CREATIVE **COLLABORATIONS** UNDERGRADUATE RESEARCH CONFERENCE

Thursday, April 20, 2023 | 12 -2 p.m.
University of San Diego | Hahn University Center
www.sandiego.edu/cc-urc
Office of Undergraduate Research

Student-faculty
Research
Scholarship
Creative Works

WELCOME to the Creative Collaborations Undergraduate Research Conference! We are thrilled to have you all here, representing various fields of research and showcasing your creativity and hard work.

This conference aims to provide a platform for undergraduate students to showcase their research, engage in meaningful discussions, and foster collaboration with their peers. We believe that this event will not only enrich your knowledge but also give you a unique opportunity to network with fellow students and faculty.

This year's conference features a diverse range of research topics that reflect contemporary society. Topics range from Business to Humanities to the Sciences, including the intersection of fast fashion and sustainability in consumer tendencies, deconstructing the colonial hierarchies of the #vanlife movement, and the incorporation of plastics into marine snow. Students from the Shiley-Marcos School of Engineering will also be featuring their technologies, including a bio filter made out of plant xylem and a voice-controlled hand cycle gear shifter for military veterans with limited hand control or finger dexterity. We hope you enjoy the conference and find inspiration, knowledge, and new collaborations through this event.

Thank you for your dedication and commitment to undergraduate research, and we look forward to a successful conference!

Best regards,

Elisa Maldonado Greene,
PhD Director

Disciplines & Schedule

Pages 5 - 14: Life and Physical Sciences **Pages 15 - 19:** Social Sciences

Pages 20 - 34: Humanities

Pages 35: Math and Computer Science

Page 36 - 43: Engineering

Page 44 - 48: Business

ABTRACT BOOK

In keeping with USD's commitment to sustainability, the abstract book can be found online at www.sandiego.edu/cc-urc.

RESEARCH MONTH April 2023

Creative Collaborations Undergraduate Research Conference is part of USD's Research Month. For more information about offerings, please visit https://www.sandiego.edu/osp/research-month/2023.php

OFFICE OF UNDERGRADUATE RESEARCH

Established in September 2011 with a grant from the W.M. Keck Foundation and funding from individual donors, the mission of the Office of Undergraduate Research is to support undergraduate students in research, scholarship and creative activities. Underlying our mission is a commitment to equity and access, to ensure that all students are able to participate in and benefit from research activities both in and out of the classroom. The office provides services to both students and faculty members who mentor them in research activities, and encourages collaborations across departments, disciplines, and with the local and global community.

The University of San Diego is an enhanced institutional member of the Council on Undergraduate Research.

Life and Physical Sciences

A high-throughput microscopy method for material characterization

STEVEN DANG, J.J Siu, Philip Neill and Ryan McGorty

Optical microscopy methods are commonly employed to measure rheological properties, like viscosity or viscoelasticity, of materials from biological tissues to colloidal suspensions. Such rheological properties are important for applications such as formulating pharmaceutical ointments to tailoring the mouthfeel of foods and for answering many fundamental questions such as how phase separation proceeds and how the material properties of the cytoplasm respond to stimuli. In recent years, an optical microscopy technique for performing rheological measurements known as differential dynamic microscopy (DDM) has grown in popularity. However, a drawback of DDM is that one typically needs to acquire movies of ~1000 frames of a sample to quantify that sample's properties. If multiple samples or multiple locations within a sample need studying, this is a time-consuming process. Therefore, we devised a method to record a movie of our sample as we scan the sample using a motorized stage. This allows us to measure properties across a large region of the sample (or possibly multiple samples) quickly. However, because the sample is moving as we record images, the computational image analysis becomes more complicated. We discuss the computational image processing methods, including digital Fourier analysis and machine learning, we employ to tackle this problem.

Glucose oxidation on nickel-gold composites

NICK SHEY and Eleanor Gillette

Glucose monitoring is critical to many industries such as healthcare, food/beverage, and bioprocessing. Current glucose sensors enzymatically detect glucose, but their long-term stability is poor. Non-enzymatic glucose sensors are an attractive alternative. Instead of enzymes, metal electrocatalysts oxidize glucose, producing a current proportional to glucose concentration. High surface area, multimetallic electrodes are desirable because the abundance of active sites and synergy between different metals improve sensitivity. Nickel-gold composites containing nickel nanostructures on a gold substrate were fabricated. The electrochemistry suggests nickel may prevent adsorbates from poisoning the gold surface, and nickel/gold synergy improves electrode performance.

