Spring 5-5-2020

Spring 2020 Student Scholar Symposium Abstract Volume

Chapman University Center for Undergraduate Excellence

STUDENT SCHOLAR SYMPOSIUM

SPRING 2020

TUESDAY, MAY 5
AND
WEDNESDAY, MAY 6

SPRING SESSION

ABSTRACT VOLUME





CHAPMAN UNIVERSITY | Center for Undergraduate Excellence

Message from the Director

Greetings and welcome to the Spring 2020 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.

This year we have moved the Spring Student Scholar Symposium to this virtual platform where you can attend a live Microsoft Teams meeting to connect with the student and discuss their research/creative activity. The virtual symposium allows our students multiple ways to showcase their research and creative project, consisting of posters, oral, visual arts, performing arts, and film and media presentations.

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 designed and developed the event. A special thanks to both of them.

Thanks to all the student presenters and their faculty mentors!

Dr. Julye Bidmead

Director of the Center for Undergraduate Excellence at Chapman University

Acknowledgements

The Center for Undergraduate Excellence gratefully acknowledge the following individuals and programs for their support:

- Dr. Glenn Pfeiffer, Provost
- Crean College of Health & Behavioral Sciences
- Donna Ford Attallah College of Educational Studies
- Schmid College of Science and Technology
- Wilkinson College of Arts, Humanities, and Social Sciences

A special thanks to the following students, staff, and faculty members for their help with testing and providing feedback on our virtual symposium:

Alex Ballard, Alexis Sutterman, Dr. Christopher Kim, Dr. Elaine Schwartz, Emily Cauble, Jacky Dang, Jessica Bocinski, Dr. Kelli Fuery, Dr. Marco Bisoffi, Michaela Montgomery, Dr. Quaylan Allen, Rebecca Green, Valeria Park

Schedule of Events

Tuesday, May 5

Poster Presentations-Session I	9:00AM-10:30AM
Poster Presentations-Session II	10:30AM-12:00PM
Oral Presentations-Session I	12:00PM-1:00PM
Film and Media Arts Presentations-Session I	1:00PM-2:00PM
Oral Presentations-Session II	2:00PM-3:00PM
Film and Media Arts Presentations-Session II	3:00PM-4:00PM
Visual Art Presentations-Session I	4:00PM-5:00PM
Oral Presentations-Session III	5:00PM-6:00PM

Wednesday, May 6

Oral Presentations-Session IV	9:00AM-10:00AM
Oral Presentations-Session V	10:00AM-11:00AM
Oral Presentations-Session VI	11:00AM-12:00PM
Poster Presentations-Session III	11:30AM-1:00PM
Oral Presentations-Session VII	1:00PM-2:00PM
Poster Presentations-Session IV	2:00PM-3:30PM
Oral Presentations-Session VIII	4:00PM-5:00PM
Oral Presentations-Session IX	5:00PM-6:00PM

Table of Contents

Wednesday, May 6

Biochemistry and Molecular Biology

Characterizing the Interaction Between CowN and Nitrogenase

Presenter(s): Terrence Lee, Kiersten Chong, Chloe Garcia, Max Strul, Ruchita Kharwa, Emily Wong, Kevin Bretzing
Advisor(s): Dr. Cedric Owens

Nitrogenase catalyzes the conversion of atmospheric dinitrogen into ammonia. The enzyme produces ammonia under ambient conditions, using the free energy of ATP to drive dinitrogen reduction. The most common form of nitrogenase is molybdenum nitrogenase (Mo-nitrogenase). Mo-nitrogenase is inhibited by the ubiquitous pollutant carbon monoxide (CO). To prevent inhibition of Mo-nitrogenase by CO, nitrogen fixing bacteria produce the protein CowN. In presence of CowN, Mo-nitrogenase avoids inhibition by CO and remains active. However, the mechanism by which CowN protects Mo-nitrogenase is unknown. Enzymatic assays suggest that CowN and Mo-nitrogenase interact with a Kd of approximately 5-10 µM. Here, we present data from crosslinking and pulldown assays that were used to determine how CowN interacts with Mo-nitrogenase. Crosslinking assays using the heterobifunctional crosslinker EDC showed no binding between CowN and Mo-nitrogenase in presence or absence of CO gas. Pulldown assays using Ni-NTA resin with a His-tagged CowN bait also did not show significant binding between CowN to Mo-nitrogenase. These assays indicate that CowN may not have a strong binding enough affinity to Mo-nitrogenase to be detected by crosslinking or pulldown assays. Future work will investigate potential nitrogenase-CowN interaction using fluorescence anisotropy.

Exploring The Effect Of The Diarylpentanoid ca27 On The Degradation Of The Androgen Receptor In Prostate Cancer Cells

Presenter(s): Emma Beale
Advisor(s): Dr. Marco Bisoffi

The present study addresses a possible mechanism of action for the diarylpentanoid curcumin analog 27 (ca27), which has been shown to downregulate the androgen receptor (AR) in prostate cancer (PCa) cells. Prostate cells, both normal and cancerous, express the AR, which functions as a hormone-induced cytoplasmic/nuclear receptor and transcription factor promoting cell growth and survival. In PCa, AR expression and activity are overexpressed, and the AR is a major oncoprotein leading to uncontrolled cell growth. ca27 is a synthetic diarylpentanoid analog of the natural product curcumin. Previous research in Dr. Bisoffi's lab has shown that ca27 downregulates AR expression at low micromolar concentrations in prostate cancer cells. However, the mechanism of action is unknown. The goal of the present work is to determine at what step of the central biological dogma ca27 acts to downregulate AR expression. Specifically, we hypothesize that ca27 interferes with AR protein stability by enhancing its degradation. Using specific inhibitors of transcription, translation, and degradation, applied to human androgen-dependent LNCaP prostate adenocarcinoma cells, preliminary data is presented based on the method of sodium dodecyl sulfate gel electrophoresis (SDS-PAGE) followed by immunological detection by Western blotting and quantitative reverse transcription polymerase chain reaction (qRT-PCR). Our preliminary findings indicate that ca27 is a mediator of protein degradation. A better understanding of the mechanism of action of ca27 with respect to its activity to downregulate AR expression will build the foundation for the development of organic small molecules as therapeutic candidates in the clinical management of PCa.

Characterizing the Ganglioside Content in Human Intestinal Epithelial Cells and Extracellular Vesicles With or Without Supply of Exogenous Gangliosides
Presenter(s): Jordan Jernigan
Advisor(s): Dr. John Miklavcic
Dietary fats play a role in the development, progression, and treatment of chronic diseases. Gangliosides are a type of lipid, or fat, found in all human tissues. Both healthy and diseased cells undergo intercellular communication by secreting vesicles into the extracellular environment. Extracellular vesicles (EV) contain many bioactive compounds, including gangliosides. Dietary gangliosides are not considered essential nutrients and their health benefits and therapeutic traits remain unidentified. The purpose of this research is to characterize the change in total ganglioside content in human intestinal epithelial cells and EVs due to a treatment with dietary gangliosides. Caco-2 human intestinal epithelial cells were given with an exogenous source of gangliosides (10 μg/mL of GM3 ganglioside or 10 μg/mL of GD3 ganglioside). Cell media was collected at 6h, 24h, and 48h, and EV and ganglioside isolation was complete. EV verification was achieved using immunobotting and electron microscopy. A University of Alberta collaborator will complete lipidomic profiling on cells and EVs. It is anticipated that an exogenous source of gangliosides will alter the total ganglioside content and composition in cells and EVs. The findings of this study will support future research on the therapeutic applications of dietary gangliosides, as well as the physiochemical properties of dietary fats and EVs in relation to human chronic conditions.

Biological Sciences

Uncovering Slime Deployment Mechanisms in Hagfish
Presenter(s): Lucy Chalekian
Advisor(s): Dr. Douglas Fudge, Gaurav Jain, Matthew Snyder, Andrew Lowe
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. Although the biophysical mechanisms of exudate deployment in seawater are not understood, some details are known. 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 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. We hypothesize that the slime gland pore remains attached to ejected exudate, and acts as an anchor that allows mucus, and skeins embedded within it, to be loaded in tension, which facilitates unravelling and efficient slime formation. We have employed high-speed camera mounted on an Axio Zoom microscope to observe this process in detail. Our preliminary results suggest that hagfish slime exudate indeed requires an anchor for proper skein unraveling and slime formation.

Swelling Kinetics of Fresh Mucin Vesicles Project Proposal
Presenter(s): Anne Kenney
Advisor(s): Dr. Douglas Fudge
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 stabilized vesicles. Slime is also formed rapidly after secretion, however the exact speed and kinetics of the gel formation of the slime has not been quantified. In this study I propose that the swelling kinetics of mucin vesicles in fresh exudate happens extremely fast forming the gel seen in slime deployment. This is purely a speculative proposal for future research. Knowing the swelling kinetics gives key insights about slime production and can help describe the process of skeins unraveling in a mucus gel when ejected. To observe the swelling kinetic, high speed video of fresh mucin vesicles being exposed to artificial sea water will be quantitatively analyzed. The change in area of the vesicle when exposed to the sea water will be measured and plotted to determine the rate of expansion. That rate of expansion will give a time frame for the gel formation when slime is ejected. These insights on the mucin vesicle swelling kinetics in fresh exudate will further contribute to research involving the mechanisms for hagfish slime formation.

Identification and Quantification of Secondary Metabolites in Pignut
Presenter(s): Jordan Farmer
Advisor(s): Dr. Hagop S. Atamian, Dr. Matthew Gartner, Dr. Peter Chang
Plants synthesize very diverse types of 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. Altogether, 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. Nowadays, 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 is to identify and quantify the secondary metabolites of an understudied 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.

Screening for Salinity Tolerance and Weed Suppression Ability in Different Hairy Vetch Accessions

Presenter(s): Nina Rodricks, Kiana Saleminik, Alise Maripuu
Advisor(s): Dr. Hagop S. Atamian

Hairy vetch (Vicia villosa Roth) is a winter annual legume that is very frost tolerant and is grown as a cover crop during fall, winter, and early spring. Being a legume, hairy vetch fixes atmospheric nitrogen through its symbiotic association with soil rhizobium bacteria. Consequently, when planted during off season, hairy vetch enriches the soil quality and nutritional status resulting in higher yields in the following summer annuals such as corn, cotton and many vegetables. In addition, hairy vetch suppresses weed populations by producing abundant biomass and effectively competing for essential resources such as light, water and nutrients. Another mechanism of weed suppression is through production of chemicals that either inhibit weed seed germination or reduce weed growth through phytotoxicity. While hairy vetch is adapted to all soil textures, it is very sensitive to soil salinity. This limits its widespread adoption. In addition, its weed suppression ability is variable and depends on the plant genotype and the environmental conditions. The two objectives of this project is to 1) identify salt tolerant hairy vetch accessions by screening a panel of wild populations and 2) better understand the mechanisms of weed suppression. Seeds from nine wild hairy vetch accessions were grown between November and March in pots. Plant biomass, seed weight, and seed number data was collected. The plants were also subjected to salinity conditions and their performance evaluated. Finally, leaf and stem sap were extracted from the different accessions and tested for their ability to suppress the germination and growth of two weed species. Our results show differences between the nine hairy vetch accessions in terms of their salinity tolerance and weed suppression potential. These results will be used in future efforts to better understand the molecular mechanism of the salinity tolerance and identify the chemicals in hairy vetch that are responsible for suppressing weed growth and germination.

Genomic Correction of Pompe Disease Knock-in Mouse Myoblasts via CRISPR-Cas9 Homology-directed Repair

Presenter(s): Emilie Sandfeld
Advisor(s): Lindsay Waldrop

The goal of this study is to optimize CRISPR-Cas9 homology-directed repair (HDR) strategies to evaluate in vitro efficacy of genome correction in knock-in models of infantile-onset Pompe disease (PD). To accomplish this goal, we used a CRISPR-Cas9 knock-in system targeting the Gaa gene to introduce the known infantile-onset PD orthologues – Gaac.1826dupA (p.Y609*) or Gaac.1935C>A (p.D645E) - into C2C12 mouse myoblasts. We confirmed the molecular and biochemical analogy of our Gaac.1826dupA and Gaac.1935C>A knock-in myoblasts to PD by measuring GAA mRNA expression and enzymatic activity as well as glycogen accumulation. Next, for each Gaa knock-in line, we screened 6 CRISPR single-guide RNAs (sgRNA) and their respective single-stranded oligo DNA nucleotide donors (ssODNs) via nucleofection-mediated ribonucleoprotein (RNP) delivery. We then chose the top sgRNA candidates – with the highest levels of on-target nuclease activity and HDR template integration – to subclone into GFP-tagged CRISPR-Cas9 expression vectors (pX458). Lastly, we nucleofected CRISPR sgRNA-containing pX458 vectors with their respective ssODNs into knock-in myoblasts and used fluorescence-activated cell sorting to isolate GFP-positive cells. Overall genome correction efficacy was determined by TIDER (Tracking of Insertion, DEletions, and Recombination events) analysis. As determined by this study, the optimal genomic correction strategy will be used for future work to isolate, expand and characterize genome-corrected Gaa knock-in myoblasts prior to evaluating its therapeutic potential in an in vivo model system.

Chemistry

Computational Investigation of the Lewis-Acid Mediated Activation of Sulfonyl Fluorides
Presenter(s): Matthew Nwerem, Brian Han
Advisor(s): Dr. O. Maduka Ogba
Sulfur is an abundant, versatile element that exists in 14 unique forms and five oxidation states. Due to its many oxidation states and high electronegativity, sulfur is hungry for reactions that complete its octet or fill its empty d-orbital. Sulfur has been used medicinally since its antiquity, and now with more than 240 sulfur-containing US FDA approved drugs on the market, it's worth continues to rise[1]. Since the early 20th century, nitrogen-containing sulfur (VI) compounds such as sulfonamides have been synthesized via either the oxidation of thiols or the substitution of sulfur (VI) chlorides. The former occurs under harsh conditions which limit the functional group compatibility. Sulfur (VI) chlorides precursors in the latter are thermodynamically unstable and are susceptible to hydrolysis and redox reactions. Sulfur (VI) fluorides have emerged as promising alternatives to the chloride analogs in the synthesis of sulfonamides. A recent study by Ball and coworkers has reported the use of stoichiometric calcium triflimide in the activation of sulfonyl fluorides; however, the mechanism of this process was unknown. We employed DFT computational techniques to (1) elucidate the calcium complex responsible for the S-F bond activation, (2) investigate the mechanism of the reaction, and (3) provide rationale behind the use of stoichiometric amount of calcium salt. Results from this study will be presented.

Computer Science

SprintOnline; A Look Into The Difficulties of Multiplayer Game Design
Presenter(s): Filip Augustowski, Sebastian Brumm, Jon Le, Travis Mayer, Michelle Yoon
Advisor(s): Dr. Michael Fahy
The goal of this project is to create a simple, multiplayer capable game by using the Unity Engine as both a client and a server. Creating a game is difficult enough, however, once networking is involved a substantial amount of code must be added or changed to fit the constraints of the protocol of choice. Our aim is to see how difficult it is to implement a smooth gameplay experience while networking in addition to understanding how to: update physics properly to each client every frame, choose what information does not need to be sent and what information is necessary for all clients, and avoid hacking or cyber attacks to the server. SprintOnline will be "connected" by Unity clients communicating through both TCP and UDP to one another and to a Unity server. UDP will be used to update physics and player positions since this data is constantly updating, while TCP will be used for player names and instantiating objects within the game. It will be able to connect up to four players to a server where they can compete against one another in a race. There will be additional mechanics to the game including power-ups that any player can pick up to get an edge against their competitors.

Data Analytics

Preventative Healthcare Via Accessible Data Tools
Presenter(s): Matt Raymond, Tristan Chilvers
Advisor(s): Dr. Michael Fahy
The purpose of our research project is to show that technology, when paired with the right data, can be a powerful, egalitarian tool. We constantly hear how data collection can negatively impact society, but we wanted to use this as an opportunity to show how it can potentially save lives. By leveraging data from local/federal governments, GPS/IP locations, and free services provided by Google and others, we hope to be able to create a mobile website that can help users avoid COVID-19 epicenters. Ideally, the user would be able to search a given radius for a given type of business, and receive the results with dangerous locations removed. To allow this tool to work in extremely-dangerous locations (such as New York City), there would be a setting that would allow the user to choose how dangerous they were willing to be. Even though this may send the user into a dangerous location, the user is fully aware of the risk that they'd be taking on, and would be better able to prepare. If fully realized, and provided with enough data, it could potentially help reduce the rate of infection, as well as save the lives of immunocompromised individuals. Governments around the world are taking drastic administrative action to combat the virus, and organizations like Johns Hopkins are creating datasets and tools for researchers. Some of this is making it to the public in the form of interactive maps, but far too little is being done to put this data in an actionable format that the public can use to make an immediate difference. That's exactly what our project aims to accomplish.

English

Listen or Die: A Tribute to the Accuracy of One's Intuition
Presenter(s): Taylor Holt
Advisor(s): Sam Risak
The purpose of my creative project, titled Listen or Die, is to establish the importance of listening to an individual's intuition in the format of a screenplay. Within this piece, I intend to elucidate this reality with terrorizing ghosts and ghouls that appear when the feelings of something being wrong are ignored. As articulated by Julian Holloway and James Kneale, "we are happier with the idea of ghosts as traces of the unknown or unknowable than as a kind of puzzle." That being said, humans have a tendency of treating everything as part of a puzzle piece that can be solved by science. With the lack of scientific grounds, the significance of one's intuition rises, as does the threat of the ghosts that individual is able to perceive. In this piece, Bea is a very grounded individual who, like most of us, looks for reasoning over the supernatural when strange encounters occur. As these events unfold and Bea's bad feelings grow stronger, the audience is presented with two differing views: Bea's friends who are only able to hear the strange things around them and Bea, who can see the terrifying spirits. The combination of the two perspectives will lead the audience to a sense of discontent, fear, and near insanity as they read. Audience members will question their own intuition upon coming to the end of the piece when they realize Bea's nightmare is not a nightmare at all, but a vision that allows her to prevent disaster by listening to her instincts.

Jump Scares-Horror
Presenter(s): Tatum McGovern
Advisor(s): Sam Risak
The purpose of the short film "Boo" is to utilize cinematic techniques and psychological fears to create an effective jump scare. The goal is to create suspense through the use of sound, a dark setting, numerous camera angles, and video editing. Christian Gillion, a psychophysiologist points out that "when I make subjects anxious and then I startle them, the startle reflex can be increased by 100 to 300 percent." By building the scene and focusing on the small details of the film, whether you are expecting the scare or not, it will be effective. Incorporating jump scares shines light into real life fears that occur today when we least expect it. Startling current events pop up randomly, like the Coronavirus, and distract us from our daily activities. My film provokes an emotional response as I capture an average day and then a jump scare appears shaking up the character in the film and the audience as they are not expecting it. I am using inspiration from the movie Lights Out as the director David Sandberg uses darkness and silence to create multiple effective jump scares. My film is intended for a wide audience of students and adults, in hopes they all walk away unknowing what fearful real life event could pop up at any point in their own lives.

In the Mind
Presenter(s): Cameron Pastore
Advisor(s): Sam Risak
My research project is a short story called "In the Mind". The purpose of this short story is to research why serial killers are able to blend into society so easily. I will be researching common trait between well known serial killers and how that has enabled them to become the people they are. I have studied their background, things like their education, upbringing, jobs and mental health. I haves also studied fictional stories about serial killers and if they have similar traits to real life serial killers. My short story will highlight these traits and will also highlight a common mental illness between well known serial killers. The goal is to show my audience that serial killers can be hiding in plain sight and common people don't even know it. It is hard to scare someone through writing so the story's purpose it make people more aware of their surroundings and to make them question their every move. I will be using traits from Robert Yates and Dennis Rader to display how serial killers can have normal jobs, even some that serve the country. I will also be using Ted Bundy for his extensive education. The story will hopefully make the audience think twice before doing something that could cause serial killer to chose them as their next victim.

Writing a Horror Screenplay
Presenter(s): Thomas Rubino
Advisor(s): Sam Risak
My horror film screenplay follows a man and his internal struggle with identity, trauma, and memory while learning that he has been living a second life in his sleep triggered by a mysterious elevator. After switching from a short film to a screenplay, I started fleshing out my previous story but with different intentions. I wanted to focus on dreams due to a great deal of research I conducted on them previously. This research included topics of nightmare and dream production, brain activity during sleep, and trauma in dreams. The most prevalent research I conducted was on nightmare production, as my screenplay dives into the memory and psyche of the main character throughout many experimental sequences involving nightmares. The most important takeaway I found was that nightmares and their origin could come from almost anything that has a psychological effect on a human, like emotional and physical trauma. These concepts I

found through scientific experiments and academic journals were significantly used to influence the script, as the main character seeks reasoning behind his nightmares. Stylistically, this script is influenced by Donnie Darko, a film where dreams and mental illness are explored and intertwined to create horror. The objective of this script is to scare audiences through multiple kinds of horror while telling a wildly experimental story that still makes sense. Some traditional horror elements that are implemented into the story include jump scares and paranormal components concerning the elevator (which is a critical element of the story). There is a focus on psychological horror throughout the story that is told through detailed dream sequences that are set to use kaleidoscopic yet horrific visuals. My purpose for this script is to propose that nightmares and their influences are more constructive than destructive, and can be used as a window to view memory differently.

Somniloquy
Presenter(s): Graham Taylor
Advisor(s): Sam Risak
The purpose of this creative project, the short film Somniloquy, is to demonstrate the role of sleep, subconscious and the unseen in horror. The film uses the blending of sleep science with existential and psychological terror. The idea of sleep talking, and sleepwalking has been a subject of scientific scrutiny for more than three centuries. The high level of brain activity during REM sleep and during parasomnias are still not fully explained by modern science. The idea of the unseen threat in horror is a common device and heightens the tension by letting the imagination do the heavy lifting by not revealing the true nature of the creature. The film is set in one bedroom at various times of night and early morning to create a scenario that plays out in real-time. The antagonist in the film is never seen. Referred to only as The Speaker, this invisible presence is only active when Cal is in a deep state of sleep. The Speaker represents the uncertainty of the subconscious mind. The audience is uncovering the mystery in real-time with the protagonist Cal evoking the same growing suspicion and fear as the story unfolds. Throughout the piece, we follow Cal grasping the idea that something is not only lurking in his room and communicating with him each night after he has let his defenses down and succumbed to the depths of sleep.

The Imagination: A Short Film Exploring How to Effectively Inject Fear and Curiosity into the Audience
Presenter(s): Tyler Udarbe
Advisor(s): Sam Risak
The purpose of this short film “The Imagination” is to explore how horror films effectively inject both curiosity and fear into the audience by playing with sounds, music, camera angles, camera movements, suspense, and jumpscares whilst blending in some comedy. The short film follows a boy, who is home alone, as he gets trapped in his own world of imagination. He becomes trapped in this world, forced to explore and face his fears. He will help drive the film as he turns every corner, opens every door, or walks towards darkness. The camera angles, camera movements, sounds, and effects will all work together in order to fill the audience with both curiosity and fear as the main character explores this unknown and mysterious world. In order to increase the amount of fear and curiosity felt by the audience, mysterious figures will also be strategically placed in order to make an effective jumpscare. Studies have shown that the most memorable horror films usually stir fear, curiosity, and sometimes a little humor into the audience; therefore, “The Imagination” is purely a film to experiment with multiple elements in order to build fear and curiosity in the audience while also trying to bring some comedy into it. Comedy will not play

a big part in the film and will be occasional. “The Imagination” is expected to attract a wider audience as it does bring two genres (horror and comedy) into one film. This film is also expected to not be the same quality as professional films since they do have better equipment, experience, budgets, etc. Although there will be a very low budget for this film, “The Imagination” will definitely be pleasing to the audience’s eyes.

FFC

Tsukuyomi and Hades: The Connection Between Japanese and Greek Mythology
Presenter(s): Dominic Quinones
Advisor(s): Dr. Eileen Jankowski
In Japanese Mythology, Tsukuyomi, the God of the Moon, was the second of the “Three Noble Children” born from Izanagi, the God of the Land of the Living, and Izanami, the Goddess of Creation and Death. His siblings Amaterasu, Goddess of the Sun, and Susanoo, God of the Storms, all shared their reign of the sky; however, their siblinghood and chemistry involved many challenges. For example, Amaterasu invited Tsukuyomi to the heavens for a meal created by the God of Food, but Tsukuyomi was displeased with the meal and killed the Food God, which led to Amaterasu to deeming Tsukuyomi an evil god. This incident resulted in the separation and creation of day and night, and Tsukuyomi was no longer allowed to interact with the sun. Tsukuyomi’s story strongly relates to Greek mythology’s story of Hades. Tsukuyomi and Hades both have two extremely powerful siblings that they share power over the world with, and both rule over dark parts of the world; Tsukuyomi rules over the night and Hades rules over the underworld. Due to the darkness associated with the areas over which they reign and complicated backgrounds, it’s easy to misunderstand both of them and make biased assumptions about them. However, as with most mythological figures, the binary forces they represent, both dark and light, offer an intriguing picture of both culture’s recognition of complications in their divinities.

The Power of History with a Ticking Bomb: Godzilla the Dangerous Hero
Presenter(s): Sophie Qu
Advisor(s): Dr. Eileen Jankowski
The famous monstrous movie series from Japan created back in the 1950s were named Kaiju. It has become a new genre of films featuring giant monsters. Among all the monsters that were created, Godzilla was the most influential one. The complete mythology of Godzilla was tightly related to the Japanese history, culture, and world events. It all started with dropping nuclear bombs onto the Japanese soil during WWII which have awakened the monsters under the deep sea. The significance of Godzilla fighting against other evil monsters wasn’t just action movies. World events were hidden in Godzilla’s story timelines. The appearance of Ghidorah was created after China was developing its own nuclear weapons in 1964. Rodan the fire demon was announced when the Soviet Union was establishing its nuclear power in 1956. Godzilla was the hero against new threats to Japan. Godzilla is a creation of the Japanese dragon that people had fear and respect to. Godzilla’s “personality” was created based on the Shinto god, Kami. She represented both good and evil, as well as the balance restorer of nature. The concept of using monsters to restore the balance of nature was the key plot used in the last movie of Godzilla: King of the Monsters. With trees growing everywhere and animals roaming freely turned into the result of the monsters destroying cities. At the end of the movie, humans were introduced as dangerous predators. The idea of mankind developed into the ultimate destruction to natural would be used for the future Godzilla movies.

Film

Exploration of Found Footage Techniques
Presenter(s): Isabelle Lui
Advisor(s): Sam Risak
The technique of found footages is a popular choice when trying to create a low-budget and realistic horror film. It is popular among the audience because of its realness and perspective of how it is shot. The purpose of my film project is to help the audience to understand what specific techniques and characteristics in found footages are used to create a successful, realistic, and low-budget film. My project will include points stating a technique or characteristic used, following the film on how it is incorporated into my story. My story is based on a youtuber who goes missing during one of her livestreams. I made this topic related to technology because it is something that my targeted young audience will be able to relate to. Throughout the film, I will be utilizing words, cinematic techniques like a shaky camera and first perspective filming to build tension and to add to the affect of realness. I will also pay attention to the mine-en-scene and natural acting to make the film look more believable and natural. According to an article I researched on, realistic environment and natural acting are important factors that will make the audience believe. Making the audience believe the story will increase their chance of being scared. My expectations of this film, is for it to look like a realistic vlogger who got kidnapped during filming her video. I hope that after viewing my project, the audience will be able to understand and remember what specific characteristics are used normally in a found footage film.

Health & Strategic Communication

Twitter COVID-19 Case Bot
Presenter(s): Miles Milosevish, Andy Anguiano
Advisor(s): Dr. Michael Fahy
We will be creating a twitter bot that will accept subscribers and direct message users with relevant case data in their county, including total and new confirmed cases, total and new deaths, total and new patients tested, and total and new projected actual cases (using methods described by Thomas Puey), in order to keep the public informed on the impact of COVID-19 in their area. There are many useful sites that describe the quantity of confirmed cases by county, but it may be more tiresome to check one of these sites at regular intervals to get updated. Just as well, there are no easy ways to discover the projected number of unconfirmed cases in your area aside for calculating it yourself. This number is currently much higher than the confirmed number of cases due to a combination of lack of available tests as well as asymptomatic people unaware of infection and the need to be tested. In order to do this, our twitter bot will pull data from the NY Times Coronavirus dataset to notify people of cases in the location specified in a user's bio unless otherwise configured by the user. Users will subscribe by tweeting to the bot, along with optional location preferences and update frequency. User preferences can also be modified after subscribing by tweeting to the bot or by reaching out via direct message.

History

Nationalism Endures in Massacre Survivors

Presenter(s): Nathan Huffine
Advisor(s): Dr. Shira Klein, Dr. Thomas Reins, Dr. Alexander Bay

The Japanese committed terrible atrocities against the Chinese following their invasion of China in 1937, which culminated into the Nanjing Massacre. The unfolding of the Massacre, and its lasting impressions upon survivors, affected victims' views of the Chinese Communist Party (CCP) and its role on the world stage. My research examines the nationalistic perspective held by Massacre survivors despite CCP efforts to suppress nationalism. I further argue that Chinese Massacre victims contributed to the growth of the nationalistic perspective in China through their experiences and memories, and they came to view the CCP as a force for national security and not world liberation for the working class. Revealing the nationalistic perspective underpinning Massacre survivors' views and analyzing its affects upon the CCP will contribute to the scholarship of the Nanjing Massacre in two ways. Firstly, this research provides analysis of new primary source material, namely video interviews of Massacre survivors. Secondly, while scholars have considered both Chinese Communist efforts to suppress nationalism and the censoring of Massacre survivors, they have yet to consider the causal link between victims' nationalistic perspectives and the shift in CCP acceptance of nationalism following the 1980s. Indeed, this research makes the case for such a link. This research is conducted using both primary and secondary sources. The primary sources consist of fifteen oral accounts accessed online through the USC Shoah Foundation Archive. Secondary sources include the foundational works, The Making of the 'Rape of Nanking' by Takashi Yoshida and The Nanjing Massacre: in History and Historiography edited by Joshua Fogel, as well as recently published scholarly articles.

Silent Stasi: Decades of Repression

Presenter(s): Noelle O'Braitis
Advisor(s): Dr. William Cumiford

Following World War II, Germany and its capital Berlin were split into East and West Germany in which the East emerged as a communist society known as the German Democratic Republic (GDR), lasting from 1949 to 1990. The communist party leaders developed Ministry for State Security, a secret police organization more commonly known as the Stasi, which they modeled after the Soviet KBG organization. The Stasi's purpose was to act as the sword and shield of the Republic whose mission entailed knowing the entirety about everyone and everything. Overtime the Stasi amassed the largest network of agents of its kind compared to its small population. The Stasi, with the help of tens of thousands of informal collaborators, performed atrocities such as psychological torture and round the clock surveillance to prevent suspected persons from spreading anti-communist ideas. They created mass quantities of extensive and detailed files on potential dissidents, prompting a new, though familiar, culture of fear after the reign of the Nazi Party. This paper outlines the depth to which the Stasi repressed its own citizens and how their methodology became so precise, effective, and devastating. The atrocities committed continue to have long-lasting effects on the victims and their mental health due to the years of suppression and treatment. Ultimately, the Stasi violated all ethical and legal guidelines of today to break down dissidents and to root out any insurrection. Their methods of psychological warfare left no scars or traces which continue to be difficult to prove from their files today.

Physics

Optimizing Grating Couplers for Integrated Plasmonic Devices
Presenter(s): Brittney Kuhn
Advisor(s): Dr. Mark Harrison
On computer mediated communication networks, information is typically encoded optically to transmit signals over long distances. At a network node, the optical signal is transformed into the electrical domain, processed electronically, and transformed back to an optical state to reach its destination. Transitioning between optical and electrical encoding of the signal is a potential security weak point, especially for quantum communication links. If information can remain in one state as it travels through the network, then security breaches can be detected and dealt with more easily. Furthermore, keeping the information in one state can reduce power consumption in the network. Therefore, we are designing integrated photonic devices to enable information processing in the optical domain and remove the need to transform the signal from the optical domain to the electrical domain for processing. The photonic devices will couple light in from an optical fiber using a grating coupler, which helps to funnel the light into the device integrated on a silicon wafer. We are using plasmonic devices defined by a metallic strip that conduct the optical energy to the output of the device. Plasmonic devices allow for a smaller footprint (smaller circuit) than other integrated photonic architectures, which is impactful because photonic circuits are larger than electronic circuits. This work focuses on designing the grating coupler portion of the device that enables efficient coupling of light from an optical fiber source. Our goal is to optimize the dimensions of the device using high-powered computer simulations to maximize the coupling of light. This is the first step towards integrated photonic devices that enable better and more secure communications technology.

Psychology

Demographic Predictors of Adult Behaviors in the Pediatric Postoperative Environment
Presenter(s): Natasha Hikita, Amber Osorno, Carlie Taurosa
Advisor(s): Dr. Brooke Jenkins
Over 85% of children experience postoperative pain. If poorly treated, pediatric postoperative pain may lead to various negative health outcomes. Adult behaviors may be associated with child experiences in the postoperative environment. For example, adult behaviors such as distraction, humor, and coping advice divert a child's attention away from their pain and thus, may significantly reduce child postoperative distress. In contrast, adult behaviors such as empathy, reassurance, and apology direct a child's attention towards their pain which may increase a child's overall postoperative distress. Moreover, patient demographic factors, like child ethnicity, may significantly alter the frequency of use of these adult behaviors. Therefore, this study aimed to determine which participant demographic factors are associated with the use of certain adult behaviors in response to child postoperative distress. This study included children ages 2 to 10 years old (N=112) undergoing elective surgery at the Children's Hospital of Orange County. Participant demographics including ethnicity and race were collected prior to surgery. Nurse, parent, and child postoperative behavioral interactions were video recorded in the Post Anesthesia Care Unit (PACU). From these video recordings, adult behaviors were coded for their frequency of use. Multiple regressions analyses showed that adults were more likely to use humor with Non-Hispanic White children compared to Hispanic children ($b = 0.393$, $p = 0.049$). Moreover, fathers were marginally more likely to use empathy, reassurance, and apology with Hispanic children compared to Non-Hispanic White children ($b = 0.249$, $p = 0.05$). These results suggest that Hispanic and Non-Hispanic White children may receive different behavioral treatment in response to their postoperative distress. Implications for these findings suggest

that child ethnicity may be predictive of different adult PACU behaviors which may illustrate how cultural differences can influence the child postoperative experience.

Mind over Matter: Is Affect Variability Associated with Mental versus Physical Health?

Presenter(s): Lydia Ong
Advisor(s): Dr. Brooke Jenkins, Dr. Julia Boehm

Greater affect variability (i.e., higher fluctuations in affect over time) has been associated with poor mental health in a number of investigations. Physical health outcomes, however, are rarely studied. In the current investigation, we examined the impact of affect variability on both mental and physical health outcomes using the Midlife in the United States Study data to examine these associations (N=1,500). Participants self-reported affect during 8 days of daily diary reporting and self-reported mental and physical health outcomes 9 to 10 years later. Affect variability was calculated using standard deviation. Simple and ordinal logistic regression and negative binomial models were used. Results indicated that greater affect variability, regardless of valence, was associated with worse mental health. Greater negative affect (NA) variability was associated with worse self-rated physical health and greater positive affect (PA) variability was associated with worse physical health for five of the seven physical health outcomes. Although greater variability tended to be associated with worse health, variability interacted with mean affect levels such that variability was associated with better health for individuals high in mean NA and low in mean PA, which were already less favorable for health. More variability may provide breaks from high NA and low PA, thus leading to better health. Overall, results indicate that greater affect variability over time is associated with worse mental and physical health. Findings suggest additional investigations of mean levels of affect and affect variability in relation to health outcomes are warranted. Future research can use objectively measured physical health to assess its relationship with affect variability.

Helping Others, Helping Oneself: Can Generativity Priming Boost Cognitive Function in Middle-Aged and Older Adults?

Presenter(s): Natalie Standridge, Erin Bonham, Clarissa Tadros, Brianna Dinn, Danielle Zahn
Advisor(s): Dr. Tara Gruenewald

Generativity is care and concern directed towards others. This motivation is hypothesized to take on greater significance to individuals' self-concepts with advancing age. Our past research has also demonstrated that greater perceptions of generativity and greater engagement in generative activity, such as helping behavior and volunteerism, also predict better trajectories of mental, physical and cognitive functioning and health in older adulthood. In a prior study, we demonstrated that priming older individuals with a representation of older adults being a generative and contributory group in society led to enhanced memory performance in elder participants as compared to being exposed to a social burden prime. The current study extended our prior work by replicating our previous study with a larger national sample and adding a neutral prime condition for additional comparison. A total of 300 participants aged 55 and older across the U.S. are being recruited to participate in a web experiment in which participants will complete an online survey of demographic and psychosocial factors, a set of cognitive performance tasks, and be randomized to a priming task which primes participants with older individuals as representing a generative force in society, a social burden to society, or a neutral non-group prime. Analyses will examine whether priming individuals with a message that their social group represents a generative force in society will enhance cognitive function (memory performance) and positive affect as compared to exposure to a neutral or social burden prime. We expect study findings to contribute significantly to our understanding of how messages regarding the generative potential of specific social groups in society can affect the cognitive and affective well-being of members of those groups.

Message Framing and Health Behaviors: Moderating Effects of Self-efficacy and Current Stage of Behavior Change

Presenter(s): Stella Wallace
Advisor(s): Dr. Tara Gruenewald, Eunice Choi

Past research has shown that the way in which a message is framed (gain vs. loss) can have differing effects in various contexts. While research has examined message framing in the context of health behaviors, the current study sought to examine how individuals' self-efficacy and current behaviors could affect this relationship. Participants were young adult, college students who completed an online assessment where they were randomly assigned to receive either a gain or loss framed message about diet and regular physical activity. Participants completed measures of self-efficacy and their current stage of change before reading each message, then indicated their attitudes and behavioral intentions toward diet and physical activity. Data collection is ongoing, but it is expected that analyses will indicate that individuals self-efficacy and current stage of change will moderate the effect of message framing on the behavioral intentions and attitudes. This study may contribute to the current fight against chronic diseases and obesity which are greatly impacted by health behaviors such as physical activity and diet by providing data that can inform the most effective health messages to promote healthier behaviors.

Race, Culture, and the Self

Presenter(s): Gigi Cliatt
Advisor(s): Dr. Tara Gruenewald, Eunice Choi

Race/ethnic identities are key components of individuals' views of themselves, yet knowledge of how racial centrality is linked to individual self-esteem remains limited. How these links might be moderated by cultural orientations of the self-other interface, such as where an individual falls on an individualistic to collectivistic cultural orientation, also remains underexplored. . The association of racial centrality with self-esteem and how that might vary by cultural orientation are key aims of the current study. Participants were recruited on Amazon's Mechanical Turk platform to complete a brief web survey. Self-esteem was measured with the Rosenberg Self-Esteem Scale, racial centrality with the centrality subscale of the Multidimensional Inventory of Black Identity (MIBI), and cultural orientation with Singelis et. al's Identity Self-Construal Scale. Data collection is ongoing, but it is expected that the proposed analyses will shed light on the role of racial centrality in individuals' self-concepts and potential variation in this association as a function of cultural orientation.

Decoding the Time-Course of Abstract Intentions

Presenter(s): Alexandra van der Hoeven, Alexandra Rudis, Jake Gavenas, Elnaz Lashgari
Advisor(s): Dr. Uri Maoz, Dr. Aaron Schurger

Decoding a person's intentions from noninvasive recordings of brain activity is a major goal in neuroscience. Furthermore, such decoding efforts have revealed non trivial facts about decision-making. For instance, Salvaris and Haggard (2014) decoded motor intentions (left or right button press) in a delayed-response reaction time task. Motor intentions were highly decodable before movement for both instructed and free choice scenarios. Furthermore, the decoding accuracy improved gradually and then plateaued, as if matching the evolution of a decision-making process. However, this paradigm was solely motor-based and thus confounded intention with motor preparation. Therefore, we modified their paradigm to study abstract decisions, where participants first make a decision without knowing the motor output required to express their decision. In our experiment, participants make a free decision between two colors (or are

instructed on which color to press), and are told the mapping of decision to button only after a delay, all the while having their brain activity recorded (electroencephalography; EEG). Thereby we will investigate whether it is possible to decode abstract intentions with similar accuracies as motor intentions. Furthermore, we investigate the time-course of decoding accuracy as well as reaction times to early and conflicting cues to assess differences between abstract and motor intentions.

Public Relations and Advertising

Chap Maps
Presenter(s): Jaxon Skidmore, Ricky Vila, Jeremy Anderson
Advisor(s): Dr. LouAnne Boyd
Our beautiful campus at Chapman has a lot to offer, but unfortunately many are unaware of its accessible features. Our goal with Chap Maps is to shine light on Chapman's wide range of accessible tools for people with disabilities to help aid navigation through campus. This includes specific bathrooms, stairs, elevators, ramps, automatic doors, etc. We originally kept our focus small, specifically on people with wheelchairs that needed help navigating, but we widened our perspectives and realized an interactive map with other helpful things such as gender-neutral bathrooms and crosswalks can kill two birds with one stone. After doing some research, many people have thought of using technology to help people with disabilities, and their recommended processes of testing. We have already started our testing with paper prototyping and asking users to test out our prototypes gathering feedback. There are multiple other tasks needed to be completed before we can fully engage in executing this application, but we have made the right steps and made an end goal for ourselves along with a reach goal. For our end goal, we want to be able to map every elevator, ramp, automatic door, etc in an app with an interactive map and have our app execute multimodality and other key aspects we have learned this semester. We thought that was a very reachable end goal for us, and for a reach goal being able to help aid people with disabilities by giving them the best evacuation plan based on their location and needs in case of an emergency such as a fire.

Art

Depression in Horror
Presenter(s): Ryan Gimeson
Advisor(s): Sam Risak
The purpose of my project is to address the harmful effects of depression and how it is more subtle and less dramatic than most people realize. According to an article by Vice, horror films "effectively throw mental health issues under the bus"; horror is so concerned with telling stories that prey on our fears about the unknown, that they exacerbate the pain and suffering of those with preexisting conditions to inadvertently shape our opinions about them.This is wrong, not simply because it can be (and generally is) very offensive, but it makes the mistake of attempting to categorize and scrutinize a subject that unaffected individuals will never even begin to fully comprehend in a real life situation. In my project, I want to create something that speaks from my experiences with an individual who dealt with the complexities of the condition, as opposed to a filmmaker or storyteller who would potentially only research the project and not seek to understand anything but the broadest concepts. Truthfully, I do not know what creative medium would bring this condition the most justice. However, I know that I do not want to portray depression as "the condition where you cry a lot", as so many films have done. Depression operates in the shadows and behind closed doors; that is a metaphorical concept that I want to experiment with as tastefully as I can, and the hope is that creating this project will provide levity to those who feel misrepresented in society.

Biochemistry and Molecular Biology

Comparing the Antibacterial Efficacy of Novel Eastern Medicine-Inspired Toothpaste with Commercial Toothpastes
Presenter(s): Joshua Goldfaden
Advisor(s): Dr. Hamidreza Montazeri Aliabadi
Toothpaste is an oral health care agent that dates back to the 5th Century B.C. in East Asia. Following the conception of dentistry in the 7th Century B.C. and the field's subsequent growth, the embodiment of toothpaste has evolved from containing natural substances such as tea leaves to abrasive chemicals, particularly: fluoride, triclosan, and sodium lauryl sulfate (SLS). Regarding how each respective reagent functions, fluoride forms a complex with calcium ions in the teeth to prevent erosion of the protective enamel coating. This ion also disrupts metabolic activities of Streptococcus mutans (S. mutans), which are the bacteria that cause cavities. Similarly, triclosan is involved in countering gingivitis and limiting bacterial growth. SLS serves as a foaming agent in many toothpastes for texture. Although these chemicals are generally effective in maintaining oral health and are present in many mainstream toothpastes, they also impose various health complications in humans. In particular, fluoride disrupts a vital metabolic pathway in odontoblasts (teeth cells), resulting in cellular death. Regarding triclosan, even in small concentrations within toothpaste, has been found to downregulate anticancer genes. Concerning SLS, this ingredient contributes to the formation and prolongation of mouth ulcers and also diminishes oral epithelial tissue thickness. In place of these ingredients, I have formulated six toothpastes that contain different combinations of the following, minimally abrasive Eastern medicine ingredients: coconut oil, sodium bicarbonate, bamboo charcoal powder, xylitol, matcha, and cinnamon oil. After conducting a minimum

inhibitory concentration test to determine the efficacy of these formulations against S. mutans, my pilot data suggests that one of the formulations exhibits antimicrobial properties that are qualitatively comparable to three mainstream toothpastes from Colgate®, Crest®, and Sensodyne®. Going forward, I plan to refine my formulation and compare its safety to those of mainstream brands using in vitro human gingival tissue.

Biological Sciences

Are Pacific Hagfish Reactive to Light Stimuli?

Presenter(s): Dahlya Habashi
Advisor(s): Dr. Douglas Fudge

Hagfishes are marine craniates that burrow into the ocean floor. Hagfishes do not have functional eyes, instead, they have unpigmented eye spots located on the top of their head. As such, hagfishes perceive light through a dermal light sense, photoreceptors under the skin. Though effectively blind, Pacific hagfish (Eptatretus stoutii) first react to light with a wave-like movement of their tail or head. They have also been observed curling up in response to light in captivity. After some time spent in light, Pacific hagfish tend begin to swim around and settle once reintroduced to the dark. This behavior led us to hypothesize that they are photosensitive. Therefore, we predicted that hagfish would spend more time under a darker section of the tank than a light section. An LED light fixed to the top of the tank illuminated the tanks during the trials and a digital video camera allowed us to monitor Pacific hagfish movement across the 30-minute trials. Pacific hagfish were allowed a 15-minute adjustment period in the dark after the tank apparatus was set up, before being exposed to light from the LED mounted in the tank. Our preliminary results suggest hagfish are, indeed, photosensitive. In response to bright light, hagfish began to move their tail and head then swam around the tank and either moved or stayed on the dark side of the tank. Additionally, a secondary experiment was set-up in which an LED light was turned on in the tank, while recording, in order to capture the reaction of the Pacific hagfish immediately after introducing the stimulus. Using video analysis, movements of the hagfish could be quantified both before and after the light stimulus was introduced in the tank. Our results raise interesting questions about the role of photosensitivity in deep sea animals and the diversity of photosensitivity within the hagfish lineage.

Chemistry

Computational Investigation of the Mechanism of HOCl-Mediated Cysteine Oxidation in the Conserved Zinc-Binding Core of Cytosolic Chemoreceptor Transducer-Like Protein D (TlpD)

Presenter(s): Lindsay Zumwalt
Advisor(s): Dr. O. Maduka Ogba

Helicobacter pylori, a gastric pathogen present in about 50% of the global population, is known to facilitate gastritis, stomach ulcers, and stomach cancer. Previous experimental studies show that local unfolding at the conserved chemoreceptor zinc-binding (CZB) domain within the transducer-like protein D (TlpD) cytoplasmic chemoreceptor upon contact with hypochlorite (a known biological oxidant), is implicated in the mode in which H. pylori effectively colonizes the stomach. However, the mechanism of oxidation at the conserved zinc-bound cysteine residue upon HOCl contact, the role of the zinc complex in modulating the reaction, and the origins of selective oxidation are unknown. Our work utilizes DFT

computations to probe plausible mechanisms for the oxidation process, illuminates the role of ligand exchange equilibria at the zinc complex in modulating the reactivity and regioselectivity, and provides new hypotheses for the origin of the chemoattractant response. Insights from our computational study will be presented.

Communication Studies

Social Media & Product Endorsements
Presenter(s): Holly Knox, Erin Jensen, Mackenzie Maynard, Melissa Castillo
Advisor(s): Dr. Riva Tukachinsky
Our study goes about analyzing the relationship between product endorsements and the effectiveness of a Youtuber's video with such a part of it. We have gone about hypothesizing that the "Timing of a product endorsement within a series of YouTube videos affects the strength of a parasocial relationship between the viewer and the Youtuber" and that the "Strength of the parasocial relationship between the Youtuber and the viewer will increase with time spent watching the Youtuber's videos." We have observed that often product endorsements make viewers feel as though they are being exploited or become irritated leading them to avoid watching content that contains endorsements. We formed our hypotheses because viewing a Youtuber for an extended amount of time begins to strengthen the relationship between the viewer and the Youtuber. Thus, ultimately causing a greater parasocial relationship as opposed to viewing the Youtuber for a shorter amount of time. The placement of the advertisements directly affect the viewers perception of the product and their willingness to support the Youtuber. The later the advertisement, the more receptive viewers will be towards the product. Whereas, the earlier the advertisement the less receptive viewers tend to be. Our study will analyze this through a survey. This survey will have people view a few short clipped videos with an endorsement placed at a specific time within each with questions following in regards to their perception of the video as a whole.

After the Match: Discovering the Attitudes and Beliefs of Why People use Online Dating Applications
Presenter(s): Ethan Vieira
Advisor(s): Dr. Jennifer Bevan
In this study, we explored individual's online dating apps behaviors and attitudes that guide why an individual decides to match with a potential partner. Previous studies have focused on ideal characteristics (looks, personality, etc.) and their influence on matching decisions, but have not looked at intended behaviors that may lead to different relational outcomes. Our data collection occurred during the COVID-19 pandemic and additionally examined how online dating behaviors have been affected due to the shelter-in-place federal mandate. The purpose of this study was to understand what happens after the match and the intentions and outcomes of an individual on online dating apps. Our study tested the following research questions and hypotheses: RQ1: Is someone with low sociosexuality more likely to end up in a committed relationship than someone with high sociosexuality? RQ2: What are the reasons an individual uses dating apps if they do not meet up with anyone in person? RQ3: What impact has COVID-19 had on online dating app behaviors? H1: Individuals with high sociosexuality are more likely to not be in committed relationships and are more willing to meet up with an individual in person. H2: The more often an individual uses online dating apps will be positively associated with (a) amount of hookups an

individual has had in the past 6 months and (b) higher sociosexuality score. Thus far our data shows a mean age of 23.5 and participants use an average of 2 online dating apps at a time. We hope to finish data collection by early April with an estimated sample size of 350 participants that include a diverse sample of both Chapman students and community members.

Role of Image Framing in Perceived Justification of Police Brutality Act Against African Americans

Presenter(s): Lucile Henderson, Leora Kalili, Simone Guillory
Advisor(s): Dr. Riva Tukachinsky

Police brutality in the United States is an issue that affects many African Americans and is the result of years of institutionalized racism. This study aims to explore if the general community has internalized this culture of racism as it pertains to the perception of African Americans as violent and deserving of such mistreatment. While many studies examine the correlation between the perception of African Americans and the justification of punitive action against them, we wanted to further that research by specifically examining how image framing plays into this correlation. We believe that exposure to negative versus positive visual framing of the Black victim in news stories about police brutality will result in a more negative perception of the Black victim and the larger African American community. As well as a more favorable perception of the police officer involved and his action taken compared to the same negative versus positive visual framing of a White victim. To test this we created identical news stories about an incident of police brutality and only changed the images of the victim used (socially desirable versus undesirable images of both Black and White males) to isolate only race as the factor for altering the perception of the victim and justification of the act.

Computer Science

Chapman Rates

Presenter(s): Mica Marietta, Nidhi Vedantam, Brinly Xavier
Advisor(s): Dr. LouAnne Boyd

On the Chapman campus, through taking and choosing various classes, there is a significant need for communication and feedback between students and peers, professors, tutors, and study groups. With this, we wanted to create an application that enables users from various majors to not only easily and effectively communicate with various people in their field, but one that also enables them to give and receive feedback on various classes through a rating system. We believe that the application will aid students in a myriad of specific ways, including being involved in study groups and getting tutoring help, determining which classes to take for following semesters, communicating with professors on a class and individual level, and more. In order to ensure that the application is inclusive and effective, we want to perform user testing with a diverse set of users. Receiving feedback from users with different majors, ages, involvement on campus, technological experience, and more will help us ensure, through user-driven design, that we are accommodating the application for the widest range of students possible.

Chapman Library Room Booking App

Presenter(s): Alejandro Ferrer-Peasley, Elise May, Nawal Alasmari, Sofia Danielle
Advisor(s): Dr. LouAnne Boyd

Our purpose is to develop an application that will adhere to and support diversity and inclusion initiatives on Chapman University's campus. The application aims to facilitate a seamless process of library room booking for a diverse student body and promote interdisciplinary collaboration through both virtual and face to face interaction. Through user testing, we will be able to collect both qualitative and quantitative data that will allow us to create the most accessible user interface. Functionalities will include booking rooms, joining existing rooms to collaborate with others, chatting with other users, as well as a virtual library room option.

CoronaVirus Regional Updates

Presenter(s): Titan Mitchell, Michael Kulinich, Nader Banna, Chase Bradshaw, Bryce Purnell
Advisor(s): Dr. Michael Fahy

Based on the world's current situation we have decided to make information about the coronavirus easier to access. We believe that this will be an extremely useful tool for those that don't have time or those who don't know where to look for the appropriate coronavirus information. We want to answer the question, 'What is the CoronaVirus situation in my area?', for any person that opens our website. This way we can educate people about the CoronaVirus and make our communities safer. Our project will consist of a website where users are able to enter their email addresses to receive accurate coronavirus information. We will use the user's IP address to determine their location. From there, we will either use a prebuilt CoronaVirus API or web scrape information from government web pages based on the user's location to build a unique CoronaVirus report. Next, we will utilize an SMTP server to automate an email containing the user's CoronaVirus report. From this project, we plan to deliver relevant coronavirus information to those in need and we expect the results to be extremely positive. With accurate information being provided and emailed to the user based on their location, we expect our website to get substantial use by the public.

Music Caesar - Caes The Music

Presenter(s): Stephen White, Joely Fontana, Arshia Sharma, Saniya Syed, Brinly Xavier, Finn White
Advisor(s): Dr. Michael Fahy

This project is going to be a program that interacts with the Spotify and/or iTunes open APIs (Application Programming Interface) and will act as the audio system (also known as the DJ) at an event. The program will allow anyone connected on the same network to be able to vote (either like or dislike) a song in the queue, or add songs to the queue themselves. Additionally, the interaction of Spotify and/or iTunes with our program will allow the user to have access to the songs they want to add to the queue and provide the functionality of the queue. The songs in the queue will be played in the order of what song is the most upvoted (most liked). Further, the songs in the queue will be actively changing where they are in the queue depending on the number of upvotes and downvotes each individual song receives. The main goal of this project is to use the computer programming language, Java (JDK 13.0.2), to create our program and to be able to integrate Spotify and/or iTunes into this program. This idea is based upon a class project for Data Communications and Networking (CPSC 353), where we create a unique program that will use different open APIs to show varying network communications (or server to client communication). Our expected results would include an application (or app) that implements an easy to use interface that allows for people at an event to control the songs they want to hear from simply being connected to the same network as the audio system.

Data Analytics

Chapman Resource App
Presenter(s): Areeba Aftab, Alex Joseph, James Tran
Advisor(s): Dr. LouAnne Boyd
Many students at Chapman University complain about not having enough resources on campus provided by Chapman. Upon talking to administration, we found out that Chapman has a lot to offer, but there is a gap between those resources and the student body. Our idea is to bridge that gap. The idea is to develop an app which would be a "one stop shop" for Chapman students. It will contain all the resources Chapman has to offer. We will divide the resources and facilities into categories such as academics, financial aid, food and dining, events, career, etc. This way students can explore all the resources and facilities, and be directed towards where to go for each resource. Another feature on the app would be a portal where students can post questions and other students can reply in real time in an effort to help the Chapman community. In order to ensure our app is inclusive, we will use a diverse sample population that includes different ethnic backgrounds, school years, majors, and international students as well as local students.

English

The Phantom Queen of Irish Mythology
Presenter(s): Jordan Tatreau
Advisor(s): Dr. Eileen Jankowski
Each culture finds vastly different ways to explain the world around them, with many often resorting to a god or pantheon of gods. However, each culture's gods are entirely unique and fascinating—even when there is overlap, few ever represent the same aspect of life the same way. I seek to explore The Morrigan of Irish mythology, as well as her similarities and differences with other well known mythological figures. The Morrigan was a shapeshifting goddess who represented the circle of life, both fertility and war. Her role in mythology is as complex as her nature, and draws to mind similarities with many other figures, such as Athena or the Valkyries, though none fully encompass her. She could be tender or vindictive and could turn the tides of battles on a whim, either cloaking the land in a fog to protect or seeking out violent revenge against those who slighted her. Though many of her myths have been lost to time, The Morrigan looms even still as a powerful mythological figure, one shrouded in mystery and wonder to this day.

Jesus Christ and His Importance
Presenter(s): Kenny Koerber
Advisor(s): Dr. Eileen Jankowski
In society today, there are many aspects that have been taken from ancient societies. This is visible in brands like Nike, sporting events like the Olympics, and city names like Athens, Tennessee. However, Jesus Christ and the importance of the Bible is possibly one of the most influential pieces of text in modern society. Christianity is one of the biggest religions in the world, with billions of followers. It is found all over the world; North America, South America, Europe, Africa, and Asia. The reason why Jesus is so famous is because He taught people how to love, how to have a stable family, and how to have hope. When people are in distress, they turn to God, whether it be praying, or simple hope. One of the biggest ways Jesus Christ can be seen in society today is in government. America itself had a Christian upbringing regarding its government. In the pledge "...under God..." is stated. This is a clear giveaway that yes,

America was in fact influenced by Jesus Christ. The difference by the influence of the Greek Gods and Jesus Christ, however, is very visible. Nowadays, no one practices the old religion of the Greeks. Jesus Christ, however, has many followers with Christianity. People revolve their lives around him, whether they are the Pope, a priest, or just a devout believer. For this, Jesus Christ is one of the most influential ancient mythological figures in today's society.

Hey Beautiful: Calling Out Catcalling Culture

Presenter(s): Alanna Cronk
Advisor(s): Dr. Samantha Dressel

Catcalling: almost every female-presenting person experiences it, yet everyone has a different interpretation of the experience. There is a gradient of opinions of the subject ranging from longing to experience the validation catcalling can bring to reviling the insulting nature of the act. After establishing the frequency of catcalling across age and gender, this ethnographic research project will use qualitative surveys with around thirty individuals to identify and evaluate the range of attitudes people have about catcalling. This study will use Kristen Di Gennaro and Chelsea Ritschel's definition of catcalling, defining the act as "a comment in public taking place between the unacquainted breaching the norms of civil interaction between strangers but often including evaluative statements" (2019). Participation in this study is confidential and will take place remotely with an online survey that is approved by Chapman's Cayuse Internal Review Board. This project will use open coding to identify and group the unique interpretations of catcalling. With this grouping, the project will then arrange the data in a gradient ranging from negative to positive. Each group will match with a past study that has matching theory explaining the motivation for catcalling. For example, in a group of data with mostly negative feelings towards catcalling, a theory explaining a negative motivation for catcalling will be selected. Creative activity and research become one with the deliverables of this project. Twenty individual profiles will be the center of the first deliverable, a twenty-page zine. The zine will also feature samples of the subjects' handwriting, pictures of any relevant personal effects, and artistically related collages. The second deliverable will be a traditional ten-page research paper.

Shock vs Suspense

Presenter(s): Skylar Fisher-Duddy
Advisor(s): Sam Risak

My research is centered around the argument of 'shock vs suspense' within horror projects. The idea of suspense vs jump scares has been a long running debate within the horror industry. While movies that have jump scares might be frightening in the moment, many psychological thriller-type movies like Alfred Hitchcock's, 'The Birds' or '10 Cloverfield Lane' have proven to be just as or even scarier than straight forward horror movies. Using different articles and statistics on the success of the two different tactics in horror films, including Keith Lafountaine's analysis on the argument and the evaluations of the financial achievements within the horror industry, I have concluded that a horror project utilizing the idea of suspense and build up is more successful and/or sometimes even scarier than a project that incorporates only shock and jump scares throughout. I will use my findings and analysis to incorporate the more successful tactic into a horror screenplay. Hopefully, this will affect the level of how scary the screenplay will be to an audience and how effective it will be if made into a horror film.

Horror Slashers
Presenter(s): Sam Wilson
Advisor(s): Sam Risak
The purpose of my screenplay is to reinvent horror holiday slashers and pay homage to them, as well as putting a spin on the clichés and tropes of the subgenre. I pulled influence from films like Black Christmas which relied heavily on suspense and the plot of "killing one off one by one". My script has a similar setting, with Christmas around the corner and snow falling. I avoided clichés like the "killer mask" or "a girl getting killed in the shower."Through my research, it helped me figure out the strengths of slashers and the weaknesses. My story follows two sisters on Christmas Eve night. Neither of them believes in Santa, and their Christmas spirit has disappeared. But on this night, they soon find out that there's something sinister going on. They hear the sounds of a sleigh and the chuckling of an old man. Could it be Santa that has arrived? The audience should feel paranoid and suspicious like the girls are. Is there someone upstairs? The audience questions themselves throughout. One of the most important elements of the slasher is "suspense", so I hold as much tension and mystery as I can to make the audience feel uncomfortable. Wes Craven said it best with the quote, "As long as you keep the audience on the edge of their seats, either scare them or keep them guessing, you can put anything in there you want." By the end, the viewers/readers understand what's going on and the motive for the killer.

Horror and Smiles
Presenter(s): Erik Wood
Advisor(s): Sam Risak
The purpose of my project is to create a horror short story that avoids drawing its frightfulness from narrative cohesiveness and instead invokes feelings of unnatural discomfort through disorientating atmospheres, and the kind of agitated nuzzles that should, all things lovely, elicit sunny celebrations. Enveloping dust and dirt, their lascivious existence in the perforated fringes of exaggerated imagination experienced in the night-time corners of our most comfortable environments, are of especial interest to my project; the tease of things jaundiced, readily smothered or otherwise avoided entirely, that suddenly appear in the threads of everyday experience are an area that I desire to resurface in the reader's memory in an attempt for a conjoined elevation of the horror therein. In alignment with the interests of my project, I intend to situate the reader in a trembling space unable to provide an accessible escape to the refuge of distinct setting or character motivations. As a result of my story's artifice, I understand that its horror necessitates some experimentation to nurture a vicious encroachment upon the audience of my completed work. Enfolding myself within examples of my favorite horror stories, in both writing and film, I have researched how to operate as a storyteller and, in doing so, a predilection for surreptitious circumstances have alighted in my framework, which I intend to animate through inexorable narrative shifts and general instability, akin to that of unspecified character relationships in writing and spectral camera shakiness in movies. Horror in the style of my enticements is frequently represented in film and I would like to dispel this preconception by investigating it in a more foreign format, inspiring innovation in creative endeavors. I aim to use a lynchpin of someone in trouble to project all of this and, ultimately, to remove the warmth of a sidelong smile.

FFC

The Story of Our Greatest Strength: Scheherazade the Word-Weaver
Presenter(s): Kade Stockbridge
Advisor(s): Dr. Eileen Jankowski
The collection of short stories originally titled 'One Thousand and One Nights' in English continues to permeate the world's cultures long after its assumed 9th-century creation. 'Arabian Nights', or simply 'Nights', starts with Scheherazade volunteering to marry the murderous Sultan. Each night, she tells him an intriguing tale and ends on a cliff-hanger, compelling the wife-killer to spare her another day. Scheherazade uses her extra nights to finish the previous stories and begin another — eventually guaranteeing her survival when she gains the love and trust of the Sultan. Although the collection is folklore, aiming to preserve Arabic culture, the time capsule's framing story of Scheherazade behaves like a myth — explaining why we weave stories. They are crucial to our survival. We use descriptive, humorous, and thrilling storytelling to pass down knowledge effectively and persuade. The conquering Middle Eastern empires of the time needed stories to ensure the survival of their ideas and traditions — and to invade culturally. Both the Greeks and Egyptians noticed the power and importance of alluring language. Hermes, the Greek god of speech, and Thoth, the Egyptian god of language, both held positions in their respective ethereal councils. Alongside the importance of language, the Greeks also acknowledged the strength of language when Hermes weaponized Pandora with speech in Hesiod's Works and Days and Theogony. Human's infatuation with storytelling is evident in mythological motifs and the countless interpretations of 'Nights' — or 'Arabian Nights'... or 'One Thousand and One Nights'. Scheherazade's stories now share modern messages and are told in today's vernacular, keeping us engaged and the 9th-century Arabic culture alive. 'One Thousand and One Nights' and its longevity exemplifies the power of crafted language.

Power of Myth: A Comparison of Greek Goddess Athena and Egyptian Goddess Isis
Presenter(s): Lilly Anderson
Advisor(s): Dr. Eileen Jankowski
Myths hold a captivating hold on the cultivation of cultures, and it’s people. Mythological figures have the power to influence the narrative of a civilization and serve as answers, whether to explain natural phenomenons, provide entertainment, or serve as moral examples; myths have proven to be timeless forms of communication. My thesis will explore the influence and validity of myths, while also examining the commonality in the theme displayed between two specific legends: the Greek goddess Athena and the Egyptian goddess Isis. In Greek mythology, Athena emerges from the head of Zeus, fully grown ready for battle, revered for her strength, wisdom, and strategy; Athena’s tales of heroism prove to be influential. Similarly, Isis holds strong links with Egyptian kinship, celebrated for her abilities as a healer, a mother, and as a role model for women. The goddess, Isis, is one of the most powerful and oldest divinities within Egyptian culture, known as the goddess of children and priests. Athena and Isis, are often depicted as courageous, wise, and beautiful mythological figures and stand as leaders for their respective cultures. Through the comparison of tales, depictions, and symbolic meanings of these two goddesses, I will examine why these figures can withstand time and constantly reinvent within modern cultures.

Film

Good Morning
Presenter(s): Jenna Bolena
Advisor(s): Sam Risak
The purpose of "Good Morning" is to make people question what influences nightmares or dreams, and if they can predict any future events, especially in children. The goal is to scare the audience as well as make them question if they have had any dreams or nightmares that have stuck out to them, and why they think those dreams or nightmares stick out in their present lives. I want to do this by making the audience see recurring dreams and seeing how it affects the child who is having these horrific nightmares and what they cause of them could be. The film is intended to scare and make people think as well as finding something realistic and relating that the audience can relate to in their own personal lives. With a topic that people can relate to, hopefully it will make the film and idea more psychological and horrifying to the audience. In Stephen King's Carrie, King does a great job of writing a nightmare at the end of the book, where the survivor of prom night is attacked by Carrie once more. With this idea, it helps relate to the initial idea, that nightmares can be formed by trauma or past events that have happened to people.

Health Sciences and Kinesiology

Utilizing Best Practices of 3D-Modeling and Printing in Veterinary Medicine to Analyze Elbow Incongruity of a Maltese Canine
Presenter(s): Johnny Altwal
Advisor(s): Dr. Caroline Wilson
Research on the application of 3D-printed models in human medicine is extensive, but it is relatively new for veterinary medicine. With the increased numbers of certified veterinary radiologists and animal imaging facilities, best practices in 3D model design and printing can be explored. This project was two-fold. First, an encompassing literature review was generated, outlining the development and uses of computer-generated 3D models in connection to their applications in veterinary medicine. Accurate renderings of an animal's anatomy can be used to train new students, educate clients on their pets' needs, and guide veterinarian surgical approaches. Several different cases were explored by body region, where models created for animal prosthetic limbs and other types of implants are increasingly being used. Successes utilizing 3D printed anatomical models in veterinary and undergraduate student education were also investigated. The second part of this research study involved the creation of a novel 3D-printed model from imaging scans provided by Western University Veterinary School. Computed tomography images from a Maltese dog with elbow joint incongruity and lateral luxation of the left radius were developed into a 3D model and then analyzed for severity of deformity, length of bones, and treatment methods. Overall, the use of 3D printing in veterinary medicine provides novel, efficient, and successful approaches to treating various disorders. This rapidly evolving technology continues to become more widespread as more veterinarians learn how to harness the capabilities of 3D modeling and printing.

History

On the Street and Behind the Scenes: Women's Resistance in Nazi Germany

Presenter(s): Tori Menninger
Advisor(s): Dr. Marilyn Harran

While most Germans remained silent and acquiescent to Nazi authority during the Third Reich, resistance was never absent. Both men and women participated in various forms of resistance, although women often conducted their resistance behind the scenes. The Rosenstrasse Protest was an exception in that it was a public, non-violent protest initiated by non-Jewish German women married to Jewish men. This non-violent protest occurred in Berlin in the spring of 1943 in opposition to the planned deportation of the women's husbands. It was a highly unusual public display of civil disobedience. To quell the possibility of more unrest, Nazi authorities released all but 25 of the 2,000 arrested Jews. While these women were public in their opposition, other women worked behind the scenes in secret resistance activities. The Kreisau Circle was one such secret resistance group. The members of the Kreisau Circle were men, but several of their wives were partners in their husbands' efforts. This was the case for the wives of the two co-leaders of the Kreisau Circle, Marion Gräfin Yorck von Wartenburg, married to Peter Graf Yorck von Wartenburg, and Freya von Moltke, married to Helmuth James von Moltke. Gräfin Wartenburg, whose husband was executed along with von Moltke, was herself imprisoned by the Nazis. Freya von Moltke endangered herself by hiding her husband's letters to her in a beehive to keep them out of the hands of the Gestapo. The women of the Rosenstrasse Protest and the Kreisau Circle represent the public and private faces of German women's resistance to the Nazis.

Art(ifacts): The Rights of the Artist vs Historical Preservation

Presenter(s): Amanda Mulqueen
Advisor(s): Dr. Marilyn Harran

Restitution of art stolen by the Nazis remains a complex and contested issue. Dina Babbitt's claim for the return of art is an unusual one in that it involves art she created under duress while a prisoner of the Nazis in Auschwitz-Birkenau. The case involves personal vs. institutional property rights, as well as memory and ethics. While imprisoned at Auschwitz-Birkenau, Babbitt, a Czech Jew, was ordered by Josef Mengele to create a series of watercolor portraits of Romani prisoners for his so-called genetic research. Days after the liberation of Auschwitz-Birkenau Babbitt's watercolor portraits were given to Stanislaw Krcz by an unnamed prisoner as a gift when he adopted Ewa, one of the very few toddlers allowed to live as a prisoner in the women's barracks. Seven of Babbitt's watercolors resurfaced in the 1960s and '70s and were returned to the Auschwitz-Birkenau Memorial Museum in the form of donations by the adopted Ewa Krcz. Museum officials recognized Babbitt's signature and informed her that the portraits were now within their possession. When Babbitt sought to reclaim them as her creative work, the Museum refused arguing that as work created at the camp the portraits are artifacts of Auschwitz-Birkenau and must remain in situ. This project examines the circumstances under which Babbitt created the portraits and the arguments and legal precedents in support of Babbitt's and the Museum's positions, concluding that the Museum's refusal to return the portraits to Babbitt and now to her heirs privileges artifact over art and the creative rights of the artist.

Mathematics

Applications of the Brouwer Fixed-Point Theorem
Presenter(s): Melissa Sugimoto
Advisor(s): Dr. Mihaela Vajiac
The Brouwer fixed-point theorem, proven by L.E.J. Brouwer in 1909, is one of the fundamental theorems of topology with widespread applications across multiple fields of mathematics, as well as multiple natural realizations - even appearing in physics and economics [1]. The theorem states that every continuous function has a fixed point, or in other words, every continuous function has a point where the output is the same as the input. In this poster, we provide a proof of the Brouwer fixed-point theorem and present several applications. For example, the theorem is interlinked with the game of Hex [2], and can also be used to show that if you overlay two maps of one region of different sizes, there must always be a point that represents the same place on both maps [3]. Returning to mathematics, one can also use the Brouwer fixed-point theorem to prove that certain kinds of equations have solutions [4]. References: [1] A. Bright. Applications of Brouwer's Fixed Point Theorem. Masters Presentation, 2016. [2] D. Gale. The Game of Hex and the Brouwer Fixed-Point Theorem. American Mathematical Monthly, vol. 86, no. 10, 1979. [3]Brouwer Fixed Point Theorem, brilliant.org. [4] M. Tabata and N. Eshima. Application of the Brouwer and the Kakutani fixed-point theorems to a discrete equation with a double singular structure. Fixed Point Theory and Applications, article 24, 2018.

Music

1089 - A Mathematically Based Composition
Presenter(s): Olivia Mello
Advisor(s): Dr. Vera Ivanova
“1089” is an aleatoric piece written for solo piano. Each line contains simple mathematical equations that are palindromic. Each digit is assigned a pitch as defined in musical set theory (ex. C=0, C#/Db=1, D=2, etc.). Each system ultimately produces ‘1089’ by a three-digit number, a subtraction of its reversal, and the addition of its own reversal. Any three-digit number (abc) where a > b > c that is reversed and the result subtracted, and that answer is then added to its reversal; the answer will always be 1089. To prove this, solve for (100a + 10b + c) - (100c + 10b + a). Every possible answer is a multiple of 99. I utilize arch form in this piece by using seven possible combinations of multiples of 99. Herein referred to as “segments.” In total, there are 84 possible three-digit combinations where a > b > c. Each multiple of 99 shows up a certain number of times for the respective first digit, and the total of appearances is palindromic in nature. I used this information to create the organization of the segments. To choose the equations to showcase in each line, I examined the largest segment produced with the smallest three-digit a > b > c number. Section B (which occurs in between Sections A1 and A2) consists of every possible three-digit combination where a > b > c. Furthermore, when each digit within a three-digit number is added to each other within each segment used in the form, it will always equal 18. I used this information to create 18 specific articulations or dynamic markings for each occurrence of the segment. I used all possible combinations with their reversals for each segment to show how different pitches (or numbers) can create the same sound at the end. Exploring mathematics as inspiration for music composition produces endless new ways to create sound. Studying mathematical phenomena has the potential to highlight how to view music in the abstraction. It allows listeners to gain a deeper appreciation and understanding of musical compositions from Baroque until the 21st century.

Physical Therapy

The Effect Of Muscle Fatigue On The Lower Extremity's Muscle Activation

Presenter(s): Christopher (CJ) De Leon, Christopher Hoang, Michael Shiraishi, Shannon Toy, Tiffany Lubrino, Armond Gray
Advisor(s): Dr. Rahul Soangra

The purpose of this research study is to examine the changes in electromyogram (EMG) signals of the agonistic muscle and antagonistic muscles during fatigue. Muscle fatigue occurs when a muscle is affected by strenuous or acute activity that decreases its performance (Enoka and Stuart 1992). This study collects data from eight college students and the materials used are twenty-six reflective markers that are placed throughout the body, four EMGs, and four Xsens inertial measurement unit (IMU). We have our patients perform walking trials, heel raises, and steady standing. The fatigue portion of this study is introduced by having our participant perform ankle plantarflexion and dorsiflexion on the Biodex Dynamometer, an isokinetic muscle testing machine that fatigues the lower right extremity by performing multiple sets of plantarflexion and dorsiflexion ankle movement until 60% of their maximum voluntary contraction (MVC) is achieved. The fatiguing of the calf muscles during this phase shows differing rates of the antagonistic and agonistic muscle decline in muscle activity during co-activation, an event where both muscles activate simultaneously to smooth movements and provide fine-motor control (Patikas et. al 2002). In terms of our data, we can accurately measure the activity level of the gastrocnemius and anterior tibialis by synchronizing Vicon, a motion capture program, with Delsys EMG collection to observe functional tasks such as walking or doing heel raises. In post-processing, we will separate low/high EMG frequencies to distinguish unique motor unit activation within the tibialis anterior and gastrocnemius. We hypothesize that tibialis/gastrocnemius co-activation ratio will vary in post-fatigue compared to pre-fatigue. If we find this to be true, then it may be an indicator that simultaneous motor unit recruitment of agonistic/antagonistic muscles will adjust post-fatigue to attempt smooth motion.

The Effects of Muscle Fatigue on Postural Stability

Presenter(s): Armond Gray, Shannon Toy, Tiffany Lubrino, Christopher Hoang, Michael Shiraishi
Advisor(s): Dr. Rahul Soangra

The main goal of this research study is to compare the relationship between muscle fatigue and postural stability using postural, gait and functional analyses. Focusing on the postural analysis, a force plate is used to determine the center of pressure during pre and post fatigue activities. The plate provides a way to measure steadiness, stability, and the net force between the left and right force plates. Furthermore, the force plates allow us to see if one side of the body is more fatigued than the other depending on the location of the subject's center of pressure (Murray, MP., et al., 1975). Fatigue is induced by Biodex, an isokinetic muscle testing machine, and allows us to fatigue the lower right extremity so that we can fatigue a given subject in order to assess their postural stability. One parameter of stability is postural sway velocity, the sway speed of one's torso while maintaining balance. In general, postural sway velocity is significantly increased when the lower extremities are fatigued, as determined by infrared motion capture markers. Fatigue is defined as the reduction in maximal force-generating capability during exercise (Harkins, K., et al., 2005). This aligns with our hypothesis that fatigue will negatively affect the gait and postural performance tested on 8 different subjects. From this study, we can expect significant variations in postural sway velocity and center of pressure travel between pre- and post- fatigue trials. For pre-fatigue tests, we expect the motor units to not be fatigued and activated. However, we expect in post

fatigue that there will be decreased postural stability resulting from the Biodex exercises and decreasing activation of motor units in the right lower extremity. Overall, the data will quantify the increase in postural sway velocity and variations in center of pressure travel due to muscle fatigue.

The Effects of Muscle Fatigue on Gait Parameters

Presenter(s): Tiffany Lubrino, Amir Memarian, Shannon Toy, Armond Gray, Christopher Hoang, Michael Shiraishi
Advisor(s): Dr. Rahul Soangra

The central purpose of this study is to observe the effects of muscle fatigue through performance based on gait parameters, muscle function, and postural stability. When fatigue increases, muscle function decreases. We predicted that fatigue negatively affects gait performance. Gait parameters are used in our experiment to measure the line of progression between the left and right foot. We also measure the subject's step and stride length, base of support, gait velocity, and gait asymmetry. The relationship to walking stability and gait strategies will contribute to our understanding of gait patterns, and to ultimately minimize the risk of falls (Alamoudi, R., 2020). Depending on the impact of an altered gait cycle, an abnormal gait can lead to more significant health issues. In a study observing how gait parameters affected Parkinson patients, these patients have increased variations in gait parameters in walking speed and stride length within average values (Medijainen, K. et al., 2019). In terms of our data, we can accurately measure the gait parameters by using Vicon, a motion capture program to observe walking cycles when the subjects walk on the treadmill. We recruited eight subjects in a healthy condition throughout this biomechanical research and observed how their pre and post stages of fatigue had affected their gait parameters over time. The gait parameters are influenced by using twenty-six reflective spherical markers, four EMGs (electromyography) to evaluate the activity of nerves and motor neurons, and four Xsens under IMU. These devices were applied at various bony landmarks to obtain walking, heel raise, and standing data through motion capture. We can identify a person's unique movements, and can ultimately observe fatigue based on their gait parameters and walking patterns. As a result, this experiment can benefit physical therapy research in the future because we can recognize and identify how muscle fatigue can impact walking performance.

Physics

Computation of Quantum Incompatibility Robustness on Qubits

Presenter(s): Conner Carnahan
Advisor(s): Dr. Matthew Leifer

Quantum mechanics has remarkable differences for measurements from classical mechanics, and this is a notion of incompatible measurements. Intuitively what it says is that given some system, it is not guaranteed that you will be able to find a way to measure the system in two different ways. The most famous result from this is the Heisenberg uncertainty principle, which states that there is a bound on the uncertainty you can have when you measure the momentum of a particle given the uncertainty you have of its position. My research project has been based on an extension to this concept, which is called Incompatibility Robustness. What is already known in quantum theory is that if I have two measurements I wish to perform on a system, even if I cannot do both of them, I can create a new measurement which is a noisy version of the two I wish to perform. This can be understood as introducing a probability of

failure to measure what I want correctly, which will allow me to measure a larger set of properties at the same time. The probability that I don't measure what I want is roughly the Incompatibility Robustness, and is a measure that can be theoretically found for any set of two measurements. This measure is a way to quantitatively study the concept of incompatibility, which we hope to use in the proofs of some general theorems. Specifically, I have derived an explicit formula for a certain set of measurements on a Qubit, and have performed numerical analysis on larger measurements.

Psychology

Prediction of Self-Initiated Movement

Presenter(s): Rebecca DeAngelis, Akima Connelly, Steven Kolinsky, Jeremiah Ayala, Joanna Pak, Lexi van der Hoeven

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

When does the brain start preparing for a voluntary movement, relative to when the movement begins? How early can brain activity be used to accurately predict that a movement is about to occur? Is there any change in pupil size before the voluntary movement? Is breathing coupled with voluntary action and the neural antecedents of movement? Voluntary action is a fundamental element of self-consciousness. The readiness potential (RP), a slow buildup of neural activity preceding self-initiated movement, has been suggested to reflect neural processes underlying the preparation of voluntary action; yet more than fifty years after its discovery, the interpretation of the RP remains controversial. Building on previous research, we investigated the degree to which neural and autonomic signals are predictive of movement onset. To answer these questions, we used a controlled experimental paradigm that yields data epochs that terminate either with or without a voluntary movement. We applied this framework as a basis for experiments in which we recorded electroencephalography (EEG), electrocardiography (ECG), respiration and pupillometry data from human subjects, and then used machine learning in a sliding window to classify data segments as belonging to a movement or non-movement epoch. Initial results suggest that the final neural commitment to initiate a voluntary movement immediately precedes the onset of the movement itself, by as little as 150ms.

Chapman Faculty Perceptions of Hiring Practices to Increase Racial & Ethnic Diversity

Presenter(s): Nicole Williams

Advisor(s): Dr. Brooke Jenkins, Dr. Stephanie Takaragawa, Dr. David Frederick, Dr. Amy Moors, Dr. Quaylan Allen

Historically, higher education has primarily been comprised of white elites, both in terms of student and faculty demographics. While universities have faced backlash for this lack of diversity, it is clear that to this day, not much substantial change has occurred. In particular, research suggests that one contributing factor to the perpetuation of Whiteness is the hiring process through which white elites continue to hire other white elites. As such, the purpose of this study is to better understand how Chapman University can utilize best hiring practices to increase the likelihood of diversifying faculty demographics. Specifically, through the dissemination of a survey, Chapman faculty and/or individuals who served on search committees at Chapman University were asked to provide their perceptions on hiring practices geared toward increasing racial and ethnic diversity. Stages of the hiring process included preparing the search, writing the job description, recruiting candidates, interviewing, evaluating candidates, as well as retention and inclusion strategies. The results of this survey lend themselves to offering empirically-based suggestions that can be implemented at Chapman to enhance the hiring process and ultimately diversify the faculty makeup.

Nonlinear Dynamical Systems Lens on Psychotherapy Process
Presenter(s): Mary Harding
Advisor(s): Dr. David Pincus
Over the past 70 years, there has been an abundance of research indicating that psychotherapy works. However, the question of how therapy works has remained elusive. In fact, a therapist can follow a logical, systematic application of a specific therapy approach, but will still only have a vague sense of what is actually happening in the process over time and how that might relate to outcomes. Given the wide range of effective psychotherapy approaches that produce similar, positive outcomes, it is logical to conclude that there is something happening in the therapy process overtime that is more impactful than the approach itself. The purpose of this literature review is to view the empirical results on psychotherapy process through the lens of nonlinear dynamical systems theory in order to derive a more parsimonious set of processes that may be at work in facilitating positive treatment outcomes. Nonlinear dynamical systems (NDS) theory is a broad approach to science focusing on the potentially complex interactions of multivariate systems unfolding over time. NDS is aimed at understanding complex patterns. Two factors make NDS especially appealing for understanding psychotherapy process: 1) Linear science has been unable identify a set of independent predictors of outcome; 2) The targets of change in psychotherapy are themselves complex patterns of thought thought, behavior, emotion, and social relationships, each of which is interactive with the other and changing over time. The conclusions drawn from the existing research on psychotherapy process will be synthesized and used to form hypotheses that can be empirically tested using analogue and clinical research designs.

Intensity of Trait Measurements: Response Times to the M5-50 as indicators of Personality
Presenter(s): Kiyono McDaniel
Advisor(s): Dr. David Pincus
Personality tests aim to identify key traits that differentiate personality based on answers to questionnaires. Furthermore, it is possible that the intensity of identification with personality traits may be related to response times to the individual questions on the personality test. This current study looks to replicate the research conducted by Pincus et al. (2019) in Fractal Self-Structure and Psychological Resilience. Pincus investigates the hypothesis that the self is fractal and that its fractal structure can be captured within the distribution of response times to the MMPI-2. The current study attempts to replicate the methodology used in Pincus et al. (2019) using the Big Five personality traits as identified in a shorter, fifty item questionnaire (i.e., the M5-50). The same analytic technique will be used, examining the shape of the exponential distribution of response times to the 50 individual items for each participant. This study looks at the individual questions as measured by response time as predictive of fractal personality structure and tests whether the shape of the distribution (relatively steep or shallow) predicts levels of psychopathology (e.g., anxiety, depression, and obsessive-compulsive symptoms). The significance of this study is to test if this methodology, specifically analysis of the reaction time distributions, can be applied to the M5-50 in a manner that measures fractal self structure and focuses on general personality traits.

The Effects of Breastfeeding on Maternal Psychological Well-Being
Presenter(s): Danielle Liu
Advisor(s): Dr. Laura Glynn
It is well-established that women who experience stress or depression are less likely to initiate and persist in breastfeeding. However, it has also been hypothesized that breastfeeding may confer psychological

benefits, including enhanced mood and stress buffering. In this study, we examine the relation between breastfeeding and mood in a prospective longitudinal cohort of 132 women recruited during pregnancy. Prenatally and at two-months postpartum, psychological distress and positive affect were measured using the ecological momentary assessment over three consecutive days with the Center for Epidemiologic Studies Depression Scale, the Perceived Stress Scale, the Modified Differential Emotions Scale, and the anxiety subscale of the Profile of Mood States. Breastfeeding status and frequency were assessed through self-report. Women who were breastfeeding reported less perceived stress, fewer depressive and anxiety symptoms, and more positive affect at two-months postpartum (all p's < 0.01). Importantly, these group differences held after consideration of potential covariates (including maternal ethnicity, age, socioeconomic status, educational level, and cohabitation with baby's father), as well as after adjusting for prenatal perceived stress and depressive symptoms. In addition, greater frequency of breastfeeding predicted less negative mood. These findings are consistent with bidirectional effects of breastfeeding and maternal mood. The fact that breastfeeding may exert protective effects against maternal postpartum negative mood suggests that it could be a practice with the potential to enhance both maternal and child health.

Childhood Abuse, Generativity, and Familial Obligation

Presenter(s): Gabi Frassenei
Advisor(s): Dr. Tara Gruenewald, Eunice Choi

Approximately 700,000 children are abused and/or neglected annually in the United States. Of these, it is estimated that a majority of victims suffer from abuse by their parents. Typically, as these children grow up and gain independence from their parents they express a motivation to not repeat the abuse they experienced with their own children However, research suggests that childhood abuse experience is associated with later life health and well-being challenges, including impaired trajectories of psychosocial development. Erik Erikson proposed an eight-stage model of psychosocial development, the seventh stage of which is generativity. Generativity refers to the goal of contributing to the welfare and well-being of others, particularly younger generations. Research shows that adults that were victims of childhood abuse are less likely to achieve generativity in adulthood. However, the likelihood of generativity development may be moderated by desires to do well with one's children as is typically assessed in measures of familial obligation. The present study aims to identify whether abuse experience in childhood is linked to lower levels of adult generativity achievement, and whether levels of familial obligation moderate the association between childhood abuse experience and adult generativity development. These associations will be investigated in secondary analyses of data from the Study of Midlife in the U.S. (MIDUS). Data analysis is ongoing, but it is expected that the proposed analyses will enhance our understanding of the role of childhood abuse experience in the development of generativity in later adulthood and how feelings of familial obligation might help to mitigate hypothesized negative effects of abuse experience on generativity development. Such findings will help to inform policies and interventions that aim to optimize adult development in the context of childhood adversity experience.

Can Social Support Act to Maintain Optimism for a Better Future for LGBTQ Rights?
Presenter(s): Lynsey Joy
Advisor(s): Dr. Tara Gruenewald, Eunice Choi
Background: Social support is known to play a key role in mental and physical well-being, in part by enhancing individuals' resilience to life's stress and challenges. Support is also linked to optimism for positive outcomes. However, the role of these processes in optimism for a positive future within the LGBTQ policy arena remains understudied. Aims: The current study examines whether experimental enhancement of social support availability bolsters optimism for positive future policy changes in the area of LGBTQ civil rights in LGBTQ individuals, their family members, and close allies, when exposed to evidence of negative attitudes towards LGBTQ rights. Method: 254 participants who were either a member of the LGBTQ community, a close family member/friend of someone who identifies as LGBTQ, or an ally of the LGBTQ community were asked to read a news article on the negative state of individuals' attitudes towards LGBTQ rights, perform a social support enhancement or neutral prime writing task, and then report on their levels of optimism of future LGBTQ policy change. The Brief Resilience Scale was used to identify individuals' resilience style. Results and Conclusions: Data collection is ongoing but it is expected that the proposed analyses will elucidate whether a social support enhancement intervention can bolster optimism for the future of LGBTQ rights when individuals are exposed to negative attitudes regarding LGBTQ rights. Our study may contribute to mental health research to encourage the importance of social support systems in the lives of LGBTQ individuals.

Calorie Intake and its Effect on the Affect of College Students
Presenter(s): Ivan Penate
Advisor(s): Dr. Tara Gruenewald, Eunice Choi
Research suggests that our affect may be both a cause and consequence of our dietary behavior. For example, distress is often associated with increased intake of comfort foods, such as foods high in sugar and fat. Conversely, caloric deprivation can lead to negative affect. Our affect may also be affected by our food consumption behavior, such as feeling guilty when we consume more calories than our needed or make poor dietary choices. The diet-affect connection may also be altered by level of physical activity and body weight and size which affect individuals' basal metabolic rates and optimal caloric consumption for maintaining a healthy weight. The aims of the current study are to track the associations between individuals' daily caloric intake and content (fats, sugars, carbohydrates, fiber) and daily affect, accounting for individuals' basal metabolic rate. Undergraduate college students will be invited to participate in a 7-day daily survey in which daily caloric intake and nutritional content will be assessed with the MyFitnessPal smartphone app. Participants will also be asked to rate their daily positive and negative affect with a 10-item affect measure. Basal metabolic rate will be calculated from height, weight, and physical activity level. Analyses will examine linear and curvelinear associations between daily caloric intake, as well as deviations from target caloric intake as determined by basal metabolic rate, and daily positive and negative affect. The day-to-day assessments will also allow for analysis of potential lagged associations of diet and affect (i.e., affect affecting next-day diet behavior and vice-versa). Our study may contribute to our understanding of the links between daily diet and daily affect both of which contribute to college students' mental and physical well-being.

Parents' Marital Quality and Adult Children's Marital Attitudes

Presenter(s): Britney Wong

Advisor(s): Dr. Tara Gruenewald, Eunice Choi

Past research has suggested that family relationships and methods of communication could be influential to child and adult development, especially in ways of how adult children deal with conflict, interact with others, and attach to a future partner. While past studies have examined the relationship between parents' marital status and adult children's marriage attitudes, the potential association of parents' marital quality and adult childrens' views of marriage remains underexplored as do potential moderating factors (e.g., religiosity, sexual orientation). The current study sought to address this gap by investigating how children's perceptions of their parents' marital quality could influence their attitudes, expectations, and optimism toward marriage, and identify possible moderators of these associations. Participants were Chapman University students who completed an online survey measuring parent-child relationship and parental marriage quality, and participants' marriage attitudes. Data collection is ongoing but it is expected that the proposed analyses will provide new knowledge on the intergenerational transmission of marital attitudes.

College Students and Interpersonal Skills

Presenter(s): Victoria Marohn

Advisor(s): Dr. Tara Gruenewald, Eunice Choi

Research is conflicting regarding the influence of empathy on cyberbullying attitudes. While some research suggests that online bullies are less empathetic than those who do not cyberbully (Steffgen et al., 2011), other research has found higher cognitive empathy in online trolls (Sest & March, 2017). Despite the current research on empathy and bullying, very few studies have yet to explain how sadistic personality traits might be related to cyberbullying attitudes and behavior. The current study sought to examine how sadistic attitudes and gender moderate the relationship between cognitive and affective empathy and cyberbullying behavior and attitudes. It is hypothesized that empathy will decrease endorsement of bullying, except when sadistic attitudes are present. Participants were Chapman undergraduate students who completed an online survey that included measures of cognitive versus affective empathy (QCAE; Reniers, Corcoran, Drake, Shryane, & Völlm, 2011), sadistic attitudes (SSIS; O'Meara, Davies, & Hammond, 2011), and an Instagram task to observe and measure cyberbullying behaviors and attitudes. Data collection is ongoing but it is expected that the proposed analyses will add to our understanding of how empathy and sadism affect cyberbullying in college students, which is a critical developmental period for developing social bonds and relationships.

Implicit Gender Biases and Views of Sexual Encounters

Presenter(s): Lauren Castleton

Advisor(s): Dr. Tara Gruenewald, Eunice Choi

The "Me Too" movement in Hollywood and other highly publicized sexual assault allegations made against celebrities and public figures has drawn attention to the high prevalence of sexual assault in the U.S.. Awareness of sexist attitudes is also on the rise as seen through the latest wave of feminism. Many studies have been conducted examining the relationship between sexual assault and sexist attitudes. Of these studies, many examine the explicit, or more straightforward, expressions of sexist beliefs. However, much less is known regarding the relationship between implicit gender bias and views of sexual assault. The aim of the current study is to explore the potential correlation between implicit gender bias and attitudes

towards sexually coercive behavior, measured as variations in the labeling of sexually aggressive and coercive behavior as inappropriate. Participants were young adult college students who completed an online assessment of implicit gender bias and indicated the point in a fictional sexual encounter script in which they felt that a male target engaged in inappropriate sexual behavior Data collection is ongoing but it is hypothesized that individuals who exhibit greater levels of implicit sexism will exhibit greater acceptability of coercive behavior in the sexual encounter script. Knowledge of associations between implicit sexism and sexual behavior attitudes will provide information that may aid policy-makers in decision making when it comes to educating society on sexual assault behaviors and gender biases. This study may, ideally, contribute to a greater awareness of and decrease in sexual assault on college campuses and the wider society.

News Media Exposure and Political Action

Presenter(s): Bryleigh Blaise
Advisor(s): Dr. Tara Gruenewald, Eunice Choi

Whether repeated exposure to violence in media amplifies or dampens individuals' emotional and physiological reactivity, the subsequent effects on behavior have long been the subject of debate and to a more modest extent empirical research. These questions are of considerable significance for exposure to forms of violence that require political advocacy in order to decrease violent occurrences, such as gun violence in the forms of shootings. The current study sought to examine whether repeated exposure to gun violence in the media would affect political advocacy intentions related to firearm regulations and whether emotional and physiological habituation to repeated media exposure might play a role in observed effects on political advocacy intentions. Study hypotheses are that: 1) those exposed to violent news media will show greater physiological and emotional arousal compared those exposed to non-violent news media, 2) those exposed to violent news media will show increased intentions for engagement in political advocacy compared to those exposed to non-violent media, and 3) the level of habituation will moderate the hypothesized effects of media exposure on political action. To test these hypotheses, Chapman University undergraduates were randomly assigned to view either violent or non-violent media, self-report affective states, and indicate intentions for political action before and after media viewing. Galvanic skin response was a measure of physiological arousal and videotaped expressions of facial emotion (arousal) were collected during video viewing. Data collection is ongoing, but it is expected that the proposed analyses will indicate that exposure to violent media enhances individuals' intention to create political change but that these associations will be more muted in individuals who show greater physiological and emotional habituation during violent media exposure. Our study may contribute to our understanding of the role of habituation processes in shaping individuals' political advocacy in the face of repeated exposure to violence in news media.

Effects of Reporting Movement and Intention Timing on Neural Precursors of Action: Evidence From Pupillometry

Presenter(s): Jake Gavenas, Amber Hopkins, Sabrina Takla, Ruby Moss, Kate Harder, Andy Liang
Advisor(s): Dr. Uri Maoz, Dr. Aaron Schurger

The neuroscience of volition, to a large extent, investigates the neural precursors of conscious decision-making and action. Pupillometry is a powerful tool for investigating conscious and attentional processing, partly because of its connection to the locus coeruleus (Josh et al., 2016). For instance, in an attentional blink paradigm, differences in pupil dilations were associated with conscious versus nonconscious stimuli

(Wierda et al., 2012). Nevertheless, this technique has received little attention in the study of conscious volition. We collected pupil data during a spontaneous action paradigm, in which subjects freely pressed a button at a time of their choosing, on some trials reporting the timing of movement onset, intention onset, or a tone using a clock (Libet et al., 1983). Preliminary analysis demonstrated significant differences in baseline pupil size between conditions, potentially indicating cognitive load differences. Furthermore, replicating Richer and Beatty (1985), we found significant dilations before spontaneous movements. There were also indications that larger, pre-movement pupil dilations occur when reporting movement onset compared to reporting onset of intention. These results support arguments that task demands, such as monitoring awareness, may affect the underlying neural activity leading to action and could therefore impact recorded signals—e.g., the readiness potential (Trevana and Miller, 2011). Moreover, these results offer a starting point for the use of pupillometry in studying conscious volition and action production.

Norepinephrine and Global Brain Dynamics: a TMS-EEG-Pupillometry Study

Presenter(s): Joanna Pak, Jake Gavenas, Emma Krivoshein
Advisor(s): Dr. Uri Maoz, 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.

Sociology

The Meaning of Ancient Artifacts

Presenter(s): Annabelle Koeber
Advisor(s): Dr. Stephanie Takaragawa

Human interest in humankind's history now seems like a standard fixture in education. This was not always the case. The study of humankind, anthropology, brought questions about how to study the past. Thus, we find that not all history is equal. The pasts of different cultures are not understood or discussed in the same terms as others, this stems from hegemonic structures. These structures affect all aspects of life and can often be overlooked. Antonio Gramsci argued that having control of the dominant ideas within a society was the highest form of hegemony as it requires a form of consent from those it controls. Language is one way ideas are controlled. Organizations and institutions are often perpetuating these hegemonic structures through their language whether or not they recognize the impact. Collectively, Western understanding of the past tends to be focused on themselves, as the pinnacle of "higher" culture that was established with the theory of unilineal cultural evolution, this makes other cultures subordinate

to western ideologies. In the absence of writing, archaeology has become important in constructing and understanding the pasts of cultures. All objects have meaning, but these objects from the past have more meaning associated with them as they have become representative of not just the past but power. The people who control artifacts also control the language used to understand and discuss these objects. I explored how the meaning is constantly created for artifacts from their initial discovery to archival, and how this has shaped the Western understanding of the past and these objects. My research included archaeological fieldwork in Menorca, participant observation in museums, and interning for the collections department of a museum. My findings suggested that artifacts themselves do not matter to the public, but it is the value of the history they represent and the idea of human exceptionalism. The importance of history within society originates from individuals and cultures using the past to help support their importance is the present.

Software Engineering

Canvas Assignment Scheduler

Presenter(s): Kyle Burack, Frank Entriken, Michelle Kutsanov, Corey McCrea
Advisor(s): Dr. Michael Fahy

Now that schools around the world are transitioning to online classes due to the COVID-19 outbreak, students and teachers find themselves needing to adapt to the use of online lectures. Given the uncertainty of everything going on we decided that what our team needed right now is a chance to give our minds a rest. We wanted to create something that would help to organize our schedules and get back on track in a way that would not seem overwhelming. We understand that many students could have extra stress from outside sources at this time and want to help minimize these added stresses in any way. From this idea, we are creating a program that will let students who use Canvas, an online tool for university courses and communication, be able to lay out all upcoming assignments for each class in an easy to understand manner. We hope that this will bring a sense of clarity and ease of access to a student's schedule and will be a useful tool for them moving forward. We will be researching the Canvas API in order to use our knowledge of networking for polling the calendar database and give a standard output of a given student's assignments for the next week.

Gamifying Hacking with the Power of Networking

Presenter(s): Nicholas Mirchandani, Lloyd Black, Alex Joseph, Logan Welsh
Advisor(s): Dr. Michael Fahy

Stereotypical Hacker – Mainframe Access Token is a project we're developing as a team to unleash the immersive powers of networking to keep players engaged by playing with each other. We wanted to push ourselves to the limit and create something truly worthwhile in the form of a gamified hacking experience, while also learning skills required to incorporate various different ideas seamlessly into a final product. Not only does this project implement various networking protocols simultaneously to create an enjoyable game, but it also does so while allowing us to constructively teach players simple cybersecurity concepts, as they would seem from the point of view of an experienced stereotypical hacker. We believe that by introducing players to these concepts, they'll take measures to secure their own data from real-world hackers, especially after seeing how easy things seem to the hacker. However, above all, our goal is to grant players an unforgettable experience to share with their friends that'll show them what fun truly is. We believe that we'll accomplish our goal, but the only way to find out is to try it for yourself when it's finished.

Smarter Homes for Smarter Secondhand Smoke Habits

Presenter(s): Noah Estrada-Rand
Advisor(s): Dr. Vincent Berardi

Despite the numerous campaigns against cigarettes, other forms of smoking including vaping have continued to surge in popularity. This increase in usage brings with it increased exposure to secondhand smoke to those directly and indirectly exposed to the user. Though secondhand smoke is unfavorable to anyone, children are especially prone to resulting health implications. If the parents are the source of this smoke, this effect is amplified as the child is continually exposed to secondhand smoke. Our Alexa research and development directly addresses this problem by creating an adaptive and interactive smart home application that aims to shape household occupants' smoking behaviors to create a healthier indoor environment for children. Leveraging tools across multiple programming languages and systems, the centerpiece of the intervention rests upon Amazon's cloud infrastructure, integrating the internet of things to measure air particle levels in participants' homes. Daily behavior modules are administered via an Amazon Alexa Echo to gauge user engagement, as well as their sentiment and motivation. Data from an in-home smart smoke air monitor is incorporated into the platform to shape dialogue, responses, and daily activities that adapt to the subjects' performance. Alexa also offers feedback on daily performance, reviewing strategies to help the smoker make better decisions and smoke outside the home and as far away from the child as possible. By personalizing the approach, the intervention is meant to be salient to the user while effectively shaping and coaching behavior in a non-intrusive manner. While still in development, this work will hopefully expand to other areas of health behaviors assisting in not only recording data but also providing real-time feedback to users.

Film

The Development of Sound Design in Jim Henson's The Dark Crystal
Presenter(s): Erika Sela
Advisor(s): Dr. Kelli Fuery
Cinema is often regarded as a visual medium, but Michel Chion's "Film a Sound Art" emphasizes how films are much more than an exercise in watching, but instead an engagement in a process of "audio-viewing" (2009, Pg. 22). Jim Henson's 1982 all-puppet film The Dark Crystal exemplifies the audio-viewing process by showcasing the power sound has in animating the whimsically fabricated world of Thra. By using the multi-track technology of the 1980s to create the immersive whimsical soundscapes such as swamplands, the call of the landstrider, and the menacing variation in the Skeksi voices, sound designer Ben Burtt was able to establish a sense of "auditory verisimilitude" for the viewer that was just as innovative as the very characters that inhabited the frame (2009, Pg. 71). In the Netflix revamp series, The Dark Crystal: Age of Resistance, director Louis Leterrier carries on the Henson legacy, expanding Thra in all of its creative glory in order to meet the heightened expectations of an audience that grew up in the digital age. With the marriage of sound and image, the artifice of puppetry is recognized in a way that enworlds viewers by "confirming expected characteristics'' of this cinematic universe, forming a coherent believable blend between the aural fantasy of Thra and an artificially puppeteered world (Hearing the Movies, Buhler pg. 13). With the synchronous growth sound design and puppetry have experienced in the past forty years with the integration of Dolby and animatronic development, I aim to track the historical growth of sound and its emotional impact in the viewing experience of puppetry through the worlds of both Henson's and Leterrier's The Dark Crystal.

Boredom: How The Anti-Spectacle Frees the Spirit
Presenter(s): Kamla Thurtle
Advisor(s): Dr. Kelli Fuery
Few people enjoy or appreciate the feeling of boredom although those that do will understand its importance for a rich psychic life, exercising their creativity and coming in control of their existence. Through an existential phenomenological reading of Jeanne Dielman, 23, quai du commerce, 1080 Bruxelles (Chantal Akerman 1975) and The Chronicle of Anna Magdalena Bach (Jean Marie Straub and Danièle Huillet 1968) I argue that film facilitates spectator grasp of boredom. I discuss how aesthetic "lack", what I am referring to as the anti-spectacle – indicative of long run times, minimal editing, static shots, absence of plot – in cinema can enable the spirit and allow one to engage with boredom. Drawing on philosophical and critical theory via the works of Heidegger (1983), Henri Lefebvre (1977) , Siegfried Kracauer (1963), and Mary Ann Doane (2002) I explore the nature of boredom and the positive properties it has in human life. While each author treats the phenomenon of boredom differently, it is critical to my work to couple the various approaches toward the mood, demonstrating its importance in everyday experience, and to bridge the psychic inner-world with the outer-world. Heidegger discusses how boredom leads to a greater sense of "being-in-the-world", while Kracauer explores consequences of not engaging in boredom, and Lefebvre discusses the potentialities of everyday-ness. Cinema becomes the ideal mode for evaluating the mood of boredom because the cinematic anti-spectacle offers its spectator a heightened sense of viewing, confronting everyday-ness, and life-time. Doane helps to substantiate temporality and rethink dead-time, time that is "wasted", and reformulate this as life-time, time that reflects lived, everyday time. I seek to articulate and exemplify the filmic anti-spectacle and life-time that facilitate mediation of our own time and come in touch with our psychic life and inner worlds, enabling creativity and freeing the spirit.

Interruptive Ethics of an Ethnographic Film Artist: Chick Strand

Presenter(s): Valentina Pagliari
Advisor(s): Dr. Kelli Fuery

The ethnographic film art of Chick Strand clarifies the notion of an objective clinical assessment of a people. Within her ethnographies, Strand not only positions herself within the field of anthropology but also within film studies. As a woman, she felt a special responsibility to provide an intentional and authentic representation of the experience of being woman through the film medium. Framed by Simone de Beauvoir's The Second Sex (1949) and its existential philosophy on being woman, Strand assumes authority in representing this experience as an ethnographic film artist. Emmanuel Levinas's ethical thoughts from his book Otherwise than Being or Beyond Essence (1974), discusses the correlation between ethics and representation and their relationship to ethical responsibility. These ideas are developed in Kristin Lené Hole's Towards a Feminist Cinematic Ethics (2016), suggesting an idea of interruptive ethics that assess how ethics interrupts being from within Being itself and suggests a pre-ontological relation where the trace of other intrudes within our daily lives. Further contextualized by Strand's personal essays, her work raises questions about the ethics of representation and authenticity which supports the possibility of considering her as an interruptive filmmaker. Strand places herself in an interruptive position that not only upholds an assumed authority to depict, document, and represent her subjects, but also works to create a new narrative for the contemporary women in her films. This raises critical questions concerning the ethics of representation in non-feature film and also concerning feminist ethics through her assumed calling as a woman film artist choosing other women as her subjects. Through a textual and aesthetic analysis of her films The Fake Fruit Factory (1986) and Soft Fiction (1979), this paper illustrates how Chick Strand's agency as an ethnographer and her position as a film artist facilitates a critical questioning of the relationship between ethics and representation in rendering and studying the experience(s) of being woman.

Film

Feminism and the Rise of the Modern German Woman in "The Blue Angel", 2019
Presenter(s): Tatum Lenberg
Advisor(s): Jenna Weinman
By examining, The Blue Angel (d. Josef von Sternberg, 1930), through the lens of feminist theory, we can see that Marlene Dietrich's character, Lola Lola, utilizes her sexuality to seduce and exploit the male gaze in order to gain independence and financial freedom. This is important because it offers viewers a look at the changing role of the modern woman during the Weimar Republic in Germany. Following World War I, German women were briefly given the right to vote, hold office, work, and pursue higher education. While they fought to pursue these new opportunities, women's equality was challenged by the increasing economic restrictions and gender biases they faced during the rise of the Third Reich (Silva, 2018). In the film, Lola Lola's counterpart, Professor Rath, represents an old-fashioned way of life and a society with strict moral codes. This is shown through his outdated costumes typical of the middle class during the Weimar Republic. By capitalizing on her femininity, Lola Lola subverts these social limitations and uses them to shift the power in their relationship to her favor. This is a metaphor for the Weimar women's rise in power during the time period. Von Sternberg shoots the diegetic audience from Lola Lola's point of view to hijack the male gaze and usurp its power by adding humor and parody to her performance. Lola Lola's cabaret act involves alternately revealing and masking her body, which is representative of the cultural tensions and contradictions of German society. My research seeks to examine the character, Lola Lola's, role in evolving German society under the Weimar Republic, and the ways Marlene Dietrich and Josef von Sternberg played with male gaze and point-of-view to achieve this parallel.

Silk Screen, 2020
Presenter(s): Michael Nicholas, Paolo Wolfsdorf, Jamie Weiss
Advisor(s): Christine Fugate, Michael Wood
Within recent years, Asian-Americans have only occupied 1% of leading roles in Hollywood and many acting programs have failed to graduate even one Asian Male. Student films operate in a pre-cursory area to the film industry and allow for ideas and chances to be taken without the overbearing concerns of a studio. The financial success that tends to drive studio's casting decisions towards only "familiar options" is not present in the student space. These "familiar options," and hesitancy to step out of the perceived comfort zone has hindered the growth of diversity in Hollywood. As a Film Production Directing student, I saw my thesis film as an opportunity to place an under-utilized and under-represented minority in multiple leading roles. My film, titled Silk Screen, centers on a father and son's screen-printing business and the troubles they get into when the son's mysterious photography leads to months of late rent and an angered landlord. The story takes place among the block of Korean Wholesale Marts in downtown Los Angeles. Hiring a casting director based out of Los Angeles gave me the ability to find Korean actors interested in taking on a project of this level. As demonstrated in my film, I was able to showcase the talent and importance of pulling from the under-represented Asian-American minority with Korean actors at the forefront.

Public Relations and Advertising

Celebrate Your Links, A Hot Dog Advertising Campaign, 2019

Presenter(s): Marie Tobias, Jack Irvine, Emiko Kaneoka, Josh Prettyman, Christina Cherekdjian, Hailey Todhunter

Advisor(s): Kathryn Thibault, John Most

We were presented with a National challenge by the American Advertising Federation of creating a category-wide hot dog campaign, sponsored by Wienerschnitzel, to elevate the perception of the hot dog and drive category sales. Utilizing secondary research to build a foundational understanding, we concluded that the hot dog is a beloved and ever-present social staple. Consumers' affection for the traditional hot dog can be traced back to camping trips, backyard BBQ's, and sporting events, leading consumers to unintentionally pair hot dogs solely with special occasions. These findings led us to conduct primary research, ultimately gathering over 1,400 research impressions through surveys, focus groups, in-person interviews, and a research summit that led us to some key insights. During focus groups, negative perceptions were voiced about hot dogs. However, the dialogue changed once we asked, "What MEMORIES do you have associated with hot dogs?" We found that the conversation shifts from negative perceptions to compelling life moments when hot dogs are associated with a unique memory. Our barriers? Hot dogs aren't top-of-mind. They're associated with the Fourth of July and baseball games and aren't considered an everyday food. They're not always accessible. While Wienerschnitzel dominates the market in hot dog-specific chains, there are very few restaurants that offer hot dogs. Lastly, people think that hot dogs are made out of leftover animal parts and, therefore, think they are unhealthy. But from our research, hot dogs aren't unhealthy or basic, so our target needed to be reminded that hot dogs are a dynamic food that can bring people together in a special way. Our positioning? While hot dogs will always be at sporting events and backyard barbecues, their versatility, customizability, and price point make them great for everyday consumption.

Film

Bad Faith and Violence in the Films of Abel Ferrara
Presenter(s): Ethan Cartwright
Advisor(s): Dr. Kelli Fuery
The films of Abel Ferrara are often radical and divisive, not just because they examine violent, powerful characters living in bad faith but also because they directly attack various institutions and ideologies for upholding these characters' bad faith. As discussed in Jean-Paul Sartre's Being and Nothingness (1943) and Simone de Beauvoir's The Ethics of Ambiguity (1948), bad faith occurs when a person denies his own freedom and subjectivity, effectively objectifying himself and others around him. In this paper, I analyze three of Abel Ferrara's films from the 1990s—Bad Lieutenant (1992), Dangerous Game (1993), and The Addiction (1995)—using Sartre's original thoughts on bad faith, all featuring protagonists immersed in the objectivity of their roles who eventually self-destruct and violently come to terms with their own bad faith. I also discuss Ferrara's Welcome to New York (2014) in relation to Beauvoir's interpretation of bad faith, outlining how it contrasts with Sartre. In Ethics, Beauvoir expands on her initial criticisms of Being and Nothingness, that a person is both fundamentally free and constrained by social barriers such as race, class, and gender. Welcome examines a French politician who is arrested for raping a hotel maid, but who never achieves the realization or catharsis that the characters in Ferrara's previous works do. Instead, he further embroils himself in bad faith by using his political power to objectify his victims and deny responsibility for his abuse. All four films ultimately confront the bad faith created and perpetuated by larger institutions and systems like police departments, late capitalism, and Hollywood filmmaking itself. Through analyzing Ferrara's works from this perspective, I question whether a viewer can recognize his own bad faith and that of the world around him through watching films with characters undergoing similar journeys.

Juventud en Huelga De La Huelga: Euphoric Melancholia, Crowded Loneliness, and Progressive Guilt
Presenter(s): Diana Alanis
Advisor(s): Dr. Kelli Fuery
Mood landscapes are enriched through an oscillating series of contradictions in Güeros (Alonso Ruizpalacios, 2014) to evoke a visceral catharsis through an internal migration of feeling. Migrating between and through emotions is a liminal space that defies fixed meaning between the "negative" and "positive" connotations of melancholia and happiness. Julia Kristeva's 1987 Black Sun: Depression and Melancholia is positioned as the conceptual foundation to argue and incorporate the function and sensation of guilt as a necessary self-reflective vessel that endows "negative" emotions with an unrestricted vocabulary, extending beyond verbal communication. Güeros rejects the dichotomy between "negative" and "positive" emotions to mirror a phenomenological experience for the spectator to be, as Christopher Bollas describes in The Shadow of the Object (1987), "in a mood" yet "capable of dealing with phenomena outside the mood space" (99). The characters' actions and inactions liberate depression from its prescriptive definition as an undesirable state. Being able to recognize participation within a mood prompts immediate judgment of a "good" or "bad" experience and this judgment, as theorized by Sara Ahmed (2010), links the ideal of happy with the notion of "good" (22). Güeros provides a critical subversion of "bad" and "good," reinterpreting their relationship with "negative" and "positive" emotions. Cinematic moods build an environment that grips the active spectator towards a realm of

inescapable affect and allows contradictions of adolescent angst to remain in a constant flux between the expression of heightened emotions and inaction. To be "wrapped up" in a mood and incapacitated towards proper release is a form of catharsis as it confronts an unwillingness and discomfort to linger among unpleasant feelings. As both a love letter to and a critique of Mexican youth, the film establishes an ambiguous stance towards placing judgment on how the characters exercise their feelings or chose not to.

The Frontier Myth Abroad
Presenter(s): Peter Gassett
Advisor(s): Dr. Kelli Fuery
The Frontier Myth, while created from a specifically American context that perpetuates the societal ideas of the ruling class as Roland Barthes affirms, is equally applicable to colonial and postcolonial experiences. The Frontier Myth acts as a defining theme for the Western genre, and films that can be classified as such must negotiate with this mythology. By examining the development of the myth in American history through Richard Slotkin's work on the subject, the underlying expansionist themes espoused by figures like Teddy Roosevelt will be revealed. Therefore, western films that come out of countries that have been colonies of imperial powers must deal with the Frontier Myth as it relates to their cultural experiences. Films from countries such as Australia, South Africa, and Mexico all make use of the Frontier Myth to contextualize their own exposure to the frontier expansion of a ruling class that enforces their will on the indigenous population. Barthes states that "our society is the privileged field of mythical signification". The Western genre is perfectly fit for expressing this privileged field, due to its foundation upon the Frontier Myth, and therefore allows films from the previously mentioned countries to communicate their own experience with imperial forces. The Western then, as an extension of the Frontier Myth, is remarkably suited for exploring colonial and postcolonial themes in non-American films.

Digital Arts

Parallax, 2019-2020
Presenter(s): Scott Cummings, Nicholas Mirchandani, Ryan Millares, Dan Haub, Sean Robbins
Advisor(s): Kenjiro Quides, Robert de Bruijn
Hurtling through space, the light of the stars shining on their face as they explore the cosmos, this is the experience that Parallax offers to its students. A thrilling journey through our solar system, one that will teach basic and advanced lessons in astronomy and physics. Using the virtual reality technology available at Chapman's Grand Challenges Makerspace, students from across several fields have come together to craft an educational opportunity unlike any other. From experiencing changes in gravity in real time, to seeing first hand the scope of our solar system, students will no doubt be wanting more from this four lesson pilot. Education that is out of this world: Covering topics from fourth to ninth grade, Parallax is the perfect tool to spark an early love of science in your students. With a curriculum designed to match their progress, the game is consistently rewarding while pushing students to do their best. Vibrant Realms: Set in the beautiful world of outer space, our artists have painstakingly worked to create worlds as imaginative and realistic as possible: Exploring the cockpit of their ships, students will be able to interact with learning modules, take cumulative assessment quizzes, and play with the scientific instruments located within. Walking the planet's surface, students will experience astronaut life as they collect rock samples, complete lessons, and have fun on various planet's surfaces. Experience true interactivity: Working with Unity's Virtual Reality Tool Kit, our programmers have developed a fun, easy to use, and informative UI. Beyond this they have meticulously scrubbed the code of the game, ensuring that each level works seamlessly so that the fun never ends! Become a child again: Explore the vast worlds of Parallax with your fun loving A.I. Parallax, a guide and friend on your journey, Parallax will help guide students through lessons and let them know when to take a break from the game.

Film

Peace of Her Own, 2020
Presenter(s): Brynne McKee, Kylie Miller, Kaustubh 'Vick' Singh, Jordan Prieto-Valdes
Advisor(s): Jeff Swimmer, Christine Fugate,
Peace of her Own is a short documentary thesis film following as one woman in the farming community of Devgadh Baria, India, attempts to find Peace of Her Own amidst economic struggle, climate pressures and patriarchal oppression. In an agricultural community where women are responsible for 100% of the farming work and receive none of their family's profit or land ownership, Navaliben, a mother and fierce leader, aims to bring the women of her village together to fight for their rights and recognition. With crop failure rising due to changes in climate, food supplies are becoming less and less reliable. Without control over their family's finances, women of all marital statuses struggle to manage the cost of feeding their family and educating their children. At the core of their fight lies the women's need for recognition and equality. If women are not recognized as true farmers in the eyes of those who hold power, they cannot gain the economic autonomy they so desperately need. Aided by the camaraderie of other women around her, Navaliben must find a way to stably feed her family and set her daughters up for a hopefully more equal generation that lies ahead.

The Growling/ Short Film, 2019

Presenter(s): Samantha Kurtz, Noah Jorgensen

Advisor(s): Nana Greenwald

The Growling asks the question we all face when venturing into the perilous world of dating: what would you do if your crush had a murderous, man-eating dog? Franklin (Winston Salk) has to contend with this very issue. As he wanders to Melody's (Naomi Molin) house, he is attacked by a monstrous Frankenstein beast that was, at one point, a nasty little French bulldog. Franklin is lightly wounded but he us determined to have a normal date. Melody is unusually upset with Franklin's attack and, when Franklin wanders into the house, he learns the terrible history of the undead hound by the name of...Fat Elvis!

Art

Pretty Little Flower, 2020

Presenter(s): Nicole Daskas
Advisor(s): Micol Hebron

Pretty Little Flower, 2020, is my junior thesis project which has been funded by the CUE's Scholarly and Creative Grant. The piece consists of three videos. Each is focused on a specific type of flower and corresponds to a moment or movement from feminist history. Flowers, metaphors of femininity, are destroyed in each video. The first video is inspired by The Feminine Mystique, Betty Friedan's novel outlining the dissatisfaction felt by housewives in the fifties and early sixties. While this novel predominantly focused on white women, failing to represent all women, its lasting significance is the impact it had in starting the second wave feminist movement. In this video, I adopt the fifties aesthetic and insert myself, a half Asian woman, into this history. I destroy orchids by chopping them, sewing them, cleaning them, and eating them. The second video is inspired by Naomi Wolf's The Beauty Myth, which details the process by which intense standards of physical beauty have replaced former systems of oppression. As women gained power in other areas of society, the beauty myth became ingrained deeper and deeper into women's brains. I wanted to illustrate how this myth is still relevant to contemporary society; the beauty myth is present in different iterations rather than disappeared completely. Pink roses sit on a vanity in glass vases as I "beautify" myself in front of a mirror. As I apply makeup incessantly, I absentmindedly knock the vases to the ground, shattering them. Sunflowers are utilized in the third and final video component to Pretty Little Flower. I burn sunflowers in a recreation of the Freedom Trash Can, used in the Miss America Pageant protest of 1968. I recreate posters from protests and boycotts surrounding the push to ratify the ERA and abortion speakout of the late 60's/ early 70's.

A Brush with Death, 2020

Presenter(s): Morgan Grimes
Advisor(s): Dave Kiddie

Throughout the history of painting artist's have strived to create brilliant pigments of every color. Using natural substances they have made pigments with unmatched brilliance, but also unknown dangers. Many of the substances used to create pigments throughout history have been toxic, unknown to artists until nearly the 20th century. These toxic pigments have been used by nearly all the most well known artist throughout history, and many are still in use today. Through this series of paintings I have delved into the history of oil painting, as well as the history of pigment itself. These six paintings highlight some of the deadliest colors in the history of oil painting; cadmium red, chrome yellow, sheele's green, Viridian green, Prussian blue, and cobalt blue. These paintings are some of the most famous in art history that have been stripped of all their color, save for the toxic one. This series is meant to highlight the dangerous use and minimal regulation on oil paints and pigments, as many of the pigments are still in production today.

Digital Arts

Hearthbound, 2020

Presenter(s): Jack Irvine, Noah Cody, Joshua Anderson, Abby Tan, Wyatt Hall, Luke Burger
Advisor(s): Chris Boyd

The gaming and entertainment industry are rising to their peak as more technology emerges and becomes a part of our daily lives. With our project, we aim to join this field by publishing our own product on multiple digital distribution services such as Itch.io, Steam, and EPIC's Game Store. Our product, Hearthbound, is a single player game made in the Unreal Game Engine. Hearthbound a third-person adventure game where players will experience the story of a wayward adventurer by taking their place and living out the journey themselves. The game is set in a dark, atmospheric world where the players will reclaim their homeland by defeating monsters, interacting with peculiar objects and solving puzzles. We've created an immersive experience for players to spend endless time exploring caves and tunnels that are overrun with monsters and fiends. As the player goes through the storyline, they will learn what calamity happened to their home and free their home from evil. Upon completion with this project, we have started our own indie game studio where this product will be the first of many. We have created a space for ourselves that's allowed us to build and develop products to the extent of our imaginations, and it's allowed us to gain new skills that will set us up for success in our future careers. In the course of making this game, we have experienced the full process of developing a game with a team, from ideation and conceptualization to development and publication.

History

Desegregation Through Entertainment: Rodgers and Hammerstein's South Pacific as an Instrument of Military Policy

Presenter(s): Leana Sottile

Advisor(s): Dr. Jeffrey Koerber, Dr. Shira Klein

American musical theatre has served as a composite of historical and cultural memory through its history, but it has also been an instrument of supporting and upholding changing American military policy and culture. The most notable example of this is Rodgers and Hammerstein's South Pacific, a 1949 musical set in the Solomon Islands during World War II. The critically acclaimed musical was celebrated by the American public for upholding Greatest Generation nostalgia associated with the heroism of the "Good War", while also endeavoring to combat intense race relations in America through its progressive views on racial tolerance. Its depiction of the war was acclaimed by veterans and service members alike, which helped prompt the shows heavy usage by the American military to assist in the military policy and culture changes that came with desegregating the military, following Executive Order 9981. The show's wide-sweeping military appeal ended up generating a nuanced relationship between the production company, Surrey Enterprises Inc., and the Armed Services that extended beyond servicemen attending the show in New York. Utilizing the archival collections of Richard Rodgers, Oscar Hammerstein II, and Joshua Logan, this project highlights the relationship and how the show became an integral part of Armed Services entertainment. This was achieved through a number of licensed productions to the USO, Department of Defense, military bases, and veterans hospitals both domestically and internationally. As the military was attempting to desegregate the service, the show's strong anti-racist sentiment, which was cloaked in the veil of wartime nostalgia, was concurrent with the direction of military policy and culture. This made it a good musical for entertaining service members. Military usage of South Pacific usage was arguably a way to ease the blow of desegregation on the military by other means, in this case, entertainment, by peppering the thematic ideas about the importance of racial tolerance into a piece of unsuspecting, morale-building, military-supporting theatre.

Political Science

Constitutional Law and Western Art Music: A Comparative Analysis of Interpretation Methods

Presenter(s): Olivia Mello

Advisor(s): Dr. John Compton

Classically trained musicians understand a piece not only through its notational schemes but through a detailed interpretive analysis process, which includes aspects not explicitly indicated on the score. Looking at original manuscripts, examining performance choices made by past performers, and analyzing the differences in instrument capabilities over time all serve as examples of the intensive nature of the work of conservatory students and world-class professional musicians alike. Interpretation practices conducted by performers share significant similarities with judicial review. Constitutional law terms may be applied to describe the interpretation strategies used by musicians. Specifically, the constitutional law theories of originalism, doctrinalism, puposivism, and textualism apply to the various interpretations of western art music. Scholars of the law apply these structural methods of analysis to address constitutional issues. Like music, the application and practice of the law can be both objective and subjective. The main challenge

for both constitutional law theorists and interpreters of western art music is reconciling the differences between interpretation methods. Whether it be analyzing the intentions of the Founders or composers, both musicians and law scholars must overcome significant scrutiny concerning the conjecture of their choices. Beyond interpretation methods, there is a vast amount of research opportunities available for other parallels between musicians and attorneys, which reaches outside the scope of intellectual property law. Using this framework for discussion in music pedagogical situations would enhance student comprehension. Additionally, discussing interdisciplinary similarities is conducive to bringing a new awareness and intellectual curiosity for both experts and the general public.

Local Identity vs. Native Identity: From Massie v. Kahahawai (1932) to TMT (2009-)

Presenter(s): Nicole Saito
Advisor(s): Dr. Sandra Alvarez

Historians have reached the general consensus that the 'local' identity of Hawaii was first tangibly formed as a reaction by working-class people of color to the 1932 "Massie v. Kahahawai" trials, in which a white woman, Thalia Massie, accused five local men of color (Native Hawaiian, Chinese, and Japanese) of rape; a mistrial was declared; and her family kidnapped and lynched one of the acquitted defendants, Joseph Kahahawai. The tragedy concretized an already developing local identity--an alliance between Native Hawaiians and Asian Americans—which positioned itself in opposition toward perceived abuses from white elites and mainland U.S. business interests. However, since the 1930s, Asian-Americans and Native Hawaiians have frequently clashed over differing political interests. The most powerful criticism of the 'local' alliance between Asian-Americans and Native Hawaiians comes from Native scholar Haunani Kay-Trask, who claims that the local identity is not a multiethnic coalition, but rather, a re-labelling of identity for Asian residents of Hawaii that "blurs the history of Hawai'i's only indigenous people while staking a settler claim." This research project will investigate the legitimacy of Trask's claim in conversation with mainstream scholarship on the politics and history of local identity. Adopting the framework of Mahler and Pierskalla's "Indigenous Identity, Natural Resources, and Contentious Politics in Bolivia: A Disaggregated Conflict Analysis, 2000- 2011," the fissures in local identity will be analyzed, especially with regard to differing claims over political legitimacy, authority over land resources, and business development in the islands. The ongoing controversy over the construction of the Thirty Meter Telescope (TMT) on the sacred Hawaiian mountain, Mauna Kea, will be used as a case study for interpretive analysis, reflecting the possible of the local identity catalyzed by other underlying political issues in the 50th state, such as the disillusionment with the Democratic Party of Hawaii.

Film

Cinematic Rebellion: Exploring the Use of Taboo Content in Politically Critical Films
Presenter(s): Stacey Bates
Advisor(s): Dr. Kelli Fuery
The films Salò, or the 120 Days of Sodom (1975, Pier Paolo Pasolini) and A Serbian Film (2010, Srdjan Spasojevic) are potent examples of critical retorts toward the censorship and propaganda which has, during various periods of time, plagued individual national film industries due to oppressive regimes. Sigmund Freud's analysis of the origins and significance of taboos, as discussed in his text Totem and Taboo, affirms the identities of dozens of applications of taboo within the films mentioned above, the presence of which has caused these films to be regarded as extremely controversial, even leading to their banishment from several countries to this day. Additionally, the application of Michel Foucault's claims about the nature and importance of discourse outlines the structure of the respective conversation that the films mentioned above are engaging in with the glossy, perceptibly untruthful representations of each nation's society that national propaganda and strict censorship seeks to pedal as objective reality. If the purpose of propaganda and censorship -- specifically in the nations of Italy and Serbia -- was to restrict freedom of expression and thought in order to maintain unchallenged authority over their respective populations, it would appear, then, that the filmmakers responsible for the disturbing and offensive subject matter within these responsive films were motivated by their previous oppression to lash out at their governments with harsh social criticism, simultaneously confirming that political monopolization of their national cinemas resulted in the exact opposite effect than was intended.

Integrated Educational Studies

Mentoring Dyads for Anxious Writers: Evidence and Experience Based Strategies
Presenter(s): Samantha McCann
Advisor(s): Anne Steketee
College student writing anxiety is noted in students of all learning profiles. Experiences of writing anxiety or apprehension can be evoked by the stimuli of assigned papers, time-restricted writing, or research papers. Students then develop coping strategies to reduce or control their feelings of stress, which can have a negative or positive effect on their writing process and performance. Writing anxiety in college students is not a new topic for mentors: it has been addressed through discussions involving writing centers and second language students. Faculty members acting as mentors, especially for students with writing anxiety, is less understood. This presentation highlights a college student's experience with writing, including both the external factors and internal processes which negatively impact her writing anxiety. In response, her professor-mentor shares the collaborative evidence-based and experience-based strategies they effectively utilized as a mentoring dyad. Techniques that were shown to be effective included receiving feedback throughout the process, additional time with the professor for writing assistance, and model writing. Another technique that was utilized was the possibility of a due date extension; however, this approach had both positive and negative consequences. Understanding extrinsic and intrinsic influences might affect future comfort with writing tasks, particularly for highly anxious students and reluctant writers of all learning profiles. With the increasing levels of depression and anxiety in college students overall, professors, mentors, tutors, researchers, and other stakeholders could use this information to develop mentoring strategies to assist impacted students of diverse profiles.

Interdisciplinary

The Ocean-Mirror: Levels of Communication and Knowledge Across Different Versions of Solaris
Presenter(s): Cedric Bobro
Advisor(s): Dr. Kelli Fuery

Anthony Wilden formulates Jacques Lacan's Symbolic and Imaginary to fit the dimension of communicational systems: where Wilden finds Imaginary identification as the prevailing mode of knowledge and exchange in dominant discourse is where he aims to introduce Symbolic difference. (Wilden 1972) Using the theory of logical types, which Gregory Bateson develops into levels of exchange within all systems, not just the logician's, (Bateson 1954, 1972) Wilden demonstrates that the Imaginary discourse is one in which the self and other are reflected within the same logical type – as well as communication therein, leading to the impossibility of truly undermining the Imaginary relation from within. The Symbolic, then, is not merely a higher logical type in that it is able to account for levels of communication otherwise than the oppositional, but it is also capable of bringing out the difference within the very terms of the Imaginary opposition itself. I use the texts of Solaris to virtualize this move to a higher logical type through the idea that the Imaginary human/inhuman opposition can be articulated as different failures and in different media – and, consequently, as different logical types. In each instance, the ocean provides the lure of a mirror-like relation, whether for scientific discourse in general or for the human subject. Crucially, there is a moment in Solaris (Stanislaw Lem, 1961) Solaris (Andrei Tarkovsky, 1972), and Solaris (Steven Soderbergh, 2002) where this lure is pursued to such an excess that the ocean/human (or human/inhuman) opposition is no longer reflected as such, but becomes a single, formal term for a higher logical type.

Physical Therapy

Evaluating Limits of Stability and Dynamic Balance of Idiopathic toe walking Children in Pre- and Post-Intervention with Smart Shoes

Presenter(s): Nathaniel Addonizio, Lexi Nehls, Christopher Hoang, Michael Shiraishi

Advisor(s): Dr. Rahul Soangra, Dr. Marybeth Grant-Beuttler

Toe walking is a common walking pattern found in toddlers learning to walk. Toe walking can lead to an increase in instability due to a smaller base of support and tightness in the calves if it continues past childhood. In 2016, Faraldo-Garcia et al. conducted a study assessing the balance of healthy individuals. The researchers used the NeuroCom Balance Manager's limits of stability (LOS) and sensory organization test (SOT) to assess a decrease of balance in the older subjects (Faraldo-Garcia et al., 2016). The LOS is an assessment that measures the maximum distance a person can lean in different directions while keeping their feet flat on the ground. In limits of stability, the subject moves their center of pressure to eight different locations and are scored on their ability to reach the target. A study conducted by Pletcher et al. used the NeuroCom Balance Manager's SOT to assess postural stability in U.S special operations forces (Pletcher et al., 2017). The SOT is used to quantify impairments to postural stability by looking at the average center of gravity sway. In this study, we used the NeuroCom Balance Manager to compare the subjects' (n=40) balance pre- and post- intervention using smart shoes embedded with sensors. The sensors use an algorithm to distinguish between toe walking and normal walking and when consecutive toe walking steps are recorded, a vibration is used to alert the wearer. We expect the smart shoe intervention to have a great impact by complementing the current intervention of physical therapy; the subject will be constantly alerted of toe walking throughout the day instead of only during visits with the PT. To assess the balance, we used the Balance Managers Software protocols including LOS, (SOT), adaption test (ADT), and motor control test. We expect to see an increase in balance and range of motion across all tests when comparing pre- and post-intervention data.

Effects of Muscle Fatigue on Motor Unit Recruitment

Presenter(s): Shannon Toy, Tiffany Lubrino, Armond Gray, Christopher Hoang, Michael Shiraishi

Advisor(s): Dr. Rahul Soangra

Introduction:Muscle fatigue is the temporary decline of force and power skeletal muscles can produce due to muscle activity (Potvin & Fuglevand, 2017). This decline in muscle ability to perform over time is associated with the state of exhaustion following strenuous exercise, causing impaired activation of motor neurons that contracts muscle fibers - this can be further studied by understanding and quantifying the recruitment of motor units. A motor unit (MU) comprises of a neuron and the group of skeletal muscle fibers it innervates. As muscles are over-exerted, localized fatigue can be easily identified by exercise-associated muscle cramping (EAMC) (Schwellnus, Derman, & Noakes, 1997). The activation of individual MU can be monitored with the use of electromyography (EMG) sensors that quantify activation of muscles by translating electrical signals from muscle contractions into millivolts (mV). This study uses the Delsys Trigno EMG to identify the number of MU recruited during exercise and passes a high/low frequency filter to separate individual MU's from all collected signals to observe the effects of fatigue through muscle

performance by doing functional, gait, and postural tasks. Due to the body's natural negative feedback system to protect the muscles, this study predicts the decrease of MU recruitment as the body experiences muscle fatigue. Material and Methods:Eight healthy college students participated in this IRB-approved fatigue study. Twenty-six reflective markers, four EMGs, and four Xsens Inertial Measurement Unit (IMU), were placed at various bony landmarks to obtain walking, heel raises and standing data. The functional trials were separated into pre- and post- fatigue tests. The subjects were fatigued using the Biodex Dynamometer by repeating 5 sets of 22 reps/min of unilateral plantar/dorsal-flexion ankle movement until 60% of maximum voluntary contractions (MVC) is achieved. The contribution of muscle fatigue to the anterior tibialis and the gastrocnemius was calculated by filtering high/low EMG frequencies to separate motor unit activation.

Mathematics

The Structure of Distributive Idempotent Weakly Conservative Lattice-Ordered Magmas
Presenter(s): Natanael Alpay
Advisor(s): Dr. Peter Jipsen
A lattice with 0 is an algebra (A,∧,∨,0) such that ∧,∨ are associative, commutative, absorptive (x ∨ (x ∧ y) = x = x ∧ (x ∨ y)) binary operations and x ∨ 0 = x. A lattice-ordered magma (l-magma for short) (A,∧,∨,0,·) is a lattice with 0 and a binary operation · such that x0 = 0 = 0x, x(y ∨ z) = xy ∨ xz and (x ∨ y)z = xz ∨ yz hold for all x, y, z ∈ A. A distributive idempotent l-magma (or dil-magma) is an l-magma A that satisfies x ∧ (y ∨ z) = (x ∧ y) ∨ (x ∧ z) and xx = x. Let J(A) be the set of completely join-irreducible elements of A, and define the property of weakly conservative as xy = x ∧ y or xy = x or xy = y or xy = x ∨ y for all x, y ∈ J(A). We show that every dually-algebraic weakly conservative dil-magma A is determined by two binary relations on the partially-ordered set J(A). In the case where the binary operation · is commutative and associative, and where the distributive lattice (A,∧,∨) is a complete and atomic Boolean algebra, we show that the structure of these algebras is determined by a preorder forest on the set of atoms of A. From these results we obtain efficient algorithms to construct all weakly conservative dil-magmas of size n and all Boolean commutative dil-semigroups of size 2^n.

Characterization of Commutative Idempotent il-Semigroups
Presenter(s): Melissa Sugimoto
Advisor(s): Dr. Peter Jipsen
An involutive lattice-ordered semigroup (il-semigroup) is of the form (A, ≤, /\, \/, ·, ~, -) such that (A, ≤, /\, \/) form a lattice, · is an associative binary operation, and ~, - are an involutive pair. That is, for any x in A, -~x = x = ~-x, and for all x, y, z in A, x·y ≤ z, x ≤ -(y·~z), and y ≤ ~(-z·x) are equivalent. Such a semigroup is idempotent if x·x = x and commutative if x·y = y·x. In this case (denoted by cidil-semigroups) the binary operation · is a semilattice operation and the partial order it induces on the set A is called the multiplicative order. We prove that the multiplicative orders of all finite cidil-semigroups can be partitioned into Boolean algebras, and we hypothesize that conversely there exists a process of combining Boolean algebras such that every gluing of this form produces the multiplicative representation of a cidil-semigroup. A similar result has recently been shown in the related case of commutative idempotent involutive residuated lattices (P. Jipsen, O. Tuyt, and D. Valota's preprint "Structural Characterization of Commutative Idempotent Involutive Residuated Lattices"), and it is our goal to prove these results in the il-semigroup case in order to give a full description of the structure of finite commutative idempotent il-semigroups.

Biochemistry and Molecular Biology

Extraction, Purification, and Characterization of Biologically Active Proteins in Mulberry Fruit

Presenter(s): Haley Reinhard, Farida Mossaad, Yen Nguyen
Advisor(s): Dr. Aftab Ahmed

The World Health Organization (WHO) defines traditional medicine as "the sum total of the knowledge, skills, and practices based on the theories, beliefs, and experiences indigenous to different cultures, whether explicable or not, used in the maintenance of health as well as in the prevention, diagnosis, improvement or treatment of physical and mental illness". A major component of traditional medicine is herbal medicine, which is the use of natural plant substances to treat or prevent illness.

Type I Diabetes Mellitus Adversely Impacts Ocular Surface Glycocalyx and Mucins

Presenter(s): Jacob Baker, Saleh Alfuraih, Kiumars Shamloo
Advisor(s): Dr. Ajay Sharma

Purpose: It is well known that poor glycemic control in patients of diabetes mellitus causes retinopathy and cataract. Recent evidence suggests that diabetes mellitus can also have a detrimental impact on the anterior segment of the eye. The present study was designed to examine the effect of type I diabetes mellitus on corneal glycocalyx, tear film and corneal epithelial defects. Methods: Type I diabetes was induced in C57 mice by a single intraperitoneal injection of streptozotocin (150 mg/kg). The blood glucose was monitored using a glucometer. Tear film volume was quantified using phenol red thread test. The corneas were stained using fluorescein for epithelial defects and imaged using cobalt filter slit lamp for corneal keratopathy scoring. The corneas were harvested at week 1 and week 2 and the glycocalyx was stained using wheat germ agglutinin. The stained corneas were imaged using a confocal microscope to obtain Z stack images. Results: Induction of type I diabetes after streptozotocin injection in the mice was confirmed by high blood glucose levels (>500 mg/dl). The diabetic mice showed a significant decrease in the tear volume as early as week 1 after the induction of diabetes. Slit-lamp imaging revealed a high corneal keratopathy score of 5-9 in these diabetic mice. Digital quantification of confocal images showed a 12- 20% decrease in the area of stained corneal glycocalyx in these diabetic mice. Conclusions: Our data demonstrates that type I diabetes mellitus negatively impacts tear film, causes epithelial surface defects as revealed by corneal keratopathy and a reduction in the corneal glycocalyx.

A Comparative Analysis of Cytokine Gene Expression in Human Conjunctival and Corneal Epithelial Cells in Response to Hyperosmotic Stress

Presenter(s): Priya Mistry, Kiumars Shamloo
Advisor(s): Dr. Ajay Sharma

Increase in tear osmolarity and chronic inflammation are cardinal feature of dry eye disease. The ocular surface is covered by conjunctival and corneal epithelial cells. Exposure of ocular surface epithelial cells to hyperosmolar stress may initiate inflammatory response. Therefore, the present study was designed to investigate the differential changes in the gene expression of proinflammatory cytokines in human conjunctival and corneal epithelial cells upon exposure to hyperosmolar stress. The cultured human corneal and conjunctival epithelial cells were exposed to hyperosmolar stress for 12 and 24 hours. The mRNA was isolated from these cells and was reverse transcribed into cDNA. The cDNA was used for quantification of IL1, IL6 and TNF-alpha gene expression by real-time PCR. Hyperosmotic stress caused a 1.5- and 2-fold increase in the gene expression of IL1 in the human conjunctival and corneal epithelial cells

respectively. Hyperosmotic stress also caused a 3- 4 fold increase in IL6 expression in conjunctival cells, whereas the increase in IL6 gene expression was much more robust in human corneal epithelial cells. Similarly, hyperosmotic stress caused a 2-3 fold increase in TNF-alpha in human conjunctival cells, whereas a >10-fold increase in TNF-alpha expression was observed in the human corneal epithelial cells. Our data suggests that hyperosmolar stress causes an increase in the gene expression of proinflammatory cytokines in cultured human corneal and conjunctival epithelial cells. Corneal epithelial cells seem to be more sensitive to the detrimental effect of hyperosmotic stress. The hyperosmolar stress-mediated increase in proinflammatory cytokine milieu may be partly responsible for dry eye associated chronic low-grade inflammation.

Analyzing Restored Nitrogen Fixation Through CowN in G. diazotrophicus

Presenter(s): Chloe Nicole Garcia, Kiersten Chong, Terrence Lee, Max Strul, Ruchita Kharwa, Emily Wong, Kevin Bretzing
Advisor(s): Dr. Cedric Owens

Nitrogen fixation occurs when atmospheric dinitrogen gas is reduced to ammonia. In certain bacteria, such as Gluconacetobacter diazotrophicus, nitrogen fixation is catalyzed by the enzyme nitrogenase, a multisubunit protein composed of an iron protein subunit (FeP) and a molybdenum-iron protein subunit (MoFeP). Nitrogenase is inhibited by carbon monoxide (CO). In certain soil conditions, CO levels are sufficiently high to inhibit nitrogenase activity and prevent nitrogen fixation. However, G. diazotrophicus expresses a protein called CowN that prevents the inhibition of nitrogenase by CO. This current research attempts to understand the mechanism of how CowN prevents inhibition of nitrogenase to restore nitrogen fixation. We have expressed G. diazotrophicus CowN heterologously in E. coli and purified the protein to homogeneity. In vitro studies with FeP, MoFeP, and CowN in the presence of CO showed that CowN effectively restores nitrogenase activity for CO concentrations up to 0.1 atm. The activity of CowN exhibits Michaelis-Menten-like kinetics with a Km of approximately 8 µM. Our experiments further show that CowN, which exists in both a monomeric and oligomeric state, is only active as a monomer. Further studies have partially elucidated how CowN binds to nitrogenase and if the prevention of inhibition is due to CowN directly preventing CO access to the active site of nitrogenase.

Protection of Nitrogen Fixation by CowN in G. diazotrophicus

Presenter(s): Kiersten Chong, Chloe Garcia, Terrence Lee, Max Strul, Ruchita Kharwa, Emily Wong, Kevin Bretzing
Advisor(s): Dr. Cedric Owens

Nitrogen fixation is the process in which atmospheric dinitrogen is reduced to ammonia. Nitrogen fixation occurs naturally in certain bacteria, such as Gluconacetobacter diazotrophicus, via the enzyme nitrogenase, a multisubunit protein with an iron protein subunit (FeP) and a molybdenum-iron protein subunit (MoFeP). Nitrogenase is inhibited by carbon monoxide (CO). In some soil conditions, CO levels are sufficient to inhibit nitrogen fixation. However, nitrogenase inhibition is prevented by CowN, a protein expressed by G. diazotrophicus. This research attempts to understand the mechanism behind CowN-mediated protection of nitrogenase from CO inhibition. We expressed G. diazotrophicus CowN heterologously in E. coli and purified the protein to homogeneity. In vitro, in presence of CowN, nitrogenase is able to tolerate CO concentrations up to 0.1 atm, a concentration that completely inhibits the enzyme in the absence of CowN. The activity of CowN exhibits Michaelis-Menten-like kinetics with a Km of approximately 8 µM. Our experiments further show that CowN, which exists in a monomeric and

oligomeric state, is only active as a monomer. Future work will aim to elucidate if/how CowN binds to nitrogenase and if CowN protects nitrogenase by directly preventing CO access to the active site or if it engenders CO reduction abilities to nitrogenase.

Structural and Biophysical Characterization of CowN from Gluconacetobacter diazotrophicus

Presenter(s): Christine Lo Verde, Alejandro Espinoza, Kevin Bretzing
Advisor(s): Dr. Cedric Owens

The bacterium Gluconacetobacter diazotrophicus expresses the enzyme nitrogenase, which converts atmospheric dinitrogen to ammonia- a critical source of nitrogen for plants. In the presence of the environmental gas-carbon monoxide (CO)-nitrogenase is inhibited. However, CowN, a protein found within many diazotrophs, can prevent CO from exerting its inhibitory effects on nitrogenase. CowN not only protects nitrogenase against CO, but is shown to have elevated expression in cold temperatures, suggesting that CowN may function as a cold response protein. Given the limited research conducted on CowN, its structure and function remain mostly unknown. Therefore, we aim to gain an understanding of the structural and biophysical properties of CowN and determine how CowN shields nitrogenase from CO. Similar to the amyloidogenic protein Aβ, CowN aggregates as a result of changes in temperature, concentration of salt and concentration of protein. Aiming to explore how these various factors change the oligomeric state of CowN, we hypothesize that a) CowN aggregation is caused by protein secondary structural changes that are thermally induced, b) aggregation is driven by increased salt and protein concentration, and c) monomeric and oligomeric states have different activities. To test these hypotheses, CowN was purified following expression within E. coli and then functionally examined using dynamic light scattering, circular dichroism spectroscopy, and Fourier transform infrared spectroscopy. Results indicate that there are two different aggregation mechanisms occurring. At pH 7.5 and above, CowN aggregates when heated. Under these conditions, aggregation and thermal denaturation both occur around 45^{o}C. Aggregation is likely caused by an amyloid-like secondary structure change from α-helices to β-sheets. At pH 7 and below, CowN aggregates at room temperature prior to unfolding. This mechanism is likely driven by electrostatics, as the pH approaches the protein's pI. Together, data suggests that CowN is active within a narrow pH, temperature and concentration window.

Investigating the Interactions Between Individual Calmodulin and HIV-1 Matrix Protein Domains

Presenter(s): Riley Kendall
Advisor(s): Dr. Jerry LaRue

The World Health Organization found that 37.9 million people were living with HIV by the end of 2018. HIV is a virus that weakens the immune system through viral replication and the destruction of CD4+ T-cells, which are white blood cells that detect infection and make antibodies. A cure for HIV has not yet been discovered. HIV-1 contains a Gag polyprotein which regulates the stages of viral replication. Previous studies suggest that the myrisoyl group of a matrix protein peptide found on the Gag polyprotein, MA, forms a complex with a calcium-binding, multifunctional regulatory protein called Calmodulin (CaM). CaM has also been found to be upregulated upon HIV infection. The MA/CaM complex induces extended conformation and causes a decrease in the compact structure of MA, which is predicted to impact the accessibility of interaction sites within MA and lead to rapid HIV viral production. Through hindering the myristoyl group on MA, it is possible that production of HIV can be greatly decreased. Before exploring this possibility, it is first necessary that the site and mechanism of the protein-protein interaction are

identified and understood. For this reason, our lab is investigating the interactions of the independent N-terminal and C-terminal domains of MA and CaM. The MA protein has tryptophan-containing helices on its domains which allows for quantification using fluorescence spectroscopy and anisotropy. By investigating each protein domain and tryptophan signal separately, the location where binding occurs can be isolated and it can be determined if the interaction of one CaM or MA domain is required, or a prerequisite, for the interaction of the other. Identifying how each protein domain is involved enhances current understanding of HIV production and is a significant step in determining a possible solution for inhibiting HIV-1 replication.

Genotype and Phenotype Testing to Predict Azathioprine-Induced Toxicity in Pediatric Inflammatory Bowel Disease (IBD)

Presenter(s): Natalie Paterson
Advisor(s): Dr. John Miklavcic

Inflammatory bowel disease (IBD) is a collective of chronic conditions characterized by a dysregulated immune response to tissue injury that causes inflammation, swelling, ulcers, and intense pain of the intestines. The immunomodulator Azathioprine serves to suppress patient's overactive immune response, decreasing their disease symptoms, and helping improve their quality of life. Of children with IBD, 20% have a polymorphism in the gene that codes for the enzyme thiopurine methyltransferase (TPMT). Polymorphisms that result in low TPMT activity are correlated to decreased efficacy of Azathioprine metabolism which increases drug toxicity and can result in life-threatening myelosuppression (reduction of bone marrow). We hypothesize that genotype and phenotype tests for TPMT can be used to predict patient response to Azathioprine. To explore this, we utilized data from ImproveCareNow (ICN) which is a vast network containing anonymized data from over 40,000 pediatric IBD patients. We found 17% of patients in ICN are currently prescribed Azathioprine, 29.9% of those patients have been genotyped and 66.8% have been phenotyped. Treatment success was measured by remission status. We found that of the patients who failed treatment, 25.8% had never completed genotype testing and 31.5% had never completed phenotype testing. Overall, these findings are informative and suggest a potential benefit of such tests but to draw statistically viable conclusions a clinical study is necessary.

Exploring the Effect of the Diarylpentanoid Curcumin Analog 27 in Androgen Receptor-Positive Breast Cancer Cells

Presenter(s): Avrita Brar
Advisor(s): Dr. Marco Bisoffi

We have previously synthesized diarylpentanoid analogs of the natural product curcumin (diferuloylmethane), one of which, ca27, has been shown to markedly down-regulate the androgen receptor (AR) in prostate cancer (PCa) cells. The AR in PCa is a major driver of uncontrolled cell proliferation and thus, a major target for therapeutic intervention in the clinical management of PCa. Therefore, ca27 has potential to foster the development of novel therapeutic organic molecules. In this work, we have begun to test ca27 in two breast cancer (BCa) cell models. MCF-7 cells express the estrogen receptor (ER), the progesterone receptor (PR), and the epidermal growth factor receptor 2 (EGFR2/Her2), while MDA-MB-231 cells do not express these receptors, which makes them of the triple-negative character. This makes them resistant against several therapies targeted to ER, PR, and EGFR2/Her2, which represents an aggressive BCa phenotype. Both cell models express the AR, which also drives cancer progression, and may be an effective target in triple-negative BCa. The effect of ca27, compared to

curcumin and vehicle control, was tested using the 96-well plate based colorimetric WST assay in which 1,3,5-triphenyltetrazolium formazan is converted by mitochondrial dehydrogenases and reductases as a measure of metabolic activity and cell viability. The cells were treated with 0.1-50 micromolar ca27, curcumin, vehicle control, or nothing for 24 hours Reference absorbances at 660 nanometer were determined to account for differences in cell number between individual wells, and metabolic activity was measured over the period of four hours by determining absorbances at 440 nanometer. Reference-controlled results indicate a dose-responsive effect of ca27 and curcumin and a stronger effect of ca27 compared to curcumin. Future experimentation includes Western blot analyses to determine whether AR expression is differentially affected in the two cell models. Ca27 may be developed into an effective therapeutic modality against triple-negative BCa.

Downregulating the Androgen Receptor in Pancreatic Cancer Cells

Presenter(s): Alex Graden
Advisor(s): Dr. Marco Bisoffi

Pancreatic cancer affects hundreds of thousands of people globally every year, and with a current survival rate of 7%, there is a high demand for new and effective treatments. Pancreatic cancer has been shown to express the androgen receptor (AR), a member of the steroid receptor protein family that mediates cell differentiation, growth, and survival. While in prostate cancer, AR overexpression and hyperactivation is an oncogenic factor, and thus a therapeutic target, the role of the AR in pancreatic cancer remains unknown and inconclusive. The goal of the present project is to determine the role of the AR in the pancreatic cancer cell model COLO 357 with respect to cell viability using the small interference RNA (siRNA) method. Three different plasmids with a pLKO.1 backbone, pLKO.1 empty vector, as well as two vectors coding for two different siRNAs targeting two different segments of the 3' region of the AR mRNA, pLKO.1/462 siRNA and pLKO.1/730 siRNA, were amplified in Escherichia coli by heat shock transformation and liquid culture followed by plasmid isolation using silica-based column chromatography. An additional plasmid coding for an enhanced green fluorescence protein (pEGFP) under the cytomegalo virus (CMV) promoter was also amplified. COLO 357 cells were transfected with the plasmids using the lipofectamine 2000 reagent and were incubated for 72 hours. Fluorescence microscopic analysis of pEGFP transfected cells indicated a transfection efficiency of ~30-50%. RNA was isolated from the cells by silica-based column chromatography and subjected to AR-specific quantitative reverse transcriptase polymerase chain reaction (qRT-PCR) to determine the expression level of the AR. Preliminary data showed AR repression by pLKO.1/730 siRNA and AR induction by pLKO.1/462 siRNA. Future studies include a repetition of these inconclusive results, as well as cell viability and cell death assays to determine the importance of the AR in pancreatic cancer cells.

Exploring the Effect of the Diarylpentanoid ca27 on the Translation of the Androgen Receptor in Prostate Cancer Cells

Presenter(s): Sarah Hester
Advisor(s): Dr. Marco Bisoffi

The androgen receptor (AR) is a steroid receptor that plays a key role in male sexual differentiation. Under normal physiological conditions the AR acts as a ligand-mediated nuclear transcription factor that binds with androgens and is able to interact with DNA to induce the transcription of genes that can lead to proliferation or apoptosis. In prostate cancer, the AR is often over-expressed in order to increase the proliferation and survival of cancer cells. ca27, an analog of the natural product curcumin, has been shown

to down-regulate AR expression in prostate cancer cells. While it has potential as a novel prostate cancer therapeutic, the exact mechanism of action of ca27 is still unknown. In this experiment we treated human LNCaP prostate cancer cells with ca27 as well as additional inhibitors of transcription, translation, and protein degradation. This allowed us to monitor the downregulation of the AR in LNCaP cells as well give an indication of at which point in protein production ca27 works to decrease AR expression (transcription, translation, or protein degradation). In conducting a Western Blot, we found the greatest downregulation of AR expression to be in cells treated with a combination of cycloheximide (a translational inhibitor) and ca27. In addition, qRT-PCR supported these findings by revealing low levels of AR mRNA in cells treated with both cycloheximide and ca27. Knowledge of the mechanism of action of ca27 will help develop further analogs of ca27 with increased AR-downregulatory capacity.

Hybridization and Gene Flow Patterns in a Novel Contact Zone Between Two Species of Native California Sunflowers

Presenter(s): Olivia Durant
Advisor(s): Dr. Jennifer Funk, Shana Welles

When closely related species have overlapping ranges hybridization may occur, and successful survival and reproduction of the resulting hybrid propagules can result in the creation of a hybrid lineage or introgression. Encelia californica and Encelia farinosa are two species of sunflowers native to southern California. E. californica's range is restricted to coastal regions of Southern California and Baja Mexico while E. farinosa occurs in more arid regions including the Southwest United States and Northern Mexico. Recent conservation efforts have led to individuals of E. farinosa being planted west of its natural range such that they co-occur with populations of E. californica, resulting in a novel contact zone. Individuals with morphological traits from both species (putative hybrids) have been observed within this contact zone. Previous studies have shown that Encelia hybrids are likely to be restricted to first-generation except for in areas of human disturbance, where the formation of hybrid lineages and backcrossing with parental species is thought to occur more frequently. In this study, we used a reduced-representation next generation sequencing approach to determine whether hybridization has occurred between E. californica and E. farinosa in this novel contact zone and whether there is evidence of gene flow between species. To address these questions, leaves of E. californica, E. farinosa, and of presumptive hybrids based on morphological traits were collected from five different locations in southern California. DNA was extracted from each sample using a modified CTAB protocol, quantified, and prepared for sequencing using restriction digests (PST1 and MSE) and sequenced on IIllumina's Hi-Seq platform. Following sequencing data was aligned and filtered. Genetic data confirms the presence of hybrids and suggests that gene flow has occurred between E. farinosa and E. californica. This demonstrates that in conservation efforts it is important to consider the potential for hybridization before moving species to areas that are outside of their current range.

Biological Sciences

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 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 studying an Atlantic hagfish in a tank partially filled with sand and artificial sea water (ASW), filming with a mounted camera. Videos were used for kinematic analysis of tailbeat frequency and behavioral patterns. It was found that Atlantic hagfish sand burrowing occurs in two sequential phases: the first phase began with the hagfish entering the substrate head-first, followed by lateral tail beating that decreased in frequency along with 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 myxinids.

Intra and Interspecific Skein Scaling in Hagfish

Presenter(s): Skylar Petrichko, Kristen Nieders
Advisor(s): Dr. Douglas Fudge, Yu Zeng

Hagfishes are bottom-dwelling creatures that are known for their defensive slime. Slime is composed of thread cells that coil into an organized structure, or “skein”, and reside within specialized cells known as gland thread cells. In most organisms, cell size is independent of body size. This means that the cell size of an organism remains fixed as body size and body proportions change. However, skeins function outside of the hagfish, which raises the question of whether the evolutionary and biophysical constraints that keep cell size constant also apply to thread skeins. One study found that the average skein is smaller in glands that were in the process of refilling than in full glands. Here, we analyzed skein size over a range of body sizes in nine different hagfish species to understand whether larger hagfishes possess larger thread skeins. Specifically, we recorded the length, mass, and girth of individual hagfish. We also collected slime exudate from full glands on the right side, posterior to the gill and measured the skein length and width. Our preliminary results suggest that skein size is conserved within and across a species, i.e. it is independent of body size. However, the variation of skein size relative to other cells across species hint that these evolutionary and biophysical constraints may be more relaxed.

How Does Hagfish Slime Clog so Efficiently?

Presenter(s): Luke Taylor
Advisor(s): Dr. Douglas Fudge, Gaurav Jain

Hagfish slime consists primarily of mucus vesicles and protein-based threads, which come packaged in coiled structures known as skeins. Much is understood about the structure and function of the thread skeins, but little is known about the nature of the mucus component. The purpose of this research is to better understand the structure of hagfish mucus and the mechanism behind its capacity to retain remarkable quantities of water. Hagfish slime has also been shown to act as a defense mechanism by clogging the gills of gill-breathing predators and hindering the flow of water. Our current field of research focuses on the entrapment of water molecules between mucin threads within the hagfish mucus. Mucins are large glycoproteins that potentially trap water molecules through hydrophobic interactions and disulfide bonding. A previous study has shown that mixing is necessary for expansion of the whole slime, but also leads to its collapse. It is unclear whether the results from this study are caused by the mucus component, skein component, or both. To better understand the contribution of mucus, we conducted mixing trials that modeled the previous study using pure mucus only. We used quantitative drain rate measurements and varied mucus mixing times to better understand the role mucus plays in the expansion and collapse of the whole slime.

Scaling of Skeins in Hagfish

Presenter(s): Kristen Nieders, Skylar Petrichko
Advisor(s): Dr. Douglas Fudge, Yu Zeng

Hagfish are benthic scavengers that produce slime as a defense mechanism against predators by clogging their gills. The unique properties of this slime are mainly attributed to the silk-like threads produced by cells in the slime gland. These threads are coiled and stored in ellipsoid shaped “skeins” that reside in gland thread cells. Since the function of a skein is to be ejected from the hagfish, it has been hypothesized that size of skeins is not conserved across organisms as evolutionary and biophysical constraints may not apply to cells ejected from the body. Preliminary investigations have revealed skein size may still be conserved within hagfish however, there is still much variation in skein size. Additional studies have found that the average skein is smaller in glands that are in the process of refilling with less mature skeins than in full glands with mature skeins. To better understand this evident variation of skein sizes in hagfish we investigated how thread diameter varies with skein size by measuring the thread diameter and skein length. Initial findings have shown that as skein size increased, the thread diameter increased as well in a positive linear fashion.

Apple Transcriptome Responses to Irradiation Treatment and Cold Storage

Presenter(s): Makayla Gallimore, Francisco Ernesto Loayza Davila, Matthew Garcia
Advisor(s): Dr. Hagop S. Atamian, Dr. Anuradha Prakash

Harvested apples often get stored under cold refrigeration for months before they are released into the market. During this prolonged storage, apples are vulnerable to physiological disorders as well as fungal fruit decay and various pests. Irradiation is commonly used for phytosanitary purposes before storage to kill some of the most destructive apple pests such as Oriental fruit moth, codling moth, fruit flies, and light brown apple moth. According to the recent findings from Prakash lab, irradiation was shown to be very effective in mitigating the superficial scald incidence in stored “Granny Smith” apples. Superficial scald is a very common physiological disorder in stored apples characterized by skin browning, which can lead to

product waste due to decrease in shelf-life and consumers' unwillingness to purchase defective apples. The objective of this project is to investigate the overall apple transcriptome changes due to irradiation and possibly explain the molecular mechanisms underlying the irradiation-mediated protection of apples against superficial scald. Apple peels were collected from irradiated and control apples on day zero and after 90 days of refrigeration. Total RNA was extracted from three biological replicates per treatment and RNA-Seq libraries were constructed. The libraries were pooled together and subjected to 150 bp single-end sequencing on Illumina HiSeq4000 machine. A total of 582 million high quality reads were mapped to the apple genome and differential gene expression analysis was conducted. Compared to 90 day stored control apples, the irradiated and 90 day stored apples showed 1,182 differentially expressed genes. Our results will provide the first step towards understanding the molecular responses in apples to irradiation treatment.

Identification of Genes Involved in Chia PAMP-Triggered Immune Responses

Presenter(s): Cailyn Sakurai
Advisor(s): Dr. Hagop S. Atamian

Salvia hispanica (commonly known as chia) is a re-emerging crop that belongs to the mint family (Lamiaceae). Chia is gaining popularity worldwide as a healthy food supplement. Chia seed contains 34.4% total dietary fiber, 31% total lipids, 16% protein, 5.8% moisture, and high amounts (335–860 mg/100 g) of calcium, phosphorus, potassium, and magnesium. Chia is gaining popularity both nationally and internationally. The US import of chia seeds increased 7.5 times since 2011. With an estimated annual import of 15,000 tons, USA is the largest market for chia. With the expected increase in chia seed demand, the crop will be planted worldwide and consequently will be exposed to diseases and insect pests that cause economic losses in agricultural crops. However, being a re-emerging crop, nothing is known about chia immune responses to plant pathogens. Plant immune system is divided into main branches. The first line of immune responses is triggered by plant cell receptors that recognize pathogen associated molecular patterns (PAMPs), signatures that are widely conserved among certain pathogen clades such as bacterial flagellin. This is known as PAMP-triggered immunity. The second plant immune response is stronger and more specific and is triggered upon recognition of pathogen effectors by specialized plant receptors called resistance (R) genes. The objective of this project is to identify the genes involved PAMP-triggered immune responses in chia. Chia seeds were germinated on nutrient media for two weeks. The seedlings were floated on water overnight and subjected to bacterial flagellin for one hour. As control, similar number of seedlings were subjected to distilled water. RNA was extracted and sequenced using the Illumina high throughput sequencing platform. We expect to find an increase in the expression of hundreds of genes that play important roles in the chia PAMP-triggered immunity. Our study will identify the repertoire of chia genes involved in the first line of defense against pathogen infection.

Chemistry

Hot Electron Chemistry on Bimetallic Plasmonic Nanoparticles

Presenter(s): Bryn Merrill
Advisor(s): Dr. Jerry LaRue

Catalysis provides pathways for efficient and selective chemical reactions through the lowering of energy barriers for desired products. Gold nanoparticles (AuNP) show excellent promise as plasmonic catalysts. Plasmon resonances are oscillations of the nanoparticle electrons that generate energetically intense

electric fields and rapidly decay into energetically excited electrons. The excited electrons have the potential to destabilize strongly bound oxygen atoms through occupation of accessible anti-bonding orbitals. Tuning the anti-bonding orbitals to make them accessible for occupancy will be achieved by coating the AuNP in a thin layer of another transition metal, such as ruthenium, silver, or platinum, creating a bimetallic nanoparticle. We will initially study the carbon monoxide (CO) oxidation reaction, where the oxygen species is strongly bound and limits reactivity, in the presence of ruthenium-gold bimetallic nanoparticles (Ru-AuNPs). The bond between oxygen and ruthenium is typically strong, which inhibits reaction rates. Excited electrons from the AuNPs can transfer to the oxygen-ruthenium anti-bonding orbital. Electrons occupy the anti-bonding orbital, weakening the bond between the atomic oxygen and the Ru-AuNPs and making the atomic oxygen much more reactive. We will be studying the physical and chemical characteristics of the synthesized Ru-AuNP catalysts with spectroscopic and microscopic techniques including: UV Vis spectroscopy, scanning electron microscopy (SEM), and transmission electron microscopy (TEM).

Designing and Building a Surface Science Ultra-High Vacuum (UHV) Chamber

Presenter(s): Tiffany G. Vallejo, Kevin Alvarado, Devon Ball, Barbara Carpenter, Jason Yoon
Advisor(s): Dr. Jerry LaRue

Catalysts increase the efficiency and selectivity of a wide range of chemical reactions by lowering the activation energy barriers for desired reaction pathways. This results in decreased energy usage and wasteful byproducts, helping to reduce pollution. Reactions on metal catalysts can involve various reactions at the same time, making them difficult to study. To study the fundamental processes of individual reactions, we need to isolate them using an ultra-high vacuum (UHV) chamber. Ultra-high vacuum chambers are capable of generating atomically clean environments, limiting potential surface contaminations. Standard UHV components include an ion gun, quadrupole mass spectrometer, ion gauge, and turbomolecular pumps. Overall, the UHV chamber configuration provides an ideal high vacuum environment to generate the proper conditions to study the reaction steps in the molecular interactions on the metal surface. Therefore, we will design and build a surface science UHV chamber to provide the ideal conditions needed to investigate the surface reactions at the gas-surface interface in heterogeneous catalysis. When completed, this UHV chamber will offer an opportunity to study methanol decomposition on platinum, an industrially important heterogeneous reaction.

Large-Area Thermoregulatory Material Inspired by Cephalopods

Presenter(s): Christopher Moore
Advisor(s): Dr. Matthew Gartner

Inexpensive, large-area thermal management is desirable for the operation of many modern technologies including smart clothing, electronic circuits, building cladding, and outdoor equipment to control heat flow. Inspired by the space blanket and the dynamic skin of cephalopods, we have demonstrated a large-area, highly uniform, low-cost nanostructured material with tunable thermoregulatory and infrared properties. We have implemented scalable nanofabrication processes to achieve a material with an area greater than 500 square cm, modulating a 40% change in infrared transmittance and reflectance, and a dynamic environmental setpoint temperature window of approximately 8 degrees Celsius. Due to characteristics of scalability and associated figures of merit, our material affords new scientific and technological opportunities not only for adaptive optics and thermoregulation but also for any platform that would benefit from dynamic tunability of infrared radiation and thermal energy.

Incorporating Docking Scores and Selectivity Measures of Tyrosine Kinases to Develop Novel Tyrosine Kinase Inhibitors via Machine Learning

Presenter(s): Robby Jones
Advisor(s): Dr. O. Maduka Ogba

Understanding TKs (tyrosine kinases) are of paramount importance in the oncogenic world of chemistry and biology. Specific mutations of TKs results in their primary function, catalyzing ATP transfers from one molecule to another, to become unregulatable and cancerous. These kinases account for a wide variety of cancers throughout the body, and they have been the targets of many cancer treatments via TKIs (tyrosine kinase inhibitors). While many tyrosine kinases have effective inhibitors, there are over 90 TKs in the human body, and there are many that have no marketable TKIs. Furthermore, TKI generation has notoriously taken decades in physical labs. With the ever-accelerating development of computational power, machine learning can generate new molecules, including TKIs. Chemical discoveries via machine learning has invented new drugs already, including a novel TKI for DDR1 kinase in 46 days. Even more promising is that this process can find other TKIs without many radical changes. Due to the scope of the project, the goal of this research is to incorporate docking scores and selectivity measures to aid the machine learning process. The software Glide will be used to obtain this information. Preliminary analyses have demonstrated Glide's ability to generate a pharmacophore hypothesis for TKIs. Using real-world TKIs, the machine can determine their bioactive aspects from the pharmacophore hypothesis, docking scores, and selectivity measures. This information will be used to generate novel molecules, all of which have the bioactive elements of the real world TKIs. The resulting computationally determined TKIs may yield a real-world applicant that could enter the market as an effective TKI.

Communication Sciences and Disorders

The Influence of Mouthing on Consonant Production in Cochlear Implant Recipients and Hearing Infants

Presenter(s): Minh-Chau Vu
Advisor(s): Dr. Mary Fagan

Consonants are speech sounds (i.e., phonemes) created by the complete or partial closure of the vocal tract. Consonant phonemes can be divided by manner or type of closure (stop, fricative, affricate, nasal, liquid, and glide), place of articulation (bilabial, labiodental, dental, alveolar, palatal, velar, and glottal), and voicing (voiced and voiceless). Previous studies have shown that hearing infants explore vocalizations during mouthing. Mouthing introduced changes in their oral closure and articulatory postures that influenced variation in consonant production and expansion of consonant inventories. The purpose of this study was to investigate the influence of mouthing on consonant production in infants with profound hearing loss and their age-matched hearing peers. There were four participant groups: infants with profound hearing loss before cochlear implantation; infants with hearing loss who used cochlear implants; and two hearing groups, matched by age to the infants with hearing loss. Participants were videotaped playing with objects for approximately 15 minutes. Their spontaneous speech sounds were then recorded and analyzed. The types of consonants produced are currently being analyzed. We expect to see an increased variation in consonant inventories associated with mouthing in infants with cochlear implants compared to infants with profound hearing loss before cochlear implantation. This increase would suggest that mouthing also aids in consonant development in infants with profound hearing loss after their surgery. With this investigation, we hope to understand the correlation between mouthing and consonant production in cochlear implant recipients and how this correlation compares to that of the hearing infants.

Communication Studies

Music in Advertisement
Presenter(s): Kayla Slack, Brooklyn O'Neill
Advisor(s): Dr. Riva Tukachinsky
Should advertisers be concerned about the type of music they use behind their visuals in advertisements? How does music that elicits emotion in advertisements affect a consumer's purchase intention? This study observes how music that is considered happy and sad affects an individual's perception of an ad and their purchasing behaviors. Participants will view the same video with predetermined happy vs. sad stimuli as determined by researchers. Participants will be exposed to the stimuli using either Beethoven's Symphony No. 9 Presto IV playing in the background or Frédéric Chopin's Prelude in E-Minor. The viewers then give us some insight into their emotions, attitudes toward the product, brand of the product, and intentions to buy the product. Then we will analyze the viewer's answers compared to the music used in the video they observed. We expect viewers that view the happy video will be more likely to see the brand and product as something they would purchase, whereas the viewers who view the sad video will have more negative feelings towards the brand and product.

Computer Science

Game Center
Presenter(s): Jonathan Bahm, Brandon Fabre, Raha Pirzadeh
Advisor(s): Dr. Michael Fahy
As early as 1973, multiplayer gaming was developed and has been played by many starting from a young age. Since then, the gaming industry has evolved significantly; however, we wanted to go back to basics and create a simple game center implementing features commonly used today. In our application, Game Center, two players interacting on different computers will be able to pick from a series of games: Tic Tac Toe, Hangman, and Rock, Paper, Scissors. We will achieve this by using multi-client to server interaction over the TCP protocol and implement the games using multithreaded persistent socket connections to the game server. The game server program handles the logic, and players can use simple commands to pick the game they want to play and chat with the other player. We intend for these commands to be either one or two-character responses. For example, when playing Rock, Paper, Scissors, the players would either send an ‘r’, ‘p’, or ‘s’ to select their next move. The server then takes that input from the users and returns the winner. When the users finish with a game, they have the option to play again, go back to the main menu to pick another game, or exit the Game Center.

ChapSafe - Bringing Safety to the Hands of Students
Presenter(s): Noah Estrada-Rand, Naoki Kita, Jack Savage
Advisor(s): Dr. LouAnne Boyd
While Chapman University offers warnings regarding security incidents on campus, many of the warnings and incident emails are too far removed in time to be adequate indications of security breaches. To address this issue, we have begun developing the application ChapSafe, a Chapman student exclusively crowdsourced warning and incident report system. The app will prompt students for their ID number and incident type before alerting security and campus Public Safety as well as all students who have this application installed on their mobile devices. Students will make incident reports as they witness them,

providing details on each occurrence. By making students more readily aware of on-campus safety incidents, the student population will become safer as well as more inclusive by looking out for one another. By restricting app usage to students and holding them accountable by tying their id number to their profile, we aim to hold individuals accountable while providing more instantaneous and timely feedback. Our prototypes aim to research different user interface designs to optimize this functionality and await our user test results to evaluate how to better create a diversity-focused and inclusive design to help boost safety on campus.

My.Chapman.Edu the App: Using User Feedback to Increase Site Navigation and Design Accessibility

Presenter(s): Amanda Hirahara, Debbie Lu, Jennifer Nguyen
Advisor(s): Dr. LouAnne Boyd

Chapman's website for university-related tasks, mychapman.edu, is structured with small text and a confusing layout, making it difficult to navigate and find information. There is currently no alternative option for this site, so its convenience is of utmost importance. Through user testing in a diverse pool of college students, we have come to the conclusion that simplifying the site would greatly improve its usability. This would be achieved by minimizing the number of branching options for each page, promoting easier accessibility and navigation for basic administrative tasks that students use regularly, e.g. class registration and payment plans. Specifically, users should be able to move from page to page with a single command. To accomplish this, we will display the necessary information in a succinct manner to minimize the overload of information currently displayed on the site, and every page and link will be clearly labeled. In addition, allowing users to have the ability to use voice control helps increase the usability of the app. We expect the app to provide a simple interface for students where they can securely complete the required transactions with ease.

Insta Info

Presenter(s): James Romero
Advisor(s): Dr. Michael Fahy

Instagram has become part of everyday society for most Americans and people around the world. It has grown to as many as a billion monthly users. Instagram is known for making hashtags popular from one's food, to the style of their clothes. Surprisingly, Instagram was not the first online application to use hashtags in this formality. People begin using hashtags online as far back as 1988 on a platform called IRC(Internet Relay Chat). Although Instagram wasn't the pioneer of hashtags, they've in a sense rejuvenated its purpose. These hashtags have also been a pillar to society in having communities come together. One example is #covid19 and #socialdistancing. These hashtags have helped bring awareness to the noble virus which has infected and taken many lives . The hashtag was also a tool to bring remembrance to great people we lost such as the tragic death of Kobe Bryant and many other influential people. Our team will collect data on certain feeds with particular hashtags and categorize them from most popular to least popular. We will design an application utilizing the Instagram API in order to collect the required data to complete our research. The data in which we collect can bring about the highlights in our communities. The world is ever changing and instagram is the source which tends to project people's subconscious. These mental connections become one's hashtags which connect people to similar mental states. Measuring this data can also be important to the way people market their products using social media advertisement. On influencermarketinghub.com, their research team found that 88% of

brand posts include at least one hashtag and posts with at least one hashtag average 12.6% more engagement than those without. We hope that our findings increase the level of understanding on how people engage with the instagram platform in terms of posts as well as hashtags.

Data Analytics

Coronavirus Sentiment Analysis
Presenter(s): David Aaron, Eric Wasserman, Aleksei Furlong, John Flees
Advisor(s): Dr. Michael Fahy
The main objective of our project is to develop a method of determining what course of action the public or the government should take in order to quell the effects and spread of the COVID-19 virus, and conceivably any future pandemic. Through the use of Twitter's available API's, we can perform sentiment analysis on the public opinion of specific current events; particularly, we are concerned with how sentiment changes as a result of new governmental actions, policies, or other measures. Using the program we make as means of analysis, we aim to evaluate how the public's sentiment changes as they are updated on the spread of the virus. We hypothesize that there exists a quantifiable relationship between public sentiment and the containment status of the virus. To conduct the research, we'll be using the programming language, Python, along with the various libraries at our disposal for grabbing sentiment and creating visualizations and depictions of our data.

English

Divinities of Death
Presenter(s): Gloria Baek
Advisor(s): Dr. Eileen Jankowski
Records show that humans past and present try to find the causes of and explanations for the objects and events surrounding them. Before the advent of science they created mythological stories about gods and goddesses, monsters and heroes, to explain life. For example, Egyptian and Greek mythology showed a great interest in death, and as a result, proposed two gods to represent this universal phenomenon: Hades and Osiris. Both Greek and Egyptian culture created such figures to practice justice, yet the difference is in their representatives: while Hades was the fearsome figure, Osiris was worshiped in multiple religions- Atenism, Hermeticism, Thelema, and Kemeticism. The difference in the impact of two was caused by the rivers they were associated with. The River Styx remains as the figurative region for Greek mythology, but the Nile River had both a figurative and realistic impact on Egyptian life in that region. Hades and Osiris as the gods of death represented each culture's views of death and the afterlife, tied in many ways to their respective rivers. The differences between a feared god like Hades and a widely revered god like Osiris reveals important aspects of each culture, evident in their mythological stories.

Shifts in Slaughter
Presenter(s): Anthony Robinson
Advisor(s): Sam Risak
The purpose of my short story is to show how shifts in perspective can determine how an audience's empathy shifts away from what it normally tends toward. My story is designed to follow the story of an animal that is taken to a slaughterhouse, but is told in vague enough detail where the audience does not

recognize this until the very end. I intend for the audience to feel surprise as well as disgust as the antagonist is revealed to be humans rather than the typical monster. The aim of this is to show how we can lack reflection on what others experience, especially those that aren't human. This will function because, as explained by David Miall and Don Kuiken in New Perspectives on Narrative Perspective, the audience will usually form feelings based on their interpretation of perspective and how it shifts. This will contain details that are very commonplace in a job like one working in a slaughterhouse and while the majority of jobs do not consist of killing animals, there are plenty of things we do that might impact others in a way we do not fully understand. In addition, my story will be written short, to the point, and will attempt to convey my aim through as little writing as needed. There is also an element of how animals are treated within this story, and this will be touched upon, as well as the issues that can arise within slaughterhouses. As a subsidiary idea of what my main idea is, I will intertwine this idea as it is so closely related to the subject matter that is the main focus.

Haunted Doll Short Story
Presenter(s): Ava Garrett
Advisor(s): Sam Risak
The purpose of this project is to show how a normal object like a doll can be turned into something scary in the genre of horror. A doll itself is not scary at all and girls have collected them for generations. There has always however been a stigma with dolls that implies something creepy about them. Older dolls were made with real human hair and at one point people even believed that human spirits were tied to the hairs on the dolls and caused them to be haunted. I plan to write a short story about a young girl who receives an old antique doll with real human hair. When the girl finds out that it is real human hair she gets scared and thinks the doll is haunted. The doll terrorizes her by only moving when it's just the two of them around and making her feel crazy. This will symbolize that how just the fear of knowing something could be haunted tricks our minds into believing that it is. This short story should appeal to the younger audiences. It is the kind of horror that can teach young children a lesson about not believing everything just because someone says it is true.

Environmental Science and Policy

Investigating the Impact of Simulated Rain Exposure and Aging on Arsenic Bioaccessibility in Mine Waste
Presenter(s): Michaela Montgomery
Advisor(s): Dr. Christopher Kim
There is an abundance of abandoned precious metal mines throughout California that pose a potential environmental and health risk to the surrounding areas, especially when the mines are located near residential, urban neighborhoods. The residents who live near the Red Hill Mercury Mine in Tustin, CA, have an increased risk of exposure to mine waste that is enriched in residual trace metal(loid)s. Since arsenic (As) is a common elevated residual trace metalloid in mine waste, the As bioaccessibility of the mine waste samples collected from the Red Hill Mine was studied to determine the initial risk of exposure using the ingestible size fraction (< 250 micron). The purpose of the study was to investigate the direct influences of rain exposure, temperature, and humidity on the As bioaccessibility of the samples through time. Rain exposure (rinsing) led to a relative decrease in As bioaccessibility (ranging from 13-39% reduction). Following rinsing, the influence of temperature and humidity through time was investigated

by exposing the samples to accelerated (12x) wetting/drying conditions in an environmental chamber that simulated actual temperature and humidity conditions (16.1-27.8°C, 36-95%) from October 2017 near the Red Hill Mine. Through bi-monthly simulated gastric fluid extractions, the As bioaccessibility was evaluated over a simulated year period. There was a significant decrease in As bioaccessibility around three “months” and then a gradual increase in As bioaccessibility up to one “year”. Due to this initial decrease in As bioaccessibility, it is recommended to more closely investigate the changes in As bioaccessibility from zero to six “months” at the 12x accelerated temperature and humidity cycle. Additional planned experiments include running 12x, 8x, and 4x accelerated temperature and humidity cycles to examine the effect of acceleration rate of the cycle on the As bioaccessibility and determine the accuracy of the simulated aging.

FFC

The Morrígan: Phantom Queen of Celtic Mythology

Presenter(s): Jacqueline Garcia
Advisor(s): Dr. Eileen Jankowski

High above the glorious battle, a treachery of ravens await. As silent as the depth of night, they circle the battlefield, anticipating the moment to swoop down and carry away the dead. This was the Morrígan. Commonly known as the "Phantom Queen", the Morrígan was a feared Celtic deity and the goddess of both death and war. As one of Ireland's most powerful goddesses, she appears as both a single being and a triple goddess, forming a trio of sisters who protect both destiny and prophecy. Legend states that she was named as the sisters Badb, Macha, and Neiman, but is also associated with the land goddesses, Ériu, Banba, and Fódla. As the goddess of fate, the Morrígan is also one of the most mysterious figures of Celtic mythology and a formidable shapeshifter. She took many forms and would often appear in different forms in one story. Her most common included a warrior queen and a raven, the latter associated with her due to the bird's constant presence on a battlefield. In the popular mythology of the Greeks, both Thanatos and Athena share attributes with the Morrígan, yet are different all the same. As the Greek and Roman god of death, Thanatos appeared to humans, along with his twin brother Hypnos, to carry them off to the underworld when their time on earth had ended. And as the goddess of war and wisdom, Athena was a respected deity who turned violent when necessary but remained gracious and kind unlike the savage Ares. In comparison to these figures, the Morrígan is not only the embodiment of what both of these deities represent, but also encompasses the ideas of fate and prophecy among the concepts of war and death.

Star Wars: Mythology Squared

Presenter(s): Erick Garcia
Advisor(s): Dr. Eileen Jankowski

Today mythology has the connotation of what ancient civilizations utilized to explain how the world came to be. Often brought up in academia, most do not pause to see if mythology plays a significant role in our life. A remarkable amount of our present pop culture has mythological roots overlooked through the naked eye. I am exploring how Star Wars contains many similarities from multiple mythologies and religions. After reviewing various articles and journals, Star Wars has become one of the leading mediums of storytelling incorporating past mythological tales, spirituality, and philosophies. The characters and the journeys they must partake in are parallels of mythologies that have been retold for eons. The franchise

imports influence from a variety of cultures; it captures a range of Ancient Greek mythology to the Arthurian legends. It also incorporates an infusion of eastern philosophies, tarot card meanings, and invocations of the Western genre. The franchise has done more than contribute to the science fiction film genre; it has encapsulated and enhanced the everlasting legacy of mythology. Star Wars has been able to bring together different perspectives of storytelling into a melting pot, with the final product becoming today's modern mythology.

Leprechauns: Evolution and Cultural Importance

Presenter(s): Jack Kellems
Advisor(s): Dr. Eileen Jankowski

Although leprechauns serve as the instantly recognizable mascot for Ireland, they also played a significant role in the assimilation of Irish immigrants into the United States. The leprechaun became relevant through Irish folklore, and their stories were brought to the U.S. with Irish immigrants. The creatures are known for being shoemakers who carry pots of gold with them. They're also known for being exceptionally tricky and can be malicious if one doesn't keep their eyes on them. It is lesser known that there are multiple kinds of leprechauns that differ slightly based on where in Ireland they are found. Immigrants have historically faced hardships when assimilating in the U.S., but the imagery surrounding the leprechaun helped nineteenth century society accept the Irish. While the trickster versions do not appear in ancient Irish mythology, the inspiration for their characteristics are a culmination of multiple Irish mythological creatures. Today leprechauns are most evident as a symbol for St. Patrick's Day and have been depicted in many movies and commercials. Modern society has changed some of the features originally associated with the leprechaun some of which align with Irish assimilation, such as changing their outfits from red to green. My research hopes to explore the cultural significance of the leprechaun to Irish society previously and today, as well as the ancient origins of these mythological creature.

Lugh and Apollo: Twins of the Sun

Presenter(s): Neal Gillespie
Advisor(s): Dr. Eileen Jankowski

The god Lugh is perhaps the most prominent deity in the Celtic Pantheon. Lugh is a solar god who is known for his mastery of many skills ranging from warfare to poetry. As a sun god, Lugh bears a strong resemblance to the Greco-Roman god, Apollo. Apollo is also a solar deity who possesses a diverse range of skills. The arrival of the Romans in the British Isles during the first century brought about cultural mixing; the Romans often attempted to conflate Celtic gods with their own deities. The resemblances between Apollo and Lugh made for a natural conflation. Both of these figures are young and radiant and are associated with the arts. Lugh was known for his mastery of the harp and poetry. Apollo is often credited with the creation of the arts and the lyre has been used to symbolize his musical pursuits. Both Lugh and Apollo are gods of distance. Militarily, for example, both use ranged weapons. Lugh uses a magical spear which earned him the name "Lugh of the long arm." Similarly, Apollo uses a golden bow. Lugh and Apollo have traditionally been outsiders when compared to their peers and this accentuates their distanced position. Another commonality is their association with ravens. Lugh used ravens to heal his son Cú Chulainn and Apollo used a raven to expose the infidelity of Coronis, the mother of his son, Asclepius, symbolizing his intensity and anger. Finally, both Cú Chulainn and Asclepius act as doubles of their fathers, possessing skills in healing and war but in a much stronger capacity. Despite being vastly different, it is clear that both civilizations felt the need for a young and powerful artistic god who possessed skills in many different sectors.

Food Science

Clinical IBD Research Using Dietary Gangliosides found in Buttermilk Powder

Presenter(s): Alyssa Levien, Emily Hickey
Advisor(s): Dr. John Mikalvcic

Intro: The debilitating symptoms of inflammatory bowel disease greatly impact the quality of life of those affected. Previous studies have shown that isolated dietary gangliosides from buttermilk powder can help improve these symptoms and are safe for consumption. The objective of this study is to determine if dietary gangliosides found in buttermilk powder can improve the disease activity and quality of life of pediatric-aged children moderately affected by the disease. Method: This clinical research trial will recruit 48 participants from the CHOC. Once informed consent is obtained, participants will be enrolled in a 10 week trial period. The inclusion criteria for the study include: being 8-18 years old, having mild/moderate ulcerative colitis or Crohn's Diseases, and are a patient at CHOC. Exclusion criteria include: severe disease activity index, below or above 8-18 years old, or pregnant. During the 10 week period, half of the participants (the treatment group) will consume 5 grams of buttermilk powder per day. The placebo group will consume anhydrous milk fat. Blood tests, calprotectin tests, stool and urine samples, as well as quality of life surveys will be given out and completed at the beginning and end of study. Throughout the trial, adverse event questionnaires will be filled out each week to moderate the overall effectiveness of the treatment. All of these tests and questionnaires assess disease activity, intestinal permeability, calprotectin levels, and quality of life. Results: It is expected that the treatment group will have improved quality of life, decreased symptoms, and improved intestinal integrity over the 10 week period when compared to the placebo group. Additionally, it is anticipated to see a decrease in inflammation and calprotectin levels in the treatment group. Significance: After completion of this study, the findings may support increased use of dietary gangliosides as a treatment to reduce symptoms and intestinal inflammation. Successful completion of this study can lead to more clinical trials and evidence.

Use of Saccharomyces Cerevisiae to Induce Inflammation in Caco-2 BBE Intestinal Epithelial Cells

Presenter(s): Jordan Skolnick
Advisor(s): Dr. John Miklavcic

Inflammatory bowel disease (IBD) is a chronic condition that afflicts millions of people worldwide and burdens those affected physically, emotionally and financially. There is a significant need for better treatments for this disease due to the lack of efficacy or response to current therapeutic measures. The barrier to investigating novel treatments exists because there is no specific experimental model for IBD. This experiment aims to create a cellular model of IBD that could be utilized to test potential biologic treatments before human clinical trials. CaCo-2 BBE intestinal epithelial cells were incubated with the yeast Saccharomyces Cerevisiae (SC). Lysates of baker's yeast (Fleishmann's Active Dry Yeast), brewer's yeast (SafeAle US-05, Fermentis), and a lab strain of SC (obtained from Dr. Nancy Da Silva lab at UC Irvine) were added to CaCo-2 BBE cell culture growth media (1% or 10% v/v). CaCo-2 BBE were grown without inflammatory stimulus (negative control) or with dextran sodium sulfate (positive control; 4% w/v). Cell culture supernatants were collected after 8 or 24 hours and assessed for the concentration of inflammatory cytokines TNFα and IL-1β using ELISA kits (RayBiotech) and read using a spectrophotometer at 450 nm. After 8 hours incubation with baker's yeast there was a dose-dependent increase in TNFα production when incubated in the absence (β= 83.75, p<0.05) and presence (beta = 144.4; p=0.086) of

inflammatory stimulus. After 8 hours incubation with brewer's yeast there was a dose-dependent increase in TNFα production when incubated in the absence (β=90) and presence (β=177) of inflammatory stimulus; though the p-value for the regression analysis was not statistically significant. IL-1beta was not detected above background levels in any experiments. Future study should refine the types and concentrations of SC yeast and incubation time used to create this model; and validate the model by assessing more outcomes specific to IBD.

Health Sciences and Kinesiology

The Effects of Zoledronate and Sleep Deprivation on the Distal Femur Trabecular Thickness of Ovariectomized Rats: Application of Different Statistical Methods

Presenter(s): Erin Nolte
Advisor(s): Dr. Frank Frisch, Dr. Oliver Lopez

Osteoporosis is a disease that causes the degradation of bone, leading to an increased risk of fracture. 1 in 3 women over the age of 50 will be affected by Osteoporosis. This study aims to understand how bone is affected by sleep deprivation in estrogen-deficient rats, and how Zoledronate might negate the inimical effects of sleep deprivation on bone. As bone mineral density (BMD) is a crude evaluation of the architectural changes seen in Osteoporosis, trabecular thickness may serve as a better single evaluation of bone health. 31 Wistar female rats were ovariectomized and separated into 4 random groups. The control group(C, n=4) were housed in standard conditions, which permitted a 12 hour light/dark cycle and given a one-time injection of 0.45 mL of 0.9% saline. The Sleep-Deprived group (SD, n=9) received the same injection but were limited to 6 hours of sleep. The Zoledronate group (Z, n=9) were housed in standard conditions but were treated with a one-time injection of 50ug/kg body weight of 10% Zoledronate. The Sleep-Deprived Zoledronate group (SDZ, n=9) were housed in the sleep deprivation conditions and received the same injection as the Z group. After 5 weeks, the rats were sacrificed, and tibiae and femora were collected and stored at -80℃ until a high-resolution micro-CT was done. This communication is a re-evaluation of previously presented data. Multiple comparison tests indicated significant differences between distal femur trabecular thickness of the C and SDZ groups (67.25, 75.5 microns, respectively; p=0.0001). Sleep deprivation improved distal femur trabecular thickness between the Z and SDZ groups (68.375, 75.5 microns, respectively, p=0.00007). Multi-factor analysis of variance (ANOVA) revealed a significant interaction between the treatment and the amount of sleep the rats received (p=0.0078). The increased trabecular thickness found in the sleep-deprived groups may be explained by their additional load-bearing. Our findings encourage consideration for studies of longer duration.

Assessing Communication Strategies for Athletes at Chapman University

Presenter(s): Preetha Raj
Advisor(s): Dr. John Miklavcic

Nutrition is a critical component to improve and maintain athletic performance, however, without formal intervention, it is difficult to predict the level of understanding athletes have on sports nutrition principles. The objective of this research study is to test the effectiveness of a nutrition education intervention on lifestyle and behavior changes related to nutrition during an athlete's formal season. A survey was constructed on Google Survey to track measurable health behaviors and categorize all athletes based on gender, age, sport, and position. Male and female Lacrosse athletes at Chapman University were given a digital survey prior to any education intervention to assess their existing knowledge of nutrition material

and health topics. Athletes attended a 45-minute live seminar on sports nutrition principles at the start of their season and completed a 24-question digital survey immediately after. Survey questions were evaluated using descriptive analysis by Google Survey metrics. Results from the survey after the live seminar indicated an increase in overall concern for diet by 3.6% in male athletes and 11.7% in female athletes. Results also indicated 8.5% of male athletes and 20.9% of female athletes increased their concern with their diet during their regular season rather than before their regular season. Athletes will be given a digital handout using a similar survey to evaluate results. Expanding this research project to include all sports teams at Chapman University will improve this research study's findings.

Mathematics

Characterization of Commutative Idempotent il-Semigroups
Presenter(s): Melissa Sugimoto
Advisor(s): Dr. Peter Jipsen
An involutive lattice-ordered semigroup (il-semigroup) is of the form (A, ≤, /\, \/, ·, ~, -) such that (A, ≤, /\, \/) form a lattice, · is an associative binary operation, and ~, - are an involutive pair. That is, for any x in A, -~x = x = ~-x, and for all x, y, z in A, x·y ≤ z, x ≤ -(y·~z), and y ≤ ~(-z·x) are equivalent. Such a semigroup is idempotent if x·x = x and commutative if x·y = y·x. In this case (denoted by cidil-semigroups) the binary operation · is a semilattice operation and the partial order it induces on the set A is called the multiplicative order. We prove that the multiplicative orders of all finite cidil-semigroups can be partitioned into Boolean algebras, and we hypothesize that conversely there exists a process of combining Boolean algebras such that every gluing of this form produces the multiplicative representation of a cidil-semigroup. A similar result has recently been shown in the related case of commutative idempotent involutive residuated lattices (P. Jipsen, O. Tuyt, and D. Valota's preprint "Structural Characterization of Commutative Idempotent Involutive Residuated Lattices"), and it is our goal to prove these results in the il-semigroup case in order to give a full description of the structure of finite commutative idempotent il-semigroups.

Physical Therapy

Quantifying Gait Parameters of Idiopathic Toe Walking Children using Inertial Measurement Units in Pre- and Post- Intervention with Smart Shoes
Presenter(s): Lexi Nehls, Nate Addonizio, Michael Shiraishi, Christopher Hoang
Advisor(s): Dr. Rahul Soangra, Dr. Marybeth Grant-Beuttler
In healthy walkers, the gait cycle begins with a heel strike and ends with the toe leaving the ground on that same foot. Idiopathic toe walking (ITW) is characterized by little to no heel strike during the gait cycle. Studies have found that issues with gait, specifically toe walking, may be neurological as opposed to just being at the level of the foot and ankle (Williams et al., 2013). When testing the gait parameters of normal versus ITW, inertial measurement units (IMU's) are often used to examine angular velocities and body segment accelerations in order to quantify human movement (Williams et al., 2013). When comparing the IMUs between a healthy walker and an ITW, children with ITW tend to have poorer motor proficiency, poorer balance, standing, and walking (Williams et al., 2013). In healthy walkers, bilateral coordination and gait asymmetry improved at faster walking speeds and deteriorated during slower speeds (Han et al.,

2019). Our preliminary observations indicated that ITWs with high gait velocities in combination with longer stride lengths tend to be more stable; however, if both gait parameters are not met then dynamic stability during walking decreases. In this study, we introduce an intervention to ITW using smart shoes embedded with sensors. These shoes use machine learning algorithms to differentiate between toe walking and normal walking - when consecutive toe walk steps are recorded, a vibration is triggered to remind the walker to walk with their heel down. The shoes are intended to supplement treatment by filling in periods when a physical therapist is not available, increasing opportunities for correction of ITW. We want to examine the long term effects of this intervention by using the IMU data to quantify variations in gait parameters. It would be expected that when analyzing the IMUs of idiopathic toe walkers versus normal walkers, gait speed, limb asymmetry, postural sway, energy expenditure, and other gait parameters would be less proficient than of a healthy walker.

Physics

Multiparameter Observations and Data Analysis of Lithospheric-Atmospheric Coupling Processes Associated with Geodynamics and Earthquakes in California

Presenter(s): Andrew Papilion
Advisor(s): Dr. Dimitar Ouzounov

The purpose of this proposal is to provide follow-up research for a grant completed through Chapman's CUE. CEESMO is a Chapman University research group studying different environmental anomalies to better prepare for future occurrences. The function of our equipment, in which we received a grant to relocate, is to measure gamma background radiation surfaced due to pre-seismic activity near major fault lines. Correlation between atmospheric and ionospheric activity has been demonstrated days and hours before major seismic events (M>6.0), showing that Radon surfaced from pre-earthquake activities reflect anomalies in atmospheric energy (due to the radioactivity of Radon's daughter elements 214Pb and 214Bi). Along with the station that was relocated from San Francisco to Sacramento, we have sites in Palm Springs, and beneath the Hashinger Science Center at Chapman University. By moving our Northern California station to Sacramento, we achieve better coverage of California's geodynamic activity through less interference near San Francisco, and a larger region covered. Although we also monitor pre-earthquake activities in our multi-dimensional model, it is important to recognize that we are analyzing geodynamic processes from a more complete geo perspective. Our study is based on a multi-disciplinary approach proposed by the Lithospheric-Atmospheric Ionosphere Coupling concept because it is widely recognized that our understanding of geophysical processes is improved by integration of studies from seismology, geochemistry, atmospheric science, and geology. The ability to detect pre-earthquake patterns days and hours before large events could have enormous environmental, economic, and societal impacts. Under the guidance of Dr. Dr. Dimitar Ouzounov, we have conducted research to change the widespread belief that earthquakes are unforecastable occurrences, and to instead confirm the more realistic hypothesis that earthquakes have a mechanism of action like many other natural phenomena; enabling a clearer detection process that will advance earth science and human safety.

Political Science

Analyzing Attitudes Towards Abortion and the Supreme Court: Do Americans Understand Their Attitudes?

Presenter(s): Jill Kleinkauf
Advisor(s): Dr. John Compton

Despite the Supreme Court existing as a legal and supposedly apolitical institution, landmark case decisions have often led to controversial reactions. This is especially evident when the cases are ruling on matters that have been accompanied by great political contention, such as with Roe v. Wade, a ruling that focused on privacy issues, while many Americans focus on abortion itself as a moral or political issue. As seen with recent studies by Adamany and Grossman on public opinion and the Supreme Court, and Bartels and Johnston on the separation of politics and the law, a gap remains in how controversial issues align with support for the court. It is also questionable whether those surveyed understand how Supreme Court decisions are made or the implications of such decisions. These studies have yet to look into a sense of political knowledge as a confounding factor of Supreme Court approval. I hypothesize that higher levels of support for the legalization of abortion lead to support for the Supreme Court as an institution, as it correlates with the Court's decision to legalize abortion. I further hypothesize that by controlling for pre-existing knowledge of the Supreme Court that those with higher levels of civic knowledge are more likely to have positive reactions of the Court than those with lower levels of civic knowledge. Using data collected in the 2016 Time Series Study from American National Election Studies and by analyzing the cross tab and the regression of the variables, I will analyze how abortion attitudes impact Supreme Court attitudes. I will then control for knowledge about the Supreme Court in order to test my second hypothesis. By comparing this to the aggregate population, it will indicate if knowledge about the Supreme Court affects attitudes towards the Court as an institution in these matters.

Fear of Illegal Immigration in America: How Media Influences Its Viewers

Presenter(s): Alexandra Leon Oliva
Advisor(s): Dr. John Compton

Illegal immigration has been an ongoing social problem, leading to a great deal of variety in public opinions. Conservative media have propagated fear of illegal immigration and have influenced their viewers' perception. This past year, media coverage has been used to promote ideas on illegal immigration. The different coverages were used to explain their own examples of what they thought about the current immigration issue. Due to this, people were influenced to create their own opinions based on the information broadcasted. The framing theory implies that an individual's preferred media influences their perception of illegal immigration. Using Chapman's survey of American fears and the American National Election Studies, I analyzed how the fear of illegal immigration is related to media choices. To what extent does media influence the fear of illegal immigration, and if the fear of illegal immigration is formed only through media influence. The analysis of the responses focused on the correlation between fear and media influence. There is a significant relationship between the fear of illegal immigration and conservative media coverage. The analyses revealed that media influence is related to an increased fear of illegal immigration. The findings determined that the person's media preference will shape their public opinion on illegal immigration.

Psychology

How Does Internalized Stigma Toward Consensual Non-Monogamy Affect Relationship Quality?

Presenter(s): Tristyn Acasio, Sierra Segal
Advisor(s): Dr. Amy Moors

Drawing on an internalized homonegativity and minority stress framework, the present study seeks to address whether people engaged in consensual non-monogamy (CNM) internalize stigma toward their relationship style, and if internalized CNM negativity is associated with poorer relationship quality and functioning. We recruited a community sample of 339 people engaged in CNM (open, swinging, or polyamorous relationship) with at least two concurrent partners. Participants completed a newly developed measure of internalized CNM negativity (which assessed personal discomfort, social discomfort, and public identification) and four measures of relationship quality for each partner. Regression analyses show that personal discomfort with CNM (e.g., wanting to change one's relationship style or endorsing CNM as unnatural) was associated with lower relationship satisfaction, satisfaction with romantic and sexual relationship agreements, and commitment (but not sexual satisfaction) in both concurrent relationships. The other two dimensions of internalized CNM negativity, social discomfort and public identification, were not related to relationship quality with either partner. These findings provide support for the notion that prevailing mononormativity (idealization of monogamy in society) can become applied to the self and negatively impact relationship quality. Understanding the processes in which broader societal stigma toward CNM can become internalized and affect well-being provides a new direction for research at the intersection of public health, psychology, and sexuality.

Witnessing Micro-Aggressions on Campus: Effective and Ineffective Ally Behaviors

Presenter(s): Nina Dours, Riley Murphy
Advisor(s): Dr. Amy Moors

Micro-aggressions are common, intentional or unintentional everyday insults towards a minority group (Sue et al., 2007). Despite their everyday occurrences and links with low well-being and academic performance (Keels et al., 2017), there is limited research on effective behaviors to combat microaggressions. This study examined ways students respond to microaggressions based on gender, sexuality, and ethnicity. Building on previous research (Toomey & McGeorge, 2018), we hypothesized that women, ethnic minorities, and sexual minorities will show more effective allyship behaviors than those who do not identify as a minority. We recruited 218 first year college students (74% women, 24% men, 2% trans/non-binary; Mage = 18) to take a three part online study. Participants were asked questions about their campus experiences, knowledge about microaggression, and ally behaviors. Participants were asked about typical reactions to a microaggression, using a scale from 1 (does not describe my typical response) to 5 (describes my typical response extremely well). These questions ranged from ineffective ("laugh"), neutral ("wait to hear/see what the victim does"), to effective ("ask the victim if they are okay") behaviors. Inconsistent with our hypotheses, we found no effect of gender, sexual orientation, or ethnicity on effective or ineffective ally behaviors (B range .06 to .43, p > .05). As for neutral ally behaviors, a statistically significant effect was found for the variable of gender on the use of neutral strategies (B = 0.39, p < 0.05) as cis-gendered women reported to be more likely to use neutral strategies than cis-gendered men. No significant effect was found for sexuality (B range = - 0.0080 to 0.29, p > 0.05). Although our hypotheses were not supported, interesting insights can be drawn from this study.

Participants may have felt pressure to answer in socially desirable ways by reporting more allyship behaviors. Furthermore, most participants identified as minorities, suggesting an unwillingness from majority group to participate in a micro-aggression study.

Coding Microaggressions Committed by First-Year Students

Presenter(s): Katherine Kindy, Meghan Dunn
Advisor(s): Dr. Amy Moors

Background: Microaggressions are forms of sexism, racism, and homophobia communicated through derogatory slights, including telling harmful jokes or making judgements about someone's perceived identity. Previous research has shown microaggressions have a significant impact on college students sense of self and belonging, often making them feel isolated on campus (McGabe, 2009). In order to assess exclusionary behavior, we asked first year students if they have committed microaggressions and, if so, in what context. Methods: We recruited 218 first-year Chapman University students (74% women, 24% men, 2% trans/non-binary; Mage = 18). Participants took a 20-minute survey asking about their overall college experiences and, in an open-ended format, whether they have intentionally or unintentionally committed microaggressions. Of the 218 participants, 122 left responses. Using thematic coding (Braun & Clarke, 2006), two undergraduate research assistants independently coded the responses. Results: Qualitative coding of the responses yielded 11 major themes and 8 minor themes. The most common response was that 50% of students had never committed a microaggression and of those, 23% couldn't think of a time it may have occurred and 9% didn't understand what a microaggression was. Among those who reported committing a microaggression, 12% were race/ethnicity-based, 7% were gender-based, and 4% were sexuality-based. In terms of the context of committing these microaggressions, 8% said it was intentional, 8% reported it was unintentional, and 6% indicated it was a joke and, of those, only 5% of those felt inclined to change their behavior. Conclusion: As early as the first year of college, students are committing intentional and unintentional microaggressions. We discovered that not only are students unaware of when they're committing microaggressions, those who are committing microaggressions are rarely changing their behavior. Better education needs to be provided about microaggressions to encourage behavior change and foster greater campus inclusion.

Speak Up! Challenging Microaggressions by Intervening as an Ally

Presenter(s): Gabi Siguenza, Carsyn Knebel, Sierra Segal
Advisor(s): Dr. Amy Moors

The primary diversity strategy of many institutions focuses on admissions to increase the representation of women and people of color (Bowen & Bok, 1998). Yet, changing the campus climate to foster belonging is a critical strategy to increase diversity (Stewart & Lavaque-Manty, 2008). To bring these issues to light, we are developing and implementing a workshop that teaches first-year students evidence-based strategies to combat microaggressions. Adapted from a previous workshop, Speak Up in STEMM!: Challenging Microaggressions to Foster a More Inclusive Workplace (Moors & Mayott, under review), our project remedies the inclusion training gap by using the prejudice habit model and ally development theoretical frameworks (Ada Initiative, 2015; Casey & Ohler, 2012). Methods: First, first-year students are actively recruited and sign up to participate in a workshop and a 3 part survey process. Participants report their attitudes towards campus climate and personal experiences prior to the workshop. They are randomly assigned to attend the workshop in Fall or Spring. Those assigned to the Fall condition participate in a 90-minute ally development workshop. Although the survey data is collected, our focus is

on feedback from the workshop independent of online responses. Results: Of the 12 participants, all rated the workshop as living up to their expectations, stimulating their learning, providing sufficient practice, and all would recommend it to a friend. Many participants enjoyed the roleplaying scenarios, learning about microaggressions and the evidence-based strategies. For future workshops, participants suggested allowing the audience to share their personal experiences and refining our role playing scenarios. Conclusions: In fall of 2020, we plan to continue running workshops and recruiting participants through the subject pool system in the Department of Psychology. We believe that by expanding our recruitment to the subject pool, we will receive more first-year students and generate more traction as it relates to challenging microaggressions.

Pediatric Postoperative Pain Medication: Child Sex and Ethnicity Interact to Predict Parent Medication Attitudes

Presenter(s): Vivian Luong, Harshitha Venkatesh
Advisor(s): Dr. Brooke Jenkins

Over 85% of children experience significant pain after surgery. Despite this presence of pain, research suggests that a quarter of these children receive very little or even no pain medication at home. Such poor pain management in children can have harmful long-term consequences, both physically and psychologically. Previous research indicates that the amount of pain medication administered to children in the home may be significantly impacted by beliefs and attitudes parents have regarding analgesics. Given this, the purpose of the present study is to identify which demographic factors are associated with certain parent analgesic attitudes or misconceptions among pediatric patients ages 2-13 who have undergone elective surgery at the Children's Hospital of Orange County (N = 112). Prior to surgery, parents completed surveys to report demographics and medication attitudes—fear of side effects, avoidance, and appropriate use attitude. Ethnicity was found to interact with child sex to predict parents' fear of side effects, $b = -4.750$, $p = 0.043$. Specifically, among Hispanic households, parents of daughters expressed a greater fear of side effects from analgesics compared to parents of sons. The opposite trend was seen in White households, such that parents of sons expressed a greater fear of side effects compared to parents of daughters. This sex difference in Hispanic families may be due to the phenomenon machismo, a term characterized by the hypermasculine idealization of men. Specifically, Hispanic parents may express a significantly lower fear of side effects for their male children because they are encouraging their sons to be more stoic and "tough." The hypermasculinity principles behind machismo, however, may not significantly transcend across other ethnic groups, as showcased by the opposite trend observed in White parents. These findings can be utilized to develop interventions that specifically target and educate parents who are likely to have misconceptions concerning analgesic use while still respecting the family's culture, values, and practices.

How Positive and Negative Affect Relate to Postoperative Pain in Children Undergoing Surgery

Presenter(s): Stephanie Munduruca, Ryan Johnson
Advisor(s): Dr. Brooke Jenkins

Positive affect has been shown to be associated with lower levels of postoperative pain, while negative affect is associated with higher levels of pain. More recent research asks if subscales of positive affect such as calm, well-being, and vigor could be related to pain experiences. Studies of postoperative pain in children relating to positive and negative affect are limited, with none examining the connection between

positive affect subscales and negative affect subscales (anger, anxiety, and depression) and children's pain. This study addresses that gap by uncovering the relationships between the aforementioned subscales to postoperative pain in children. This study was conducted at Children's Hospital of Orange County with children (N=56) aged 2-12 who had elective surgery and completed daily diaries assessing pain and affect at home on days 1, 3, and 7 post-surgery. State affect was associated with reports of pain on the same day such that children experiencing higher levels of calm, well-being, and vigor on day 1 had lower levels of pain that same day (calm: r(56) = -0.49, p < .001, well-being: r(56) = -0.52, p < .001, and vigor: r(56) = -0.51, p < .001). This pattern held for same-day measurements on day 3 (calm: = r(49) = -0.36, p < .05., well-being: r(49) = -0.50, p < .01, and vigor: r(49) = -0.52, p < .01), but not for day 7 when only well-being was associated with pain (r(51) = -0.29, p < .05). Depression was the only subscale of negative affect that showed a positive association across all three follow-up assessments of pain (ps <.01). The findings demonstrate that associations of positive affect subscales and pain diminish over time and investigating negative affect subscales may be warranted since only depression was consistently correlated with pain at all three assessments.

The Association Between Ethnicity and Anxiety with Sleep in Pediatric Patients Recovering Post-Surgery

Presenter(s): Maya Weintraub
Advisor(s): Dr. Brooke Jenkins

Proper sleep is beneficial for pediatric patients recovering from outpatient surgery. Sleep related problems such as insomnia, nightmares, reluctance to sleep alone, etc. can have detrimental effects on a patient's physical health, which can lead to greater utilization of medical services in the future. Emotional functioning can be associated with experiencing sleep disturbances. Unsurprisingly, anxious children have a higher incidence of postoperative sleep problems. Evidence suggests that aside from the biological need for sleep, sleep behavior can be impacted by social, environmental, and cultural factors. Prior research indicates that this is the case for adult patients, however the association of both ethnicity and anxiety together and their effects on sleep have not yet been researched for pediatric patients undergoing surgery. The purpose of this study, therefore, is to examine how children's ethnicity and postoperative state anxiety may predict sleep behavior post-surgery, with the hypothesis that non-Hispanic White and Hispanic families have different cultural values that may have implications for sleep. Our sample included pediatric patients ages 2-13 years who underwent surgery at the Children's Hospital of Orange County. We evaluated the state anxiety levels and sleep behaviors of children (N=121) post-surgery, as reported by their parent or guardian as a part of a follow-up measure one day after surgery and collected information on child ethnicity. Results demonstrated that Hispanic children experienced worse sleep (i.e. having difficulty sleeping), the day after surgery, compared to non-Hispanic White children (OR = 31.943, p = 0.051). Children with higher anxiety experienced worse sleep the day after surgery (OR = 3.712, p = 0.023). These results show that patients with higher state anxiety or Hispanic patients experience worse sleep the day after surgery, compared to White patients or patients with less anxiety.

Searching for Neural Mechanisms of Social Cognition

Presenter(s): Chandler Siemonsma, Cristina Uribe
Advisor(s): Dr. LouAnne Boyd, Dr. Aaron Schurger, Dr. Deanna Hughes, Tian Lan

Social cognition involves the integration and pruning of perceptual information which leads to the formation of an abstract representation, which is also known as the perceptual gist. This study examined

differences in visual perception of Mooney face stimuli of differing sizes and the relationship to gist formation in ten individuals with autism compared to neurotypical controls. Parents of both groups completed the Social Responsiveness Scale (SRS-2) to assess social functioning in real-world scenarios.

Student Employee Life

Presenter(s): June Nakayama
Advisor(s): Dr. Tara Gruenewald, Eunice Choi

Perceived organizational support is a topic that has been widely researched in an attempt to better understand organizational culture and work experiences. However, most studies have been conducted in a single organization or department with full-time employees. As college tuition rises and more people are struggling with student debt, many college students have opted to enter the workforce while pursuing their degrees. The purpose of the current study was to evaluate the role of perceived organizational support in organizations who employ full-time college students, and whether perceived organizational support is associated with students' academic performance, work-life balance including academic life, and turnover intentions. It was hypothesized that individuals with high perceived organizational support will demonstrate higher academic performance, higher work-life balance, and lower turnover intention compared to individuals with lower perceived organizational support. Students from the Chapman psychology subject pool who were employed in the Fall semester of 2019 were invited to complete an online survey which included measures of perceived organizational support, turnover intention, academic performance, and work-life balance. Data collection is ongoing, but it is expected that the proposed analyses will shed light on the associations between these variables, which will provide organizations who employ students with a better understanding of how to help their employees as well as themselves.

A Data-Driven Approach to Mood Classification and Neurofeedback

Presenter(s): Jake Gavenas, Emma Chen, Natalie Richardi, Bahram Saber, Elnaz Lashgari, Jye Bold
Advisor(s): Dr. Uri Maoz

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.

Sociology

Myocardial Infarction and Treatment Adherence Rates Across Age

Presenter(s): Deborah Shim
Advisor(s): Dr. Ashley Kranjac, Dr. Frank Frisch

Trends on first myocardial infarction and rates of adherence to treatment across age were estimated. Data sourced from the National Health and Nutrition Examination Survey (NHANES), 1999-2016, were

used to determine the patterned age trends of patients' first myocardial infarction as well as their subsequent willingness to comply with treatments, such as weight loss. Demographic characteristics and socioeconomic status were taken into account and integrated as they play a key role in contextualizing and understanding these health trends. Preliminary historical trend analyses across 9 waves of data spanning 17 years indicate that patients are increasingly presenting with myocardial infarction earlier in life, and disparities exist across demographic and socioeconomic lines.

Dim Sum and the Chinese Diaspora

Presenter(s): Ashley Lee
Advisor(s): Dr. Stephanie Takaragawa

Dim sum originated from the southern states of China, mainly Hong Kong and Guangdong. The Chinese cuisine has traveled to many places in the world today where Chinese immigrants have settled since the Chinese diaspora circa the 1960s. At the time, Chinese immigrants who came to America had to assimilate to the American culture by situating themselves in areas that had already existed, creating ethnic enclaves in Chinatown, Los Angeles. The heavy population of Chinese immigrants poured into the San Gabriel Valley, which created a bigger community for the Chinese and preserved the Chinese identity. It was easier for them to adjust to that lifestyle in Chinatown or cities in the San Gabriel Valley because most businesses and stores were Chinese-owned and served as community forums, especially restaurants where people could yum cha (direct translation: drink tea) and eat dim sum. Throughout my ethnography, I visited a handful of Chinese tea houses/restaurants in San Gabriel Valley to focus on the food and culture that exists when going to yum cha. The study consisted of maps of each establishment, photos, a collection of life histories of individuals, use of ethnosemantic research methods, and interviews with informants in both English and Cantonese. I found that these restaurants provided a sense of community where Chinese culture and identity thrived. These restaurants serve as gateways for the Chinese community to come together and as a new perspective for the upcoming Chinese-American generations to carry on the tradition to go yum cha.

Religious Studies

Student Scholar Symposium Abstract
Presenter(s): Zoe Shapiro
Advisor(s): Dr. Julye Bidmead
In my research project, I seek to explore whether or not Judaism functions to disadvantage women through gender ideology that is justified by divine will outlined in interpretations of the Pentateuch. I argue that gender expectations gleaned from Genesis lie not within the Biblical text, but within the literary work of Biblical scholars. The Torah passages detailing the myths of the first woman and man have historically been interpreted as a divine indicator of clear gender differentiation. Varying hermeneutical approaches to Genesis produce a myriad of conflicting commentary, yet traditional Jewish interpretations of the first woman and man are chiefly hierarchical in nature. I theorize that the differences between men and women's roles within Judaism are attributed to institutionalized patriarchy perpetuated by pervasive Jewish scholarship. A longstanding tradition of regarding women as subordinate has resulted in the restriction of women's roles and authority within the Jewish faith. To investigate this inquiry, I will report data production through qualitative research gathered through the conduction of interviews with Jewish women. I chose only to interview women to amplify the voice of a historically silenced population. To protect the identity of my interviewees, I will refer to them by assigned pseudonyms. I will also support my claims and findings with scholarly research and follow a framework of feminist methodology and theory.

The Theology of Augustine of Hippo: Refashioning Neoplatonism and Spiritual Reflections on Sacred Scripture
Presenter(s): Jarett Bilash
Advisor(s): Dr. Rafael Luévano
Few individuals have influenced the academic disciplines of religious studies and philosophy greater than fourth century Roman Catholic Bishop Augustine of Hippo (354-430 C.E.). To this day, Augustine's "Confessions" stands as a theological masterpiece, providing scholars of all stripes with an abundance of theological, philosophical, and deeply personal insights. Fundamentally, "Confessions" tells the story of an individual's lifelong and tumultuous journey from carnal sinner to Catholic saint. With Augustine's radical transformation held in mind, this thesis analyzes his intellectual and spiritual ascent to truth--truth that Augustine identifies as God himself. Specifically, this thesis attempts to answer the following questions: How did Augustine arrive at the truth of God and the Catholic Church? What were his tools for the journey? By relying on Augustine's "Confessions" and relevant scholarly work, this thesis argues that Augustine forged his path to God through two primary tools: a refashioning of Neoplatonic philosophy and fervent spiritual reflections on Sacred Scripture. In doing so, Augustine learned that his path to God was not merely intellectual. By unifying his intellectual aptitude and his spiritual longings, Augustine found fulfillment in God. His pursuit of truth demonstrates a fusion of faith and reason that is the primary methodology for Catholic theology today.

Sociology

Tiger Moms, Dragon Dads, and Baby Pandas: Cultural Expectations of Success Among Asian-American College Students

Presenter(s): Corinne Tam
Advisor(s): Dr. Edson Cruz

Family sociologists explore societal conditions contributing to the need for young adults to move home following the completion of school. This is known as the boomerang phenomenon, and can be seen as part of a new life stage in which young adults explore their identities. However, previous literature does not account for the extra pressures that Asian-Americans face. This research project asks, How do college-aged Asian-Americans deal with expectations of success in a contemporary society that presents them with pressures of having to return home due to financial instability? I explore this through eight qualitative interviews of college-aged Asian-Americans, finding that they feel separate pressures from their mothers and fathers. I differentiate these as a "tiger mom" and "dragon dad" style of demanding success. Secondly, I find respondents experience expectations of success from their families' success frames and the broader society's model minority myth. I call this a "baby panda" style of experiencing demands for success. Finally, I find respondents confront pressures to return home because of financial instability and pressures to fulfill familial obligations. In conclusion, my study reveals that young Asian-Americans encounter emerging adulthood with extra pressures that come with being Asian-American, contributing to our understanding of why Asian-American college students may express higher rates of depression than White college students. My research adds to the literature on the boomerang phenomenon by noting the extra pressures dealt with by Asian-Americans. Future research will explore the role of generational status in the experience of emerging adulthood for young Asian-Americans.

Biochemistry and Molecular Biology

Effect of the Diarylpentanoid ca27 on the Androgen Receptor Cytoplasmic-To-Nuclear Translocation

Presenter(s): Abbigael Eli
Advisor(s): Dr. Marco Bisoffi

Prostate cancer (PCa) is one of the most frequent cancers in the world's male population. The androgen receptor (AR), which responds to the binding of androgens (for example, testosterone), is a major oncogenic driver in cancer cells. Androgens bind the AR in the cytoplasm and initiate its translocation to the nucleus, where it acts as a transcription factor for genes that promote growth and survival. In cancerous cells, AR signaling is upregulated and constitutive, leading to uncontrolled cell growth. The diarylpentanoid ca27, an analog of the natural product curcumin, has been shown to downregulate AR expression in PCa cells, but its mechanism of action remains unknown. This study explores the possibility of ca27 interfering with AR nuclear translocation, thereby leading to its degradation and reduced expression. Androgen-dependent human LNCaP prostate cancer cells were treated with ca27, curcumin, and dimethyl sulfoxide (DMSO) vehicle control, followed by the generation of cytoplasmic and nuclear protein lysates. The protein lysates were size-separated by sodium dodecyl sulfate-polyacrylamide gel electrophoresis (SDS-PAGE) followed by immunodetection of AR, histone H3 (nuclear protein), and beta-tubulin (cytoplasmic protein) by chemiluminescent Western blotting (WB). AR expression levels were determined by AR band densitometric analysis of digitalized images using ImageJ software. In this project, we aim at testing the potential effect of ca27 on AR translocation by determining the ratio of cytoplasmic-to-nuclear AR band intensity between ca27-, curcumin-, and DMSO-treated protein lysates. We report here on our first data set and provide an experimental plan moving forward to elucidate the effect of ca27 on AR translocation and expression as a potential mechanism of action.

Engineering a Prenyltransferase Enzyme for Biocatalytic Diversification of Bioactive Compounds

Presenter(s): Ahmad Alrusayes
Advisor(s): Dr. Sherif Elshahawi

Enzymes serve an important role in any biological system as the biocatalysis of reactions is essential for the survival of the living systems. Under biologically relevant conditions, uncatalyzed reactions tend to be extremely slow and the presence of enzymes catalyze these reactions in a specific and selective manner rapidly. Many chemical reactions require toxic petroleum-derived solvents and extreme reaction conditions which complicate process development and oftentimes create safety hazards to exclude even traces of water from their reaction media. Indeed, enzymes circumvent these problems by providing a specific environment within which a given reaction can occur more rapidly. This inspired chemists to manipulate these natural enzymes to catalyze difficult reactions under favorable reactions of pH, temperature and green conditions. Furthermore, engineering the active binding sites of enzymes to become more efficient is a hot research area and can lead to the catalysis of challenging chemical reactions. Prenyltransferases (PTs) are important enzymes that catalyze the transfer of a prenyl moiety to diverse compounds naturally. By transferring a prenyl moiety to a compound, the bioactivity of the substance might increase because the hydrophobicity of the substance will increase. This lowers the substance interaction with water in the system and, therefore, the reaction will have higher yield and reproducibility. By engineering PTs to have higher promiscuity, it is possible to use them as unique tools

to generate more active compounds. In this project, we will study the X-ray crystal structure of one of these PTs and use mutagenesis to make it more proficient and promiscuous. The enzymes are then screened for their ability to diversify drugs which their counterparts wild type do not perform. A combination of different mutagenesis approaches will be used to enhance the activity of PTs towards nonnative substrates.

Biological Sciences

DriCam: An Integrated Approach to Measuring Plant Response to Drought Stress

Presenter(s): Alexandros Drivas
Advisor(s): Dr. Gregory Goldsmith, Dr. Carter Berry

Drought-induced plant stress is known to interfere with plant function, growth and ultimately contribute to plant mortality. Beyond a certain threshold of water loss, the water in the xylem tissue of the plant experiences excessive tension and air bubbles are formed. These air bubbles are known as embolisms and lead to the death of the plant. Our understanding of the factors affecting embolism formation in response to drought however, remain limited. I have developed a new device capable of coupling measurements of plant gas exchange via infrared gas analysis to measurements of embolism based on digital images. The device is simple, in that it couples to existing commercially available technologies. This device will allow us to carry out simultaneous and real-time measurements of plant water use and embolism in plant leaves under controlled environmental conditions. For instance, the device provides us with the ability to study the influence of environmental factors such as relative humidity, CO2 levels, temperature, and light intensity, on plant gas exchange and embolism. Currently, no device is capable of collecting data relating embolism formation to any of these variables allowing us to go past many current technological limitations. Further development and modifications have been made to increase the device's energy efficiency, resolution of the images, and ease of use. I have begun translating pieces of the device into 6061 Aluminum. Further manufacturing of the device in 6061 Aluminum will increase measurement accuracy and precision, particularly by addressing the need to maintain consistent air pressure in the device's sample chamber. The completion of the device will allow the scientific community to make measurements that ultimately inform our ability to mitigate the negative consequences of drought for plants in both natural and agricultural settings.

Time of Day Dependence in Plant-Rhizobia Interaction

Presenter(s): Teresa Hur, Yoobeen Lee, Isaac Min, Ashley Okhovat, Sydni Au Hoy, Kenjiro Quides
Advisor(s): Dr. Hagop S. Atamian

In nature, plants interact with diverse microorganisms present in the soil. Some of these interactions are mutualistic, where both the plant and the soil microorganism benefit from the interaction. Legumes have established a unique mutualistic relationship with soil bacteria known as rhizobia. As part of this interaction, rhizobia enter the plant root and get housed in special structures on the root called nodules. Once established inside the nodule, rhizobia fix atmospheric nitrogen for the plant host in return for photosynthetic carbon. The plant interaction with the rhizobia greatly enhances plant productivity as they get access to usable form of nitrogen which is the most limiting macronutrient in agricultural production. However, this relationship between the plant and bacteria is very intricate and is influenced by many factors such as the plant variety, rhizobia species, soil nutrient composition, and ambient temperature. The objective of this project is to investigate the effect of time of the day on this interaction. Both plants

and animals have internal biological clock that keep track of the time in the outside environment and accordingly adjust various physiological processes. We investigated the success of legume-rhizobia association by introducing the rhizobia to the plant every four-hour interval during a single day in a pouch system. Seeds of Lotus japonicus were germinated in growth pouches in sterile condition and grown for two weeks in 16 hr light/ 8 hr dark photoperiod under controlled environment. Mesorhizobium loti was cultured on a plate and a suspension of 10 billion cells/ml was prepared. The roots of two-week-old L. japonicus were inoculated with the bacterial suspension starting at dawn (ZT0) and every 4 hours until ZT20 (20 hours after dawn). Our results showed time of day effect in this interaction, where the interaction happened most efficiently at ZT12. The results from this project will help us better understand the complexity of this relationship and enable us to device new approaches to increase crop productivity.

Identification and Characterization of Plant Defensins Family Genes in Salvia Hispanica
Presenter(s): Megan Shieh
Advisor(s): Dr. Hagop S. Atamian
Being sessile organisms, plants rely on very sophisticated defense mechanisms to survive the constant challenges in nature. These include physical and chemical defenses in addition to complex immune responses. Plant defensins (PDFs) are a family of small (45-55 amino acid) cysteine-rich peptides that play important roles in plant immune responses. PDFs are conserved peptides that are widely distributed in plants and constitute a large and diverse family as part of the overall plant pathogenesis-related proteins. PDFs possess wide range of biological activities that are effective against bacteria, fungi, insects, and viruses. Interestingly, some PDFs have been shown to possess anticancer and cytotoxicity effects. Salvia hispanica, commonly known as chia, belongs to the mint family (Lameaceae). The mint family is a diverse family of flowering plants with more than 7,000 species identified to date. Being an understudied plant species that was recently rediscovered as a healthy food supplement for humans and nutritious feed source for animals, not much is known about the immunity related genes and their evolution in chia plants. The objective of this project is to identify and characterize the members of plant defensins family in chia. Based on sequence similarity, using the sequence alignment program DIAMOND, we identified chia homologs of the PDF genes characterized in number of plant species. We constructed phylogentic trees using the Maximum Likelihood (ML) approach to identify the phylogenetic relationships of candidate chia PDFs to those identified in other plant species. In addition, we analyzed the expression of a subset of chia PDFs in response to bacterial attack. The results from this project will represent the first comprehensive analysis of this important and diverse gene family in salvia hispanica.

Chemistry

Characterization of Interactions Between Organic Matter and Goethite Nanoparticles
Presenter(s): Abby Kim
Advisor(s): Dr. Christopher Kim
Iron oxyhydroxide nanoscale particles are naturally occurring and ubiquitous in aquatic environments. Nanoparticles have high surface charges and react with a wide range of dissolved ions and contaminants. Furthermore, the mobility and aggregation state of nanoparticles are highly dependent on geochemical changes such as pH fluctuation, concentrations of organic matter, and salinity. Because of the many variables that pertain to the adsorption and retention of the nanoparticles, we concentrated on the effects of organic matter on the aggregation of the nanoparticles and the nanoparticle aggregates'

retention properties at varying organic matter concentrations. The goals of this project are to observe, characterize, and classify the changes and reactions occurring between the nanoparticle aggregates, organic matter, and metal contaminants 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 a contaminant metal to the aggregates. The DLS analysis of the nanoparticle aggregates at varying concentrations of organic matter yielded an increasing trend in size as the organic matter concentration increased. The ICP-OES analysis also showed an increasing trend of adsorption and retention of Zn(II) ions as the organic matter concentration increased. With these results, the adsorption and retention properties of the nanoparticles and their aggregates can be optimized using an increasing amount of organic matter. Additionally, the aggregation of the nanoparticles may affect the efficacy of the aggregates' adsorption and retention properties.

Communication Studies

Parasocial Relationship with Kobe Bryant

Presenter(s): Grant Sewell, Natalie Hernandez-Barber, Alyssa Houstoun, Karen Sieu
Advisor(s): Dr. Riva Tukachinsky

A parasocial relationship is a one-sided relationship where one person is extremely invested in the other, who is often a media figure. A parasocial relationship with a celebrity is very common because of the celebrity's high and constant exposure. When a tragedy hits, like a celebrity death, a person can experience a parasocial breakup. Kobe Bryant was a household name known by everyone. His death shocked the nation and was talked about worldwide. In this experiment, we examine the parasocial relationship with Kobe Bryant, the effects of exposure to inspirational vs. controversial media, and rape myth theory. Stimuli that is focused on a celebration of achievement would likely invoke a positive association between individuals, as compared to stimuli focused on controversial rape allegations. H1: Individuals will report greater distress about their parasocial breakup with Kobe Bryant after watching inspirational media clips compared to watching controversial media clips. Individuals that have limited context for a relationship will not have any preexisting relationship to base their judgment or reaction to negative stimuli. H2: Individuals who have little or no prior parasocial relationship with Kobe Bryant will report negative attitudes towards him after watching controversial media clips compared to those with a strong parasocial relationship. Individuals who have a stronger parasocial relationship with Kobe Bryant will experience cognitive dissonance after being exposed to controversial media clips regarding Kobe Bryant's rape allegation. H3: Individuals with a strong parasocial relationship with Kobe Bryant who are exposed to controversial media clips regarding Kobe Bryant's rape allegations will report believing in rape myths more than those who are exposed to inspirational media clips.

Parasocial Breakup with Kobe Bryant

Presenter(s): Hannah Selesnick, Don Bingham, Bradley Crislip, Ethan Barnas, Matthew Park
Advisor(s): Dr. Riva Tukachinsky

Celebrities are often idolized by their fans. There is a deep feeling of connection in some cases for them where they feel as though they know every aspect of a person's life to the extent that there is a one-sided personal connection. When a celebrity dies, there can be a loss that is felt that can feel similar to the loss of a family member as in the case with Kobe Bryant's death. Kobe was not only loved for his basketball skills, his larger than life personality, but also his philanthropy, and his devotion to his family. The loss of

Kobe Bryant has created deep loss and parasocial breakup with his fans around the world. This research is intended to dig deeper into how individuals process grief and sadness, known as a parasocial break up, whether or not there are differences in levels of grief between those who possess commemorative media and those who do not have commemorative media, those who are considered to be in a basketball community or not in a basketball community and a fans level of understanding of the game of basketball. In addition, this study attempts to differentiate between the feelings of grief which are measured between those that are basketball fans and unaware of Kobe's other qualities versus those who are aware of Kobe's other qualities but were not basketball fans. Several hypotheses are explored in this study using different variables and we believe the findings will support each of our hypotheses.

Computer Science

Chapman Maps
Presenter(s): Nasser Aljasser, Travis Mayer, Jed Malashock
Advisor(s): Dr. LouAnne Boyd
Most schools do not have maps of the inside of buildings easily accessible for its visitors and students. This makes it difficult for anyone that is visiting a campus or is new to a campus to find their way around. We are going to address this challenge by providing an easy way to navigate map app that provides the internal room layouts for campus buildings- in particular, the Chapman University campus. Thanks to technology, a properly implemented campus map could be considered a big asset for students and faculty. In detail, Chapman Interactive eCampus Map is created with the objective of providing an easily accessible and navigable gateway for users to access university departments, buildings, classes, resources, and facilities. From a diversity and inclusion standpoint, our app will also provide features that can highlight ADA accessibility ramps and gender neutral bathrooms. The main aspect of Chapman maps is an indoor navigation system of a smart map which covers 2D smart campus map, outdoor environment, and navigation functionalities, with detailed 3D visualization. In the past few years, the growth of telecommunication networks and mobile devices, as well as the increase of urban environment and smart buildings, has grown a need for a digital campus map. We believe the Chapman Interactive eCampus Map would suffice this need.

Increasing Student Involvement on Campus to Promote Diversity and Inclusion Within Clubs
Presenter(s): Jadyn Gonzalez, Jack Gregov, Edmund Vu
Advisor(s): Dr. LouAnne Boyd
Club and event advertising on campus is limited to posted flyers, emails, and rush events that many students do not see or cannot attend due to their schedules. Our app aims to provide a single simple interface to help boost student involvement in clubs and activities on campus, while also promoting lesser known clubs on each user's home page. We conducted and gathered data from a paper prototype and a digital wireframe. In order to address the issue of diversity and inclusion, we hope to include ways to increase diversity through search results (Rodygo L.T. Santos et. al., 2010) and present tailored clubs and activities to users through the interface (Sean A. Munson et. al., 2009). Based on user feedback, we are aiming to use a simplified interface with clear icons to guide the user and increase ease of use through optional touch and voice interfaces. We expect to find that users will prefer a simple, easy to use interface to find information about campus involvement, and that they will enjoy the diversity in their search results along with the tailored interface presentation to their preferences.

Charades

Presenter(s): Benjamin Kahn, Edmund Vu
Advisor(s): Dr. Michael Fahy

The goal of our project is to learn about in greater depth how computers interact one another, specifically in the area of creating rooms in which users can interact with one another outside from the general communications available to everyone. We plan to do this through a game of charades in which users attempt to guess words provided to them by the game. If the chosen player's team is able to guess the word before the timer ends, that team will be given points based on their time. It will then be the other team's turn to receive a word and guess. The players will be divided into two teams, and one player will be given a word at random. They will then attempt to convey the word to their teammates through one-word hints. This will require us to research several things, including website development and design, allowing users from outside of the game's base network to be able to connect, limiting the number of users that can be connected to any one game at a time, and how to ensure that users cannot temper with our game in nefarious ways. By working on this project, we expect to develop a greater understanding of networking between computers, as well as further develop our coding skills.

Word Comms

Presenter(s): Ryan Millares, Yuki Chen, Rose Ramirez, Sebastian Ludlow
Advisor(s): Dr. Michael Fahy

The purpose of this project is to understand the foundation of multiplayer games by focusing on programming functionality on the backend, and to learn how client/server communication is applied in multiplayer games. Our project will involve use of a server program that will host the game, and two users running client programs to act as players. The client programs will allow the user to send input messages to the server and, depending on their player value, will be interpreted as a new word or a guess, and an appropriate response message will be sent back to the client programs. The intent is to have both client programs constantly waiting for response messages; if the player who is guessing sends a guess, the other player should be able to see it as well. The research question is how to use client server communication to make games into multiplayer games? How does information and data in game by each player communicate with each other, and potentially compare the score of each player? The expected results will be a multiplayer word guessing game similar to hangman. Players will be able to guess letters until they get the word right. scores will be added based on the number of correct letters, and the player with a higher score wins. By doing this project, we understand how multiplayer games are made, and how computer networks are communicated.

Web Scraping Web Application

Presenter(s): Gabriela Pinto, Samuel Ellenhorn, Mitch Melby, Max Miller, Billy Ross
Advisor(s): Dr. Michael Fahy

The original purpose of this project will be to learn how to make a full-stack web application that incorporates some computer networking concepts. Our idea for the project is to allow the user to save a list (or lists) of e-commerce products from any website. Although the user could hypothetically save this in their bookmark's tab or save them in their notes; the user would be able to access this list anywhere and anytime. In the web application, the user pastes a URL link and the program will scrap through the given URL for the product name, price of the product, and a picture of the product. Some additional features include organizing the list by location (which will be used by the google maps API), sharing the

website links with other users, and organizing the list by its price. My group and I plan to accomplish this using HTML, CSS, and some styling libraries for the front-end. The back-end of this project, which contains the logic to retrieve and process the information for the front end to display, will be written in Python. To store all the information--user authentication information, message, saved links--we will use a MySQL database. To speed up the development process we will use Django for user authentication and basic functionalities such as adding a link and constructing a login page. For version control, we will use Git. For project management, we will use Trello. For deployment, we will use either Heroku or AWS.

Data Communications and Networks: Research on APIs

Presenter(s): Meghana Shastri, Peter Chen, Audrey Bichelmeir
Advisor(s): Dr. Michael Fahy

The purpose of our project is to find out how to use an Application Programming Interface (API) to access information from a website and send that information to a user email. In this project, we get the top 10 news highlights through the Google News API and send it to our clients via email every morning. Our project also has a sign up process for our new clients. It allows our clients to input their emails, and we would put their emails to google sheets using the Google sheets API. We created this project in order to make it easier to notify users about current news without them having to search for news separately on google or any other site. Some of the technical challenges include having to only use Python or Java to create our program while using two APIs. There is also a technical challenge of establishing a socket connection on a server/client program in order to send information to an email, and if the socket connection fails, the program will not work. We expect that this project will get the top 10 news headlines using the Google News API and storing that information as a message, which will get sent out to an email from our google sheets database.

Data Analytics

An In Depth Analysis of Metadata Pertaining to User Interaction with Audio Streaming Services

Presenter(s): Cadre Carrigan, Nima Nakhjavani, Justin Ewoldt, Vinny Caffaro
Advisor(s): Dr. Michael Fahy

Spotify was first launched in 2006, with the goal of providing an audio streaming platform consisting of music, videos, and podcasts from record labels and media companies. Now, it reports 300 million active users each month. An application of its popularity contains insurmountable metadata that can be analyzed to better understand the factors that contribute to one's audio streaming preference. Spotify allows any user to apply for developer permissions which grants users access to Spotify's data, including user data, in depth song analysis, and more. Using Spotify's Web API, our team intends to discover patterns and gain insight on user preferences based on their region and other elements. Initially, our team will need to develop a better understanding of Spotify's Application Program Interface (API). Being able to piece this together will be the platform which allows us to tackle the main focus of our research involving Spotify's metadata. Applying adequate data manipulation and analysis, we will draw conclusions towards which variables are significant when determining user preference. The Spotify Web API endpoints return JSON metadata about music artists, albums, and tracks, directly from the Spotify Data Catalogue. The API also provides user related data such as songs they save and playlists they create, allowing us to critically examine all aspects of the streaming service. We expect drastic differences in music preference

across selected regions, with the critical factor being the most prevalent language for that region. Additionally, we predict that distance between regions will be an insignificant variable for user preference. Using these results, we hope to grasp a better understanding in which the music industry makes decisions on releasing music, applies marketing techniques, and manages artists, while also seeing in which ways users are drawn to music. All in all, Spotify's platform gives us the opportunity to explore the use of APIs as well as analyze practical data that many people can relate to.

DegreeAdvisor
Presenter(s): Aleksei Furlong, Eric Wasserman, Saman Kashanchi
Advisor(s): Dr. LouAnne Boyd
Most students use little to no resources that Chapman University provides when internship searching. This is due to two reasons: the assets and services are difficult to access as well students have little knowledge of them. The main objective of our project is to create an easy to navigate app for Chapman students that helps them with career outreach. There will be three main menus - Alumni Connect, Resume Building, and Event Outreach. Alumni Connect will allow Chapman students to reach out to Alumni in their field and see news about successful alumni in their field. Resume Building will give students templates of polished resumes for their major and students will be able to make appointments with resume specialists. Event Outreach will notify Chapman Students about events, clubs, or speakers on campus that might interest them or help with their career development. This is an app that is missing from the current Chapman community and there is definitely a user base for it. Our app also will be multi-modal allowing it to be accessible by a very diverse group of users. We believe this app will allow students to better utilize the resources that Chapman provides and will help facilitate finding the right internship.

English

The Japanese Kitsune: Bestower of Supernatural Good or Evil?
Presenter(s): Tiffany Wong
Advisor(s): Dr. Eileen Jankowski
The Kitsune, known as the fox spirit in Japanese culture, and Kumiho in Korea, is rooted in Chinese mythology where it is known as Huli Jing. Foxes hold the honor of being one of Japan's five spiritual animal species and shared a close relationship with humans in Ancient Japan, so it is no surprise that Kitsunes have made such a lasting impact on its culture. These shape shifters are known to be benevolent creatures, as well as evil, sometimes seeking humans to eat their flesh to absorb memory and their human form. This classification of foxes is the yako, and brings destruction and anguish. Zenko foxes, however, are associated with the goddess of prosperity, Inari, and bring happiness and wisdom. Furthermore, Kitsunes gain their magical looks and powers as they grow a new tail every 100 years, growing up to nine in total. The Kitsune and Japanese folklore bear a similar likeness to Greek mythology. Much like how the Japanese worshipped Inari, the Greeks worshipped gods who were also associated with an animal. For example, Zeus's sacred animal is the eagle, and Poseidon's, the dolphin. These animals served gods and intervened in human lives on account of the gods they belonged to. One difference, however, is that the Japanese made sacrifices to the Kitsune themselves, as they were seen as deities who had the power to bestow either supernatural good or evil on humans. The Kitsune's importance to the Japanese has not faded since its first appearance in Japanese literature in the 10th and 11th century, where they were simply told as black and white foxes that were associated with either good or evil. Today, they can be seen as statues throughout Japan, near shrines for Inari, and even through Western literature such as Jeannine Hall Gailey's poem, "The Fox-Wife's Invitation".

Harry Potter's Mythical Monsters: Victims of Structural Power and Privilege

Presenter(s): Lauren Sieberg
Advisor(s): Dr. Julye Bidmead

How can the realm of fiction–specifically in relation to popular speculative literature–reflect the real societal issues we see in the world today? Through a meticulous dissection of one of the most popular works of modern fantasy, J.K. Rowling's Harry Potter series, it becomes evident that novels such as these often act as a window into complex concepts we deal with in real life. One such topic is the construction of privilege and power; not only does this include how some have more power than others, but it also delves into how aspects of one's identity can intersect and complicate the advantages or disadvantages they are assigned within society. In Rowling's Wizarding World, not all magical beings and beasts are considered equal. Throughout the series, it is established that numerous magical creatures are social outsiders who lack the privilege and power that most wizards are automatically granted, ranging from private property ownership to autonomy to the right to pursue one's greatest dreams without judgment. For beloved characters like Remus Lupin and Rubeus Hagrid, this means that they cannot be viewed as insiders to the larger wizarding population while still being true to significant aspects of their identities (being a werewolf and half-giant respectively), leading them to hide those parts of themselves for fear of being misunderstood. Many creatures, such as mermaids and house elves, are not even given the luxury of choosing how they are viewed by the magical community and are misjudged with little to no power or privilege in the wizard-centric society. By deconstructing these conflicts within Harry Potter, we can improve upon our understanding of their parallels to issues faced by numerous marginalized groups in our own world, demonstrating how fiction often helps us explore a range of lived experiences and cases of inequality and inequity.

Why Are We Afraid of the Unknown?

Presenter(s): Mia Crum
Advisor(s): Sam Risak

The purpose of my project is to answer the questions "why are we afraid of the unknown?" and "how is this fear used effectively in horror movies?" from a psychological perspective. According to clinical psychologist Steven Reiss, many fears that we have can be underpinned by the fear of the unknown. To answer these questions I'll be looking at movies from the "psychological horror" genre as it's all about the darker side of the human psyche, deep emotional fears, and psychological struggles translated to film. Pareidolia and the uncanny are two themes frequently used in this genre to create a sense of humanity where it shouldn't be and remove it from where it should be. Sigmund Freud's essay titled "The Uncanny" addresses the meaning of "uncanny" and concludes that these fears are a return of repressed ones rooted in childhood experiences. For the creative aspect of this project, I've created a short story that presents the fear of the unknown in a day to day setting while using elements of the uncanny and pareidolia to make my audience uneasy. The story follows a woman who's house-sitting for her wealthy friends while they're on a 2-week honeymoon vacation. Strange things start happening around the house that slowly drives the protagonist to her breaking point. I hope by providing my audience with this research and my creative project they will be able to conclude whether or not they believe the unknown is effective in horror.

Horror-Comedy Guidelines

Presenter(s): Nick Pavlakovich
Advisor(s): Sam Risak

The purpose of my short story "Isolation" is to successfully prove horror and comedy can go together. Many people believe the two don't mesh, which I would like to disprove. The story will follow a group of college students on a travel study who get stranded in the Australian Outback. One of the keys to my story being successful will be the interaction between the characters. In order to make these relationships as strong as possible, I have read two articles about psychology and personal interactions. When it comes to the use of horror-comedy, I want to apply a strategy that Stephen King has used in his stories. This is to focus mainly on fear. A perfect example of this is the famous "Here's Johnny" line from The Shining, because it is meant to be scary, but also makes the audience laugh. The base of the story must be horror to implement comedy in a correct way. If I were to use comedy as a foundation, I don't think that would work well. It is easier to make a scary story funny than it is to make a funny story scary. Obviously, there are not many short stories that use horror-comedy, so much of my research on the topic has been through films. For example, Scream writer Wes Craven wrote characters that the audience would not want to know. I believe this will be a hard element to use. However, I think it is an ideal strategy when it comes to writing horror. I want to feel connected to the characters I write, but I want to base them off the type of person I don't personally like. This story should be successful in proving that horror and comedy work well together by following some of these guidelines.

Incorporation of Infrasound and Musical Elements in Horror

Presenter(s): Isabella Sills
Advisor(s): Sam Risak

The purpose of this project is to research and investigate the effect music and sound effects have on horror films, specifically, the natural phenomena known as infrasound will be explored in depth. Just outside our range of hearing at 20 Hz, infrasound may not be audible, but can still cause physical reactions such as anxiety, uneasiness, and extreme sorrow (Morrow, 2017). I am looking to create a horror comic in the form of a video that heavily relies on musical cues and the incorporation of infrasound to build up parts of the story told in the form of a comic. In the case of horror films, the usage of infrasound combined with musical scores contributes to viewers' unease and naturally puts them more on edge as they begin to anticipate the next scare. Little is known in regards to infrasound and its incorporation in horror films, however both the 2007 film Paranormal Activity and 2002 French psychological-horror film Irréversible utilized infrasonic sound to create chilling sound effects. This project will explore creative ways to incorporate the usage of musical cues and infrasound in horror to illustrate the vital role this phenomenon has on the effectiveness of horror films. In addition, I hope that by incorporating sound into a visual project, this will provide a more immersive experience for the audience.

Serial Killers in the Media

Presenter(s): Samara Othmani
Advisor(s): Sam Risak

The purpose of this project is to bring awareness of the growing attraction of male serial killers in the horror genre. White, aggressive, straight males have constantly been portrayed as attractive through the media, most of the time this has been done in horror films. Horror films provide an excellent opportunity to highlight serial killers. I believe that creating a short film designated in exaggerating the media's

glorification on serial killers will provide insight on how dreadful these points of views actually are. In my short film I would like to create the main character antagonist as a white, violent, straight, attractive male, therefore, throughout the film I would like the audience to feel love as well as hatred towards this character. The audience will be questioning their relationship between themselves and the antagonist. At first, I will present the antagonist as the protagonist, I will do this by portraying him as a welcoming, charming, attractive male. I will use music to highlight this idea by playing cheerful and bright music. Then as his true personality unfolds the film will take a dark turn…literally. The second half of the film will be in black and white, without any cheerful or bright music. These visual and auditory techniques will allow this transaction to be sharper and more focused. Although, this might seem redundant to films that glorify serial killers, I vision my film to completely mock that idea. By mocking this idea, I hope to educate the public on the affect this idea has on younger viewers. manipulated by the media. This type of horror movie will be able to educate the audience in a different way than any other genre could.

FFC

The Aesir Gods of Asgard: The Death of Balder
Presenter(s): David Cooper
Advisor(s): Dr. Eileen Jankowski
When Odin and his brothers fashioned the world out of Ymir's corpse, one single parasitic plant grew from the giant's muscles which would bring about the death of the most beloved of the gods. Unlike other religions the Norse gods were mortal, in fact, they were guaranteed to be destroyed in Ragnarök, the battle said to destroy the universe. Balder, the god of purity and light, dreamed of his impending demise which inspired his mother, Frigga, to exact oaths from every living being in the universe to not harm Balder. Believing that mistletoe was too small and too weak to harm her beloved son, Frigga skipped over it. Loki, the god of mischief, learned about how she missed the plant and quickly fashioned a dart made of mistletoe and instructed Hodr, Balder's blind brother, to throw the dart under Loki's guidance. The dart struck Balder and he fell to the ground, dead. As punishment, Odin threw Loki in prison in the deepest cavern on earth underneath a serpent whose venom would drip on the face of the god of mischief. Loki writhed in pain each time the venom would drip onto his face, causing the earth to shake. Balder's death was the first sign of the coming of Ragnarök and the end of ages. The death of Balder explained to the Vikings why exactly the earth rumbles causing destruction and why Loki holds such a grudge against the Aesir. The Greeks believed that earthquakes took place whenever Poseidon struck the ground with his trident. Where Loki struggled to get away from the toxic venom of the serpent placed above his head, Poseidon struck the earth whenever he was in a bad mood or felt that the earth must be punished.

Lakapati: Hermaphrodite Goddess in Tagalog Mythology
Presenter(s): Kari Lien
Advisor(s): Dr. Eileen Jankowski
Lakapati, the hermaphrodite goddess of fertility and agriculture in pre-colonial Philippine mythology, still stands as an important figure in modern Filipino thought. While not all Filipinos today may pray to her to bless their crops and guard their pastures, many stories still circulate about this important goddess. Scholars speculate that the fact that early Tagalog society considered Lakapati to be

androgynous/hermaphrodite suggested they appreciated the power balance between male and female she embodied. The Philippines are today are a predominantly Catholic country after Spanish missionaries arrived, so how much her androgyny is still emphasized will inform my research. A useful comparison will also be to consider similarities and differences between Lakapati and Demeter, the Greek goddess of fertility and agriculture, as well as consider Hermaphroditis, the androgynous son of Hermes and Aphrodite.

Health Sciences and Kinesiology

Geography of Crime And Violence Surrounding Tobacco Shops, Marijuana Dispensaries, and Off-Sale Alcohol Outlets in South Los Angeles; 2015-2018 Comparison

Presenter(s): Jacy Sera, Elmer Camargo Pena, Olivia Lounsbury
Advisor(s): Dr. Jason Douglas

Legal drug properties, such as tobacco shops, are neighborhood-level institutions that (1) are prevalent in low-income communities of color, and (2) frequently associate with compromised community health and wellbeing. Our research was the first to identify crime and violence increases proximal to tobacco shops in South Los Angeles (SLA), CA. Yet, these initial findings only begin to address a major gap in our understanding of health compromising crime and violence associated with legal drug properties. Thus, the current paper seeks to examine temporal geographic crime and violence associations with tobacco shops, off-sale alcohol outlets, and medical and recreational marijuana dispensaries (a new legal drug outlet in California as of January 2018) in SLA. We accordingly conducted spatial buffer analyses to examine change in property and violent crime within 100-foot buffers of each property using 2015 and 2018 crime data. Following, we conducted spatial regression analyses to investigate the relationship between legal drug outlet density and property and violent crime at the census tract unit of analysis for both project years. Results indicated that property crime decreased significantly from 2015 to 2018 around medical and recreational marijuana dispensaries. Spatial regression analyses revealed that tobacco shops, but not off-sale alcohol and medical/recreational marijuana dispensaries, associate with property and violent crime escalations in SLA. Thus, our study findings indicate that medical and recreational marijuana dispensaries may have improved security and social controls that deter crime and violence. Furthermore, our research verified that tobacco shops continue to pose a public health threat that associates with crime and violence. Therefore, we contend that (a) additional research is needed to identify the mechanisms that connect tobacco shops to crime and violence, and (b) additional policies regulating tobacco shops will be necessary to improve health and safety.

History

Passport Protection: The Role of Turkish Diplomats in the Holocaust

Presenter(s): Rosita Saul
Advisor(s): Dr. Marilyn Harran

Through courageous initiatives on behalf of endangered Jews, individual Turkish diplomats exceeded government policies while simultaneously following the intent of those policies. Both the government of the Republic of Turkey and individual Turkish diplomats viewed Turkish Jews as respected members of the national community. Jews had been accepted members of Turkish society since their mass immigration

during the sixteenth century Spanish Inquisition. At the same time as Hitler sought to rid Germany of Jews, Ataturk, the leader of Turkey, sought to recruit Jewish professionals to aid in westernizing his country. When Jews experienced increasing persecution in France and on the island of Rhodes, Turkish diplomats intervened on their behalf. Article 88 of the Turkish Constitution granted Turkish citizens living outside of the country continuing citizenship as long as they regularly renewed their citizenship at consulates. However, many Turkish Jews living in France or on the island of Rhodes had failed to register and therefore had allowed their Turkish citizenship to lapse. They were therefore ineligible for protection by the Turkish government. In order to save as many Turkish Jewish citizens as possible while awaiting approval from the government, Turkish consular officials categorized these citizens as "irregular." This enabled them to provide protection through "Certificates of Citizenship" until full citizenship could be restored. When Nazi authorities refused to recognize these Jews as Turkish citizens, the diplomats responded that Turkey did not discriminate among its citizens by either race or religion. Necdet Kent, Turkish Consul in Marseilles, and Selahattin Ülkümen, Turkish Consul in Rhodes, used their official status to follow the cases of Turkish Jews. Behind the scenes and unofficially, they risked their lives to protect not only Jews who were Turkish citizens but also those who had failed to renew their citizenship.

Integrated Educational Studies

EduStream
Presenter(s): Jon Le, Moises Lopez, Koby Yoshida
Advisor(s): Dr. LouAnne Boyd
After getting a glimpse into a world where we are unable to leave our houses, we realize the level of in-class education has been a difficult one to uphold. Many people are currently struggling to keep up with class material due to the new online format. However, there have been people experiencing these problems with education long before 2020. EduStream aims to provide tutoring sessions through live-stream and recordings to anyone looking to improve their education. During early versions of EduStream, user testing was collected through paper prototyping and the testing revealed EduStream is a program that university students would be willing to use. Students were interested in the simplicity of the interface and countless hours of free, additional help they would have available to them at a moment's notice. The idea of live-streaming classes and tutoring sessions is something we expect to help make learning more accessible to users who are unable to attend class and further enrich the learning process for everyone involved. We are able to include a larger demographic of people into the education system by allowing learning opportunities to extend outside of the classroom while simultaneously enhancing current students by having class lectures accessible outside of the classroom.

Mathematics

The Structure of Distributive Idempotent Weakly Conservative Lattice-Ordered Magmas
Presenter(s): Natanael Alpay
Advisor(s): Dr. Peter Jipsen
A lattice with 0 is an algebra $(A,\wedge,\vee,0)$ such that $\wedge,\vee$ are associative, commutative, absorptive ($x \vee (x \wedge y) = x = x \wedge (x \vee y)$) binary operations and $x \vee 0 = x$. A lattice-ordered magma (l-magma for short) $(A,\wedge,\vee,0,\cdot)$ is a lattice with 0 and a binary operation $\cdot$ such that $x0 = 0 = 0x$, $x(y \vee z) = xy \vee xz$ and $(x \vee y)z = xz \vee yz$ hold for all $x, y, z \in A$. A distributive idempotent l-magma (or dil-magma) is an l-magma A that satisfies $x \wedge (y \vee$

z) = (x ∧ y) ∨ (x ∧ z) and xx = x. Let J(A) be the set of completely join-irreducible elements of A, and define the property of weakly conservative as xy = x ∧ y or xy = x or xy = y or xy = x ∨ y for all x, y ∈ J(A). We show that every dually-algebraic weakly conservative dil-magma A is determined by two binary relations on the partially-ordered set J(A). In the case where the binary operation · is commutative and associative, and where the distributive lattice (A,∧,∨) is a complete and atomic Boolean algebra, we show that the structure of these algebras is determined by a preorder forest on the set of atoms of A. From these results we obtain efficient algorithms to construct all weakly conservative dil-magmas of size n and all Boolean commutative dil-semigroups of size 2^n.

Political Science

Political Engagement and Income

Presenter(s): Lorig Yaghsezian
Advisor(s): Dr. John Compton

Political engagement is defined as participation in a broad range of activities through which people develop and express their opinions of the world and how it is governed and attempt to take part in and shape the decisions that affect their lives. Examples of political engagement can be face to face interactions, rallies, posting to social media, contacting local officials, voting and more. Political engagement in the United States is low; only about 60 percent of eligible citizens voted in the 2016 general election. In the midterm election, only one in four individuals who earned less than $10,000 voted in 2014. Currently, even fewer individuals contact their local officials and only about 15 percent of individuals vote in local government elections. Researchers have found participation at all levels of government to be declining in the last 50 years. Robert Putnam in his book "Bowling Alone," said that Americans have voted less, exhibited lower levels of trust in government, and taken part in fewer communal activities since the 1970s. My hypothesis is that higher income causes higher political engagement, not only in voting but also in other avenues such as campaign work, social media usage and rallies. This can be seen not only in the general election, but also in local politics as well.

Psychology

The Clever Hans Effect Seen Through Pupil Dilation

Presenter(s): Gilana Pikover, Dehua Liang, Akima Connelly, Nate Everett, Laura Castellanos, Kayla Ghodsi
Advisor(s): Dr. Amir Raz, Dr. Uri Maoz

Clever Hans, a horse in the late 1800s and early 1900s, was reported to be able to do basic arithmetic and perform other cognitive tasks. However, after extensive research, German biologists at the time, Oskar Pfungst and Carl Stumpf demonstrated that the horse was able to detect unconscious micro-movements that the person asking the question, and especially its trainer, would make. Hence, only if the person asking the question knew the answer to the question and the horse could see the person, the horse could tap his hoof enough times to count towards the correct answer. The Clever Hans phenomenon highlighted the existence of subtle, unconscious cues for communication. It also served to highlight the importance of double-blind studies. The proposed study consists of two stages. During the first stage, the Clever Hans phenomenon will be recreated. Subjects will be asked a basic arithmetic question, and then hear taps that the subject counts until it reaches the correct answer. The questions are addition and subtraction, with

answers ranging from one to ten. Pupillometry is used to track the subject's pupillary change during this process, looking specifically at pupillary changes that suggest anticipation and tension towards the answer, and then the ease of that tension. The experimental process uses no visual information, except a fixation point for subjects to look into, to reduce the risk of pupillary change due to external stimuli. In the second stage, this pupillary data will be used to train a machine learning program that will learn to identify the subtle, involuntary, pupil movements that are unconscious to the subject. By only looking at pupil dilation data, the program will be able to determine the answer to a math question that the participant is thinking about, using the same process from the first part of the study without the program having any previous knowledge of the answer to the question asked.

Men With Higher Levels of Testosterone-Linked Traits Report Greater Dating Confidence

Presenter(s): Skye Sakashita
Advisor(s): Dr. David Frederick

Sexual selection theory posits that women prefer men with testosterone linked traits such as muscle tone (Frederick & Haselton, 2007) and voice pitch (Puts, 2006). What effect do these preferences have on men's mating strategies and confidence during courtship? We expected that men who perceive themselves to be more masculine than average and who are more satisfied with these traits will have higher dating confidence.

Childhood Levels of Optimism Linked to Adult Physical Activity Participation

Presenter(s): Natalie Moorhead, Danielle Zahn, Marina Carr
Advisor(s): Dr. Julia Boehm

Physical activity is important in maintaining a healthy lifestyle, however, as individuals age, participation in physical activity tends to decline. Thus, it is important to determine factors that promote physical activity across the lifespan. Research has shown that adults with higher levels of optimism tend to engage in more physical activity than those who are less optimistic. However, substantially less is known if optimism in childhood is longitudinally associated with physical activity in adulthood. We hypothesized that children with higher levels of optimism would participate in more physical activity in adulthood compared to their less optimistic peers. Data were from the 1958 British Birth Cohort, a longitudinal study in which 11-year-old participants wrote about how they imagined their life at age 25. Essays were coded by two raters for the presence of psychosocial resources, including optimism. Physical activity was self-reported at age 33 by asking participants if they regularly participated in any of 11 specific activities and, if so, how often they took part in any of the activities. The original responses were recoded into four physical activity frequency categories: rarely, low frequency, medium frequency, and high frequency. Ordinal logistic regression analyses (N = 4,708) determined the association between childhood optimism and frequency of physical activity in adulthood. Models were first unadjusted and then controlled for sex, child financial hardship, and child cognitive ability. In the unadjusted model, higher levels of childhood optimism were significantly associated with greater physical activity in adulthood (b = .06, 95% CI = .005, .11). In the fully-adjusted model, the association persisted but the confidence interval was slightly wider (b = .05, 95% CI = -.005, .10). This study is one of the first to suggest that childhood optimism may be associated with physical activity in adulthood. Early-life interventions focusing on strengthening optimism may be beneficial for the maintenance of physical activity throughout adulthood.

Mode of Delivery and Infant Cognitive Development

Presenter(s): Madison Olson
Advisor(s): Dr. Laura Glynn

The rate of nonindicated cesarean births is increasing each year within the United States. Although cesarean delivery can function as a life- saving intervention, emerging evidence suggests that it may also be associated with deleterious developmental consequences for the child. Here we test the hypothesis that mode of delivery is associated with cognitive development during infancy. 229 pregnant women were recruited and their infants' cognitive development was assessed at 6, 12 and 24 months with the Bayley Scales of Infant Development. Medical charts were reviewed by obstetric nurses to determine prenatal medical risk and birth outcomes, including mode of delivery. Infants who were delivered vaginally (n = 163) exhibited better performance on the mental development index of the Bayley at 6, 12, and 24 months (M= 98.56, 96.20, and 98.79 respectively) compared to those delivered by cesarean (n =66 ; M= 94.38, 89.64, 90.83 respectively; all F's > 7.97 and all p's < .005). These group differences remained even after consideration of potential covariates and third variable explanations in ANCOVA models including: 1. Whether the birth was spontaneous or induced 2. Length of gestation 3. A range of demographic factors including maternal age, socioeconomic status and postpartum depressive symptoms. The benefits of cesarean delivery when medically indicated are undisputed. However, these findings suggest that in the case of nonindicated cesarean delivery, practitioners should carefully consider the potential short and long-term costs and benefits of this intervention.

Gamma Frequency Sound and Perceptual Binding Ability

Presenter(s): Vincent Aurigemma
Advisor(s): Dr. Tara Gruenewald, Eunice Choi

Past research has indicated the potential therapeutic benefits of low frequency sound for pain management and reduction of disease related symptoms. Low frequency (40 Hz) sound is believed to activate gamma wave activity in the brain which has previously been linked to enhancement of cognitive performance on tasks that require the use of perceptual binding to discriminate between objects and the basic shapes that they consist of. While studies have indicated that gamma wave activity is involved in tasks that require perceptual binding, there has been no research directly linking gamma frequency sound and perceptual binding abilities. The aim of this research is to facilitate a closer investigation of the relationship between exposure to low frequency sound and perceptual binding performance. In a first study, Chapman University students participated in an online experiment in which they were randomly assigned to listen to a 40 Hz tone or silence. Following the listening period, participants completed a brief assessment of perceptual binding ability. Data collection is ongoing, but it is expected that analyses will further illuminate whether low frequency sound exposure can enhance perceptual binding performance, which is an important ability for navigating activities of daily life.

Narcissism, Loneliness, and Social Relationships

Presenter(s): Janessa Chase
Advisor(s): Dr. Tara Gruenewald, Eunice Choi

There has been much research examining the relationships between human interactions and psychological well-being. Previous studies have examined how one's perception of loneliness, the quality and quantity of their social relationships, and their levels of narcissism may impact their psychological well-being (PWB). Such research has demonstrated that PWB is negatively correlated to loneliness,

positively correlated to positive social relationships, and has a curvilinear relationship to narcissism. The current study sought to examine how these factors associated with PWB relate to one another. More specifically, the current research examined 1) whether people who are more narcissistic are less lonely, 2) whether people who are more narcissistic have fewer positive relations, and 3) how each of the seven facets of narcissism are related to both loneliness and positive relations. It is hypothesized that narcissism scores will be negatively correlated with loneliness and curvilinearly related to positive relations. Loneliness is also expected to be negatively correlated with positive relations. Participants were college aged young adults who completed an online survey which included the UCLA loneliness scale, Narcissistic Personality Inventory, and positive relations subscale of the Ryff PWB Scale. Data collection is ongoing, but it is expected that the proposed analyses will provide insight into the relationships between narcissism, loneliness, and positive relations, and may ultimately contribute to knowledge of how increase PWB.

The Effects of Luxury in Social Media on Mental Health

Presenter(s): Elena Ruffo
Advisor(s): Dr. Tara Gruenewald, Eunice Choi

Social media use is associated with higher levels of upwards social comparison which is linked with negative mental health outcomes like poor body image, negative affect, depression, and anxiety. However, there is limited research on the types of content on social media that generates such upwards social comparison. The current study aimed to address this by examining how viewing luxury photos on social media may stimulate more upwards social comparison and in turn, negative affect, depression, and anxiety. Participants will include college- aged adults who will complete an online survey experiment in which they are randomly assigned a set of Instagram photos of luxury stimuli (designer fashion, luxury cars, expensive real estate) or a set of abstract art photos. Following viewing the luxury stimulus (Luxury photos) or the non-luxury stimulus (artwork photos) participants completed assessments of social comparison and self esteem. Then participants completed assessments of depression and anxiety. Data collection is ongoing but the analysis will test whether luxury social media exposure induces upwards social comparison and decreases self esteem. We will also examine whether these processes are associated with individual's levels of anxiety and depression. This research will provide a greater understanding of the implications of social media use and its effects on young adult mental health.

Religious Studies

Norse Mythology's God of the Sky and Protector of Mankind: Thor

Presenter(s): Haley Jimenez
Advisor(s): Dr. Eileen Jankowski

Norse mythology contained the spiritual beliefs of the pre-Christian Scandinavian people; these myths were viewed as the ancestral history prior to Christianity. A particularly well-known, and favorite of the Vikings, was the Norse god Thor. He's son to the almighty chief of gods, Odin, and protector of man. Thor is known for his strength, endurance, honesty, and quest for battle. In modern society, he is widely regarded through Marvel's depiction in Avengers' film "Thor". There, he is often viewed carrying a hammer, and is similarly loved and appraised among the mortals. Thor's hammer was forged by dwarfs and is one of the most frightening weapons, it can send out lightning bolts and is capable of tearing down

mountains. It also had the ability to revive animals, as well as people. Thor was the characteristic hero of the stormy world of the Vikings; he embodied all the traits the vikings aspired to have. Thor's significance to the early Scandinavian people was that he acted as a source of hope for mankind. They believed the thunder in the sky was Thor protecting them and would often pray to him and Odin. Evidence of Thor's popularity can be seen clearly in Iceland, where more than a quarter of the founding population contains some form of his name in theirs. Descendants of this religion and mythology still continued to wear hammer amulets even after converting to Christianity, indicating that Thor's role as a hero and protecting influence has not diminished. In this research, Thor's widespread popularity will be examined in the age of the Vikings in contrast with his modern day significance.

Film

Cult Cinema and Viewing Praxis

Presenter(s): Lyric Luedke

Advisor(s): Dr. Kelli Fuery

Studies of cult cinema have long been dominated by questions of intertextuality (Bruce Austin, 1981), when in fact the intersubjective viewing experience of cult films occupies a critical, if neglected, role in our understanding of cinematic spectatorship. According to Jeffrey Sconce (1995) and Siegfried Kracauer (1987), cult cinema has historically invited active participation alongside the text on behalf of the spectator. This means that the physical, discursive, and affective viewing environment is paramount to the function of cult cinema. Whether its audience arrives costumed as a favorite character, dances in the aisles during musical interludes, or brings objects from home to toss toward the screen on cue, the experience of the cult text transcends the bounds of the frame, and is actively created in turn by the spectator. This paper will triangulate the work of Pierre Bourdieu (1984) on taste with the work of Susan Sontag (1999) and Tom Gunning (2019) on excess, spectacle, and immersive modes of spectatorship, in addition to citing films such as The Rocky Horror Picture Show (1975) and The Room (2003), which are exemplary of the behaviors listed above and therefore provide a basis for any delineation of the cult viewing environment. Overall, this paper will examine the vital condition of intersubjective viewership to cult cinema and suggest applications to the lived experience of film and technology in an increasingly interactive 21st century media landscape.

Media Manipulation and the Uncertainty of Recorded History

Presenter(s): Marc Heller

Advisor(s): Dr. Kelli Fuery

Lived experience and media have become increasingly intertwined within the Western World to the point of becoming indistinguishable. Jean Bauldrillard's book Simulation and Simulation(Bauldrillard, 1983) demonstrates the reflexive nature of phenomenological understanding of and semiotic depiction. Using Stuart Hall's Reception Theory presented in Encoding and Decoding in the Television Discourse (Hall, 1973) and Hannah Arendt's essay "Lying In Politics''(Civil Disobedience, Arendt 1972), I aim to investigate how media transmitted to a massive audience has the power to shape the collective reception experience. The response of Reddit users to the 2013 Boston Marathon Bombing exemplifies how a collective belief altered the history of the event as it was unfolding in real-time. The users attempted to hunt down the perpetrators of the terrorist attack, placing guilt upon the wrong individual in the court of public opinion; their attempted vigilanteism resulted in their suspect's suicide. When experiences become depicted in media, their histories' are dominated by their popular representation; forcing those with a lived experience of the represented moment to establish either a negotiated or oppositional reception. This can be seen with culturally impactful experiences like the OJ Simpson and Ted Bundy trials and depiction within both narrative and documentary film. The Ted Bundy trials gave many Americans their first interaction with a serial killer by projecting the trial's events into television sets across the nation, allowing his charisma to shape his public reception. The OJ Simpson trials received a similar broadcasting event, depicting another charismatic and camera friendly suspect, now with race relations and previously established fame to be added to the mix. As these moments slip farther and farther into the past, their representations become increasingly hegemonic; reducing the ability for those without the lived experience to negotiate or oppose the given representation.

Wes Craven: Desensitization and Violence

Presenter(s): Melissa Cusano

Advisor(s): Dr. Kelli Fuery

It is long debated (Barker and Petley 1997): Why do we enjoy horror? Suggested in the 1994 Newson Report: Does cinematic violence cause real life violence? Voyeuristic film spectatorship has been associated with satisfaction (Mulvey 1975). In Sigmund Freud's Three Essays on Sexuality, scopophilia is an unconscious agency of pleasure, one that is achieved through the objectification of another, removing all agency of selfhood with regard to desire in looking (Freud 1905). Filmmakers aren't always conscientious in their capitalization of this human impulse. This study will highlight Wes Craven's The Last House on The Left (1972) and Scream (1996). Craven is a pioneer for self-referential teen slasher films and Scream is aware of the conventions. Protagonist Sidney even jokes that all slasher films are the same. Noël Carroll suggests that to side with protagonists, the spectator must sympathize with them and those who punish impurity and eliminate them of disgust with impure characters: "...moral concern ripe for articulation by moviemakers is that of purity, and, especially, violations therefore" (Carroll 2010). Craven's films often have immoral protagonists. They defy the rules; their death becomes permissible, in response to the effect that this strategy causes. Can viewing cinematic violence lead to desensitization? A study on emotional and physiological desensitization stated: "...habituation effects that may indicate physiological desensitization to televised violence" (Mrug 2014). Alison Young argues that violent films invite the spectator to see "illegitimate as legitimate" (Young 2009). I will compare Craven's films and today's True Crime documentaries, notably I Am Killer (2018): Death row inmates tell their story. It may be tricky comparing fiction to documentaries, yet they present the killer similarly. The crime is introduced first, backstory next. Highlighting tactics used in Craven's films and modern True Crime documentaries, the question is asked: Is media violence responsible for heightening desensitization to real-life violence?

Chemistry

Computational Investigation of the Mechanism of HOCl-mediated Cysteine Oxidation in the Conserved Zinc-Binding Core of Cytosolic Chemoreceptor Transducer-Like Protein D (TlpD)

Presenter(s): Lindsay Zumwalt
Advisor(s): Dr. O. Maduka Ogba

Helicobacter pylori, a gastric pathogen present in about 50% of the global population, is known to facilitate gastritis, stomach ulcers, and stomach cancer. Previous experimental studies show that local unfolding at the conserved chemoreceptor zinc-binding (CZB) domain within the transducer-like protein D (TlpD) cytoplasmic chemoreceptor upon contact with hypochlorite (a known biological oxidant), is implicated in the mode in which H. pylori effectively colonizes the stomach. However, the mechanism of oxidation at the conserved zinc-bound cysteine residue upon HOCl contact, the role of the zinc complex in modulating the reaction, and the origins of selective oxidation are unknown. Our work utilizes DFT computations to probe plausible mechanisms for the oxidation process, illuminates the role of ligand exchange equilibria at the zinc complex in modulating the reactivity and regioselectivity, and provides new hypotheses for the origin of the chemoattractant response. Insights from our computational study will be presented.

Computational Investigation Into the Origins of Reactivity for Metal-Thiolate Complexes in the activation of H-E bonds

Presenter(s): Joshua Oommen, Zach Nelson
Advisor(s): Dr. O. Maduka Ogba,

Within the last decade, experimentalists have attempted to mimic the heterolytic bond cleavage of H-H bonds by [NiFe] hydrogenases by constructing synthetic metal-thiolate complexes using various transition metals for its potential applications in industrial reduction chemistry and alternative fuel sources. In their seminal work in 2008, Stradiotto and colleagues synthesized an iridium (III) and a rhodium (III) thiolate complex that was used for the successful cleavage of silane (Si-H) bonds, facilitating the hydrosilylation of ketones. Experiments reveal that stoichiometric amounts of the iridium (III) complex was needed for this transformation, while catalytic amounts were achieved for the rhodium (III) analog. The mechanism for the reactions using both metal-thiolate complexes and the origins of differing reactivity between the complexes have not been explored. Our research goal is to use quantum mechanical computations to (i) elucidate the plausible mechanism(s) for Si-H activation mediated by both metal-thiolate complexes, and (ii) uncover the factors affecting the difference in reactivity between these complexes i.e., stoichiometric for iridium(iii), catalytic for rhodium(iii). Furthermore, experimental attempts to heterolytically cleave dihydrogen (H-H) using these complexes failed, and results from our work will serve as a launch point for designing metal-thiolate variants for this important transformation. In this presentation, we will present the computed ground state complexes along the reaction pathway toward the hydrosilylation of acetophenone using both iridium (III), rhodium (III), and cobalt (III) metal thiolate complexes, and present our validation analysis with existing crystal structures. Our current hypothesis for the differing reactivity based on the ground state complexes will be discussed.

Computational Investigation of the Factors Precluding Catalytic Turnover in Ca(NTf2)2 Mediated Sulfur(VI) Fluoride Activation

Presenter(s): Brian Han, Matthew Nwerem
Advisor(s): Dr. O. 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 pre-cursor by an amine nucleophile. However, the relative instability of sulfur(VI) chlorides makes selective synthesis challenging in the presence of competing nucleophiles, and hence precludes late-stage functionalization of complex natural products. Sulfur(VI) fluorides have become an attractive alternative to the chloride analogs given the increased selectivity that can be achieved with these precursors. Our collaborators succeeded in synthesizing nitrogen-containing sulfur(VI) compounds under mild condition using a myriad of sulfur(VI) fluorides in the presence of amine nucleophiles and mediated by calcium triflimide – Ca(NTf2)2. This contrasts conventional methods where strong base/nucleophiles with elongated heating process were required. However, the mechanism for sulfur(VI)-fluoride activation using Ca(NTf2)2 is not known, and in most cases, stoichiometric calcium triflimide is required for the transformation. In my research project, we used quantum mechanical calculations to shed light on the reaction mechanism for Ca(NTf2)2 mediated sulfonyl-fluoride activation and specifically, to elucidate the factors preventing the catalytic turnover of Ca(NTf2)2 in t-BuOH as solvent. In this talk, I will present the minimum energy pathway for Ca(NTf2)2 mediated sulfur(VI) fluoride activation, and our current hypothesis for the origins of inhibition in this reaction.

Index

K

L

M

N

O

P

Q

R

S

T

U

V

W

X

Y

Z