channels for errors, including leakage to higher energy levels, dephasing, and energy relaxation. Furthermore, to make better use of this package, we integrate our quantum circuits package with another Chapman-developed software package for the simulation of qubit trajectories. We use this software to demonstrate the behavior of two-qubit entangling gates, as well as the impact of methods like DRAG pulses and active cancellation on gate fidelity.

### ***31. The Relational Hierarchy of Quantum Channels: Generalizing From Compatibility to Broadcasting***

**Presenter(s):** Jacob Anabi

**Advisor(s):** Dr. Matthew Leifer

The notion of compatibility of a pair of quantum observables is a well-explored concept in quantum mechanics; that is, two observables are compatible if they permit a simultaneous measurement. Hierarchies of incompatibility have been developed for quantum observables that relate compatibility, non-disturbance, mutual non-disturbance, one-sided broadcasting, and broadcasting. Channels, which represent dynamics, can also be incompatible and the aim of this project is to generalize the hierarchies of incompatibility that were developed for observables to channels.

## **Political Science**

### ***32. Vaccine Hesitancy, the COVID 19 Pandemic, and Christian Fundamentalism***

**Presenter(s):** Nicole Drew

**Advisor(s):** Dr. Ann Gordon

Over the past few decades, religion has continued to move to the forefront of American politics, with many viewing fundamental Christianity as synonymous with the Republican Party. Donald Trump's presidency has increased this tenfold, with significant figures within American Christianity voicing their support for him and tying him into Biblical prophecies. In the media, this appears to have affected how this demographic views the COVID 19 pandemic. The literature in this area focuses heavily on American Christians' response to mask mandates, stay at home-at-home other attempts to mitigate the spread of the Coronavirus; however, research on how this same demographic views the COVID 19 vaccine is lacking. Using cross-tabulations of data from the Chapman Survey of American Fears, I attempted to determine whether or not people who fall into the category of Christian fundamentalist, which for the sake of this research will be those who take a literal interpretation of the Christian Bible, have a higher propensity to be against vaccinations, particularly the COVID 19 vaccine. My findings show that there is a disparity in how Christian fundamentalists and those who do not

fall into that demographic view the pandemic and vaccines. When asked questions about being hesitant or fully against taking the COVID 19 vaccine, a higher percentage of people in this demographic responded that they were hesitant about or against a COVID vaccine. I also found that a lower number of the same demographic believe that vaccines' benefits outweigh their risks than in other groups. I believe this topic is highly pertinent in the moment we are in because, to reach herd immunity and bring about the end of the pandemic, we need a majority of the population to be vaccinated. By identifying the drivers of vaccine hesitancy, we can identify which populations may be swayed to receive the COVID-19 vaccine.

**33. *The Partisan Effects of COVID-19: Mask Wearing and News Sources***

**Presenter(s):** Lily Martin

**Advisor(s):** Dr. Ann Gordon

Within only one year of the global pandemic caused by COVID-19, risk prevention, including the use of a mask to prevent spread of the disease, became incredibly politicized within the United States. By looking at mainstream media sources such as CNN, FOX, and MSNBC, in this article I will be examining how news media sources affect the viewer's perceptions of wearing a mask during the COVID-19 pandemic. Relying on the Chapman Survey of American Fear, a representative national sample of U.S. adults, I found that individuals who choose to watch FOX news every day were most likely to agree that wearing a mask was not more beneficial than not wearing one. In contrast, I found that individuals who watch CNN every day were most likely to agree that the benefits of wearing a mask outweigh the consequences of not wearing one. I also found that the majority of people who watch FOX news are republican and the majority of people who watch CNN are democrats. Lastly, I found that the more republican you identify, the less likely you are to agree that wearing a mask is beneficial. The correlation between partisan news sources and the effect it has on its viewers is incredibly important as the pandemic continues to have a heavy toll on the United States. The United States is also one of the only countries in which the use of masks became heavily politicized and the pandemic became a partisan divide. In a society where media continues to have a significant presence, it is important to understand and recognize the ways in which it influences, not only our everyday lives, but perceptions of risk prevention of a global pandemic in which we all play a role in ending.

**34. *How Does Aging Influence The Fear of Gun Control in America?***

**Presenter(s):** Alyssa Castanon

**Advisor(s):** Dr. Ann Gordon

Tensions regarding gun control have increased drastically in American society, particularly due to an increase in mass shootings and subsequent media coverage. Many of these mass shootings have directly influenced the youth of America because of the prevalence of school shootings in recent years. In this paper, I will examine the relationship between age and the fear of gun control, particularly in terms of the life cycle effects theory which explains that political beliefs fluctuate with age due to changing responsibilities. Using an original data set known as the Fear Survey, which gathers information on the various fears and demographics of individuals in American society I found a moderately high relationship between older Americans and fear of government restrictions on guns. Additionally, I find that a moderately high percentage of older Americans report not being fearful of being a victim of a mass shooting while younger Americans have the highest percentage. I also find that younger Americans favor liberal ideologies while older Americans favor conservative ideologies which symbolizes a shift in political ideologies as people age. This research will provide insight on American society in order to better understand when political stances are formed and how malleable they may be. Furthermore, it would explain that while a majority of Americans support stricter gun legislation, no regulations have been passed in recent years due to older Americans being the largest representative demographic in government and favoring conservative political ideologies.



**35. *QAnon: The Effects of Radical Ideology on Belief in Conspiracy Theories***

**Presenter(s):** Samuel Andrus

**Advisor(s):** Dr. Ann Gordon

The study of conspiracy theories has existed for many decades, however a new species of conspiracy, labeled QAnon, has surfaced in recent years - QAnon theories are directly tied to current radical politics and former President Donald Trump. My research will aim to explain how the outlandish and often racist beliefs of QAnon followers have come to be not only believed but have affected so many people that a terrorist attack on the United States Capitol occurred as a result. My research will include analysis of the Chapman Survey of American Fears which includes people on both sides of the political spectrum in order to correlate belief in QAnon's allegations with a number of other different radical theories, as well as use existing research on the basis of political conspiracy belief, the factors that affect it, and the effect that belief of corruption in government can have on belief in radical deviant subjects. This will provide context for QAnon belief because QAnon is rooted in the belief that there is widespread government corruption. QAnon is a relatively new species of conspiracy and thus has very little research surrounding it and its causation. My project will serve to show that QAnon is related to a number of factors similar to the basis of belief in most conspiracy theories but the most principle will be strong belief in corruption in government and other theories where distrust in government or government officials is prevalent.

**36. *United States Media and the Partisan Divide on Iran***

**Presenter(s):** Jacob Adler

**Advisor(s):** Dr. Ann Gordon

The United States and Iran have had many decades of tense relations, this tension has increased in recent years with the presidency of Donald Trump putting sanctions on Iran, leaving the Joint Comprehensive plan of Action of 2015 (Iran Nuclear Deal), and the assassination of the Iranian General Qasem Soleimani in an American drone strike (2020). These actions were a great change of policy and actions from the previous President Barrack Obama who made the 2015 Iran Nuclear Deal. This research paper the main question that will be considered is how the mainstream American media outlets shape the partisan divide on the perception of Iran being a threat to the United States and the world. The results are that right wing media portrays Iran as a largely dangerous threat to the world, while left wing media take a more passive and optimistic view on Iran. This should be supported by the views of United States citizens by their political affiliations. The results should show a strong partisan divide for the Iranian Nuclear Deal and the varying viewpoint of Iran's threat to the security United States of America and our allies.

**37. *Partisanship as a Determinant of Policy Preference***

**Presenter(s):** Christopher Cobb

**Advisor(s):** Dr. Ann Gordon

The idea that contemporary American politics have become extremely polarized is a commonly accepted notion. In this article, I examine partisanship's role in determining individual policy preferences. There are competing theories as to what the primary determinant of an individual's party preference is. Still, it is generally accepted that the individual's policy positions likely have an influential role in determining party preference. Utilizing data from Chapman University's American Fears survey, I find that an individual's party preference is the most accurate and reliable predictor of an individual's policy position. This strengthened correlation between party and policy has resulted in a lower level of ideological constraint than has been seen in the past, with individual policy preferences rarely differing from other party affiliates. I find that the universality of policy preferences amongst those who prefer the same party indicates a changing dynamic, with party preference now potentially determining some individual policy preferences. This would represent a significant shift in how



party identity affects individual political positions, and vice versa. This changing relationship's implications could affect the analysis of policy preference polling results in the future, calling into question whether respondents' preferred policy positions will indicate public sentiment or only their party's policy platform.

## **Psychology**

### ***38. Racial/Ethnic Differences in the Benefit of Social Contact on Anxiety Symptoms***

**Presenter(s):** Melissa Vargas Calderon

**Advisor(s):** Dr. Jennifer Robinette

Anxiety is a pressing health concern, affecting 40 million adults in the United States every year. Interestingly, communities of color have lower rates of anxiety disorders relative to Non-Hispanic Whites, despite on average experiencing more lifetime adversity characteristic of members of marginalized groups, such as low socioeconomic status and discrimination. Research indicates that contact with one's social network, particularly large, closely knit ones among Hispanics, are protective factors against anxiety. However, empirical investigations of racial/ethnic differences in the benefits of social networks on anxiety are lacking. Data from the Health and Retirement Study (HRS), a nationally representative sample of adults aged 51 and older in the United States, were used in this investigation. The 2010/2012 waves were used to include information pertaining to self-reported anxiety symptoms. Results from a weighted linear regression indicate that Non-Hispanic Blacks and Hispanics reported more anxiety symptoms relative to Non-Hispanic Whites after adjusting for age, sex, degree of education, and household wealth. Second, reporting more social contact with children and friends was related to less anxiety symptoms. Third, racial/ethnic differences in the effect of social networks on anxiety were found, in which time spent away from children was even more strongly related to anxiety among Hispanics relative to non-Hispanic Whites. Such results indicate that Hispanics may benefit more from increased social contact with their children relative to other racial/ethnic groups in protecting against anxiety, demonstrating the importance of nurturing social networks in order to reduce anxiety in this particularly vulnerable group.

### ***39. Personality Traits Influencing the Psychological Impact of Autoimmune Diseases in College Students***

**Presenter(s):** Natasha Lindert

**Advisor(s):** Dr. Desiree Crevecoeur-Macphail

Chronic illnesses, which include autoimmune diseases, can have a major impact on an individual's mental health. However, individuals vary considerably, and understanding how these differences impact an individual's mental health outcome is crucial for developing best practices in psychology. The Health Belief Model (HBM) states that multiple components, including personality, influence peoples' perception of their life and ultimately their behavior. The HBM can be applied to how individuals behave regarding their autoimmune diseases. Previous studies have found that personality impacts mental health as well as various characteristics and perceptions of autoimmune diseases, and that mental health and chronic health conditions can impact one another. However, since these studies have looked at these components separately, there is a lack of research on how personality impacts the relationship between mental health and having an autoimmune disease. It was hypothesized that testing high on neuroticism will result in greater feelings of helplessness whereas extroversion will have the opposite effect. Also, it was predicted that being more conscientious and open to experiences will result in less stress when experiencing a flare of an autoimmune disease. Using the Big Five Personality Test, the Perceived Stress Scale, and the Illness Cognition Questionnaire these relationships were observed in college-aged individuals. Participants were surveyed on the components of their personality (extroversion, neuroticism, openness to experience, conscientiousness, and

agreeableness). In addition, participants were asked about how they felt towards their autoimmune disease. Overall, it is expected that individuals with autoimmune disease do experience both disease related helplessness and stress and that these factors are further amplified by being neurotic and introverted and diminished by being conscientious and open to new experiences.

**40. *The Mediating Role of Child Self Efficacy in Socioeconomic Status and Marital Status affecting Pediatric Asthma Severity***

**Presenter(s):** Stephanie Munduruca, Lexxie Lopez

**Advisor(s):** Dr. Brooke Jenkins

Asthma is one of the most prevalent chronic diseases in children. Since 1980, asthma in children has increased by 160%, with the disease affecting close to 5 million children in the United States. Family structure and environment play a prominent role in children's self asthma management and severity. Studies have found that children from families with lower parental socioeconomic status (SES) had poor control of their asthma, leading to greater severity. Children from single-parent households were also found to have greater asthma severity. These associations between family structure/environment and asthma severity may exist through the mediating mechanism of self-efficacy. Specifically, it has been shown that children from families of higher SES and married parents regard themselves as more lovable and having higher self-efficacy and self-esteem. In turn, higher self-efficacy in pediatric asthma patients is associated with greater self-management and lower severity. How family structure and socioeconomic status affect children's asthma severity, and the mediating role of self-efficacy will be investigated in this study. Data will be obtained from the longitudinal study currently being conducted at the Children's Hospital of Orange County Pulmonary Clinic with pediatric patients with asthma between the ages of 12-17. Parents' self-reported marital status and SES. Children completed subjective measures of self-efficacy and asthma severity. These variables will be used to perform mediation analysis, using the PROCESS macro tool on SPSS. I hypothesize, given the literature, that child self-efficacy will serve as a mediator in the association between parental SES and child asthma severity and the association between parental marital status and child asthma severity. The long-term goal for this study is to create more awareness in the biopsychosocial aspects of pediatric medicine and how children's home environments can play a role in their overall health and well-being.

**41. *Impact of Appearance-Related Language on Dancers' Body Image***

**Presenter(s):** Madeline Bertoy

**Advisor(s):** Dr. Desiree Crevecoeur-Macphail

Dancers are at an increased risk for body dissatisfaction and disordered eating. The constant evaluation of one's body, pressures to conform to the ideal dancer body type, and frequent appearance comparisons all contribute to dancers' negative body image. Research has shown that body-related talk may also play a significant role, as indicated by the association between receiving appearance-related comments and negative body image. Conversely, other research suggests that focusing on body functionality, including the physical abilities of one's body, is associated with greater body appreciation and body satisfaction and reduced body surveillance. The purpose of the present study is to investigate how different types of body-related language impacts dancers' body image. Participants were undergraduate students of Chapman University's Dance Department who completed an online survey in which they were randomly assigned to read instructions for a simple dance exercise that included either appearance-related, function-related, or neutral cues. After performing the dance exercise, participants completed measures of body image, using the Body Image States Scale (BISS), reported their perceived performance of the exercise, and indicated their dancer identity. Data

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collection is still in progress, but it is expected that those exposed to appearance-related language will report greater body image disturbance than those exposed to function-related language. In addition, because a preoccupation with body shape and weight impairs attention and motor performance, it is predicted that those in the appearance-related group will also report lower performance scores. Finally, body image scores may differ between the dance genres, such that participants who self-identify as ballet dancers may report worse body image compared to those who identify with another dance genre. This study may contribute to our understanding of the types of verbal cues that promote positive body image, which dance instructors can implement into their teaching.

#### **42. *Body Image and Eating Behaviors***

**Presenter(s):** Amanda Gonzales

**Advisor(s):** Dr. Desiree Crevecoeur-Macphail

Previous research has found that women have higher levels of body dissatisfaction after viewing fashion magazine advertisements compared to participants' levels of body dissatisfaction before viewing these magazines (Andrew, Tiggemann, & Clark, 2015). It has also been shown that it is a person's perception of their weight rather than their actual BMI that increases their likelihood of attempting weight loss (Assaad, Anouti, Naja, Nasreddine, Hwalla & Sibai, 2018). One study found that individuals with a BMI out of the "normal" range were more likely to be dissatisfied with their body and more likely to engage in disordered eating (Figueiredo, R. A. O., Simola-Ström, S., Isomaa, R., & Weiderpass, E., 2019). Another study found individuals who used negative internal emotion regulation strategies were more likely to have bulimic symptoms if they also had poor body image (Hughes & Gullone, 2011). The present study seeks to find data to support the following hypotheses: (1) That there will be a positive correlation between social media use and body dissatisfaction; (2) Individuals who perceive themselves to be overweight will score higher on the eating disorder examination self-report questionnaire (EDE-Q) compared to individuals who do not perceive themselves to be overweight; (3) The relationship between body dissatisfaction and eating disorder symptoms is moderated by an individual's body mass index; and (4) Individuals who do not practice emotion regulation strategies will have higher levels of body dissatisfaction than individuals who practice emotion regulation strategies. This study recruited Chapman University Undergraduate students as participants and incorporated the Emotion Regulation Questionnaire (Gross & John, 2013), the Eating Disorder Examination- Questionnaire (Fairburn & Beglin, 2008), the Adolescent Body Image Satisfaction Scale (Leone, Mullin, Maurer-Starks, & Rovito, 2014), in addition to questions regarding weight perception and social media use. It is expected that the results of this study will support the hypotheses mentioned above.

#### **43. *Spatial Frequency Implications for Global and Local Processing in Autistic Children***

**Presenter(s):** Riya Mody, Ayra Tusneem

**Advisor(s):** Dr. Vincent Berardi, Dr. LouAnne Boyd

Visual processing in humans is done by integrating and updating multiple streams of global and local sensory input. When this is not done smoothly, it becomes difficult to see the "big picture", which has been found to have implications on emotion recognition, social skills, and conversation skills in individuals with Autism Spectrum Disorder (ASD) and other learning disabilities. Previous research in this field has aimed to direct ASD patients toward normative processing of the global features by developing and evaluating a filter which is intended to decrease local interference, or the prioritization of local details. Within this process, this research focuses on whether an image's spatial frequency was affected by the filter and how spatial frequency impacted the filter's functionality. Spatial frequency can be defined as a measure of the periodic distribution of light

versus dark in image. In this work, I isolated “hot spots”, which are areas in the image where the eye gaze of normative individuals fixated. Using the OpenCV package in Python, I implemented an algorithm to detect hotspots and drew a contour around each one. I then drew rectangles around the contours in each image and calculated the spatial frequency within each rectangle. Statistical analysis revealed that there was a significant difference between the spatial frequency of the entire image and the average spatial frequency of hotspots in both raw and filtered images. Building on this work, we plan to conduct research that will help to understand how the spatial frequency in raw and filtered images affects the ability of the filter to redirect global processing. Specifically, we will use previously collected data to find how spatial frequency impacts eye gaze fixations in individuals with ASD. These findings will eventually be used to improve the image filter and conduct further research in this field.

## **World Languages and Cultures**

### ***44. Translating Nonsense: An Analysis of the Poem "Jabberwocky" and Two French Translations***

**Presenter(s):** Kylie Deer

**Advisor(s):** Dr. Allan MacVicar

In translating any text, the end product will never be an exact copy of the original. From one language to another, the connotations of a word may change, there may be many words, or conversely no exact words, to express an idea, or it may be necessary to choose words that prioritize maintaining the structure (such as syllables or rhyme scheme) of the text. Is it, then, possible to translate words that don't truly exist in any language? Lewis Carroll's "Jabberwocky" is a nonsense poem in which many of the words are invented out of the author's imagination. As a result, readers depend on Carroll to explain the meanings of such words. To determine if it is possible to translate nonsense in a way that maintains the message and poetic style, the first stanza of "Jabberwocky" was analyzed and compared to the first stanza of two French translations ("Le Jaseroque" by Frank L. Warrin and "Bredoulocheux" by Henri Parisot). The first stanza was chosen since it contains the largest number of nonsense words in the poem. A word-by-word, and to an extent, syllable-by-syllable close reading of the three texts was performed to determine the origins of the words used in "Jabberwocky" and how the translators interpreted them in order to create their French translations. It was concluded that it is possible to translate nonsense; however, a decision must be made between maintaining the poetic style or the meanings of the invented words. The two translations illustrate two distinct methods of translation. "Le Jaseroque" models translation by phonetics while "Bredoulocheux" models translation by definition.

## ROOM A

### Biochemistry and Molecular Biology

**1:30-1:50PM**

#### ***Characterizing the Interaction Between Nitrogenase and CowN***

**Presenter(s):** Terrence Lee, Michelle Jin, Ruchita Kharwa, Sophia Kelsey, Emily Wong

**Advisor(s):** Dr. Cedric Owens, Max Strul

Biologically available nitrogen is vital for agriculture, however most nitrogen exists as nitrogen gas. The industrial method to convert or “fix” nitrogen gas into biologically usable nitrogen in the form of ammonia is achieved using the Haber-Bosch Process under harsh conditions. Meanwhile, bacteria can also fix nitrogen gas into ammonia and can do so under ambient conditions. Bacteria such as *Gluconacetobacter diazotrophicus* rely on the enzyme Mo-Nitrogenase to fix nitrogen. Mo-Nitrogenase is the key player to produce ammonia biologically. Studying this enzyme opens up prospects for more sustainable ammonia production. However, Mo-Nitrogenases are highly sensitive to inhibition by carbon monoxide. Only small amounts of CO drastically reduce ammonia production. Yet, organisms are still able to grow under CO when Mo-Nitrogenase is inhibited. This is thanks to another protein, CowN. Neither its structure nor its method of protecting Mo-Nitrogenase from CowN have been studied in detail. This work explains how CowN protects Mo-Nitrogenase. In vitro enzyme kinetics reveal that Mo-Nitrogenase is inhibited by CO through a mixed-inhibition model. Adding CowN increases CO's  $K_i$ , helping Mo-Nitrogenase tolerate more CO. CowN specifically decreases the affinity of CO binding since nitrogenase substrates still turn over. These results reveal how Mo-Nitrogenase tolerates CO that is present in the environment.

### Chemistry

**1:50-2:10PM**

#### **Investigating the Cooperative Activation of H-Si bonds with Ir-S and Rh-S Synthetic Complexes**

**Presenter(s):** Joshua Oommen, Zach Nelson

**Advisor(s):** Dr. Maduka Ogba

Within the last decade, chemists have attempted to design synthetic analogs of [NiFe] hydrogenases, nature's Hydrogen gas evolution catalysts, for potential applications in industrial catalytic reduction reactions and alternative energy production. Hydrogen gas evolution by [NiFe] hydrogenases may occur through the H-H bond's cooperative activation at a metal-sulfur center. Interestingly, despite nature's use of metal-sulfur centers in this mechanism, relatively few synthetic catalysts reported in the literature harness metal-sulfur centers for related cooperative bond activation processes. Furthermore, of the reported catalysts, vastly different reactivity is observed. With little work done to explain such differences, we are limited in our ability to design optimal synthetic mimics. We revisit a seminal work showing that coordinatively unsaturated and cationic, Iridium-Sulfur and Rhodium-Sulfur complexes can successfully activate silane (Si-H) bonds for ketone reductions. Unlike Iridium, the Rhodium-Sulfur complex acted as a catalyst needing (only 2 mol % of the catalyst). Furthermore, while Si-H activation occurred, H-H activation and catalytic ketone hydrogenation were unsuccessful. We used computational chemistry techniques to uncover the factors that govern reactivity in this system. We computed plausible mechanisms for (i) activating H-H and Si-H bonds on the Iridium- and Rhodium- Sulfur complexes and (ii) the transfer process to the ketone (i.e., the subsequent reduction step). We will present the structures' geometries and energies at each mechanistic step and explain how the metal-Sulfur center might engage in cooperative bond activation. We will discuss our current hypotheses for why changing the metal dramatically affects the reactivity and why silane activation occurs rather than but not hydrogen activation.

## **Communication Studies**

**2:10-2:30PM**

### ***The Relationship Between Yoga and Anxiety***

**Presenter(s):** Olivia Lujan, Jessica Bebawi, Khiry Carter, Tony Varga, Jordan Eisleben, Jake Caan

**Advisor(s):** Dr. Austin Lee

High expectations of Chapman University students and the uncertainty of their future contribute to increased levels of anxiety. Researchers at the University of Rhode Island College of Pharmacy have shown that there is a negative correlation between yoga and anxiety. We propose that a 15-minute vinyasa yoga flow held on Zoom will reduce anxiety levels among the university participants. Vinyasa yoga flow consists of mindful breathing exercises and breath-to-movement coordination, stimulating the vagus nerve and promoting the parasympathetic “rest and digest” nervous system response. This leads to a state of relaxation. Participants will complete a survey measuring their anxiety levels immediately before and after the yoga session to measure the change. Reports of decreased anxiety levels would suggest that the mindful practice is effective in reducing anxiety among college students, despite the remote environment. This is useful for campuses to potentially implement vinyasa yoga for anxiety regulation in their student population while life is online. Furthermore, positive results from this study will suggest that online platforms such as Zoom or Skype have the ability to help those suffering from anxiety.

## **ROOM B**

## **History**

**1:30-1:50PM**

### ***Sovereignty, Statehood, and Subjugation: Japanese-American and Native Hawaiian Discourse Surrounding the Hawaii Admission Act of 1959***

**Presenter(s):** Nicole Saito

**Advisor(s):** Dr. Robert Slayton

Although discourse over Hawaiian statehood has increasingly been described by scholars as a racial conflict between Japanese Americans and Native Hawaiians, there existed a broad spectrum of interactions between the two groups. Both communities were forced to confront the prejudices they had against each other while recognizing shared experiences of discrimination they faced from white Americans, creating a paradoxical political culture of competition and solidarity up until the conclusion of World War Two. From 1946-1950, however, the country’s collective understanding of Japanese American citizenship began to shift with recognition of the community’s military service record and an increased proportion of veterans elected to Congress. This shift prioritized Japanese American interests in statehood, marginalizing Native Hawaiians. From 1950-1959, Hawaii’s indigenous people were forced to frame their political opinions before Congress in two ways: by conforming to stereotypes mainland Americans held against Native Hawaiians, or arguing their opinions based on Japanese Americans’ interests rather than their own. These constraints—along with unfavorable national political circumstances and pre-existing, intra-communal economic tensions—eventually silenced Native Hawaiians in statehood discourse, be they in support of admission or opposed. As such, statehood

discourse was defined not by an explicit racial conflict between Japanese Americans and Native Hawaiians, but the empowered assertion of Japanese American identity contrasted with Native Hawaiians' careful navigation of mainland prejudices, and eventually, their informal political silencing.

## **Political Science**

**1:50-2:10PM**

### ***The War on Drugs: United States Public Opinion***

**Presenter(s):** Karmen Pantoja

**Advisor(s):** Dr. John Compton

I set out to understand how different key demographics of Americans (gender, age, race, college education, political affiliation, and income level) affect one's support for the legalization of marijuana and federal budget spending on dealing with crime. Looking at the historical and current levels of key demographics will showcase many key answers to who and where the push for legalization of marijuana and federal crime spending is coming from, historically and currently. I postulate that age will be the constant in leading the charge on legalization of marijuana. Alongside, I propose, that the general public support will favor the legalization of marijuana. Using these key variables, a strong foundation will be created to understand greater drug standpoints of these demographics based upon the results yielded. Through the usage of ANES data from the 1970s and 2016 and data analysis there will be a data heavy argument yielded as six key demographics will be tested to showcase positional stances and a crosstab analysis will produce the public support, historical and currently, on the support for the overarching War on Drugs.

**2:10-2:30PM**

### ***The Counter-Majoritarian Court***

**Presenter(s):** Kaity McKee

**Advisor(s):** Dr. John Compton

The Supreme Court has an indispensable role in United States government. The Supreme Court differs from the other branches because of the way it interacts with public opinion. The Supreme Court is not expected to make decisions that align with the public's attitudes at the time, but rather to decide based on constitutionality. This job of the court is referred to as the "counter-majoritarian" function of the court. However, despite the Court being expected to sometimes rule against the people's wants, public support of the Court remains high. Scholars have argued that this is due to the Supreme Court's lack of counter-majoritarian rulings, or that people tend to view the government as a whole entity, basing their support on how they feel towards the government as a whole. Previous literature has found that ideology and political knowledge are influential factors on an individual's support for the Court. This research will confirm that those who are ideologically further from the Court, those who are not moderate, will have a high support for the "counter-majoritarian" function of the Court. Those who are moderate citizens will have less approval for this function but high support for the Court based on decisions that are made in alignment with their opinion. Additionally, the research will determine the influence that political knowledge has on an individual's support for the Court.



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