A Sticky Situation: Determining the Biochemical Composition of Mucilage in the Carnivorous Plant Drosera capensis

TAYLOR LOW, Lisa Baird, Steven Morrison and Carl Procko

In many carnivorous plants like Cape sundew, Drosera capensis, sticky mucopolysaccharides excreted from modified leaf structures form an adhesive 'glue' able to trap insect prey. Biochemistry of the mucilage has been studied since the mid-twentieth century, and recent studies suggested methyl ester and alkyl chain-like moieties were the sources of the adhesive property of mucilage. Our lab showed that carboxylesterase treatment of mucilage significantly reduced the adhesive property and viscosity of mucilage. Results from an RNA sequencing experiment using fed and unfed Drosera leaves revealed 35 different lipid transfer protein (LTP) genes that were upregulated up to 1000 times in fed tentacles thereby supporting the important role of lipids in tentacle metabolism and function. This work confirms and extends data on the presence of lipids and LTPs and their role in the synthesis, bioenergetics, and function of mucilage in tentacles. We hypothesize that fatty acids and triacylglycerides are synthesized in neck cells and stored in lipid bodies until they are ready to be mobilized. They move through the endodermal layer to the secretory cells where they are attached to polysaccharides before export into the mucilage. While our data show a normal composition of fatty acids in leaf and tentacle triacylglycerides, only two fatty acids, palmitic (C16:0) acid and stearic (C18:0) acid were found in high concentrations in the mucilage itself.

The effect of sex and stage of copepod behavior in response to sinking marine snow

SOPHIA LEONARD and J ennifer Prairie

Understanding the relationship between copepods and marine snow is important as they play a significant role in the carbon cycle. These aggregates are one of the main food sources for copepods and as aggregates sink they transport carbon from the surface of the ocean to the bottom. In order to ingest these particles, copepods can track chemical trails allowing them to locate the marine snow by displaying a spiraling behavior called casting behavior. In a series of experiments, we aimed to determine whether the stage or sex of copepods affected the presence of different behaviors when in the presence of sinking marine snow. To do this, copepods of the species Calanus pacificus were collected and sorted into groups of similar stages and sexes. Marine snow aggregates were created by growing the phytoplankton Thalassiosira weissflogii and then rolling them in cylindrical tanks to form aggregates. On experiment day, cameras were used to record copepod behavior in a tank with marine snow. I will present results from these experiments showing how the behavior of male and female copepods in response to sinking marine snow differed from one another, and how that might impact their chances in finding and utilizing this food source.

The Effects of Sediment Grain Size on Burial Rates of the Pacific Mole Crab, Emerita Analoga

ELAINE GIOVANNETTI and Steven Searcy

Due to climate change and resultant sea level rise our planet is suffering from increasing rates of coastal erosion. To preserve sandy beach ecosystems and mitigate coastal erosion, beach replenishment projects have become widespread. However, sediment obtained for beach replenishment often does not match the beach's original sand. Altering a beach's original sand may negatively impact the organisms that live in this ecosystem. One organism that is an important component of California's sandy beaches is the Pacific mole crab, Emerita analoga. For my research I used a controlled lab study to examine how mole crab burial time and burial amount (amount of body that was buried), were impacted by sediment grain size and which beach individuals were collected from. To determine burial time and amount burial, the individual burial trials of one-hundred mole crabs, collected from two San Diego beaches, were digitally recorded in both fine and coarse sand. Fifty subjects were collected from each of the two beaches, WindanSea Beach, La Jolla and Mission Beach. Digital video analysis identified trends that mole crabs burrow faster in the sand type consistent with that of the beach they were collected from. Trends also identified that individuals collected from both beaches burrow more completely in coarse sediment as compared to fine. These results indicate that altering a beach's native sand type through beach replenishment projects can have a negative effect on mole crab burrowing abilities, and ultimately may impact survival and risk of predation.

Changes in Characteristics of Reese River within the Shoshone Yomba Reservation, Nevada

HANNAH WHITE and Suzanne Walther

In drylands, the abundance and health of the vegetation in riparian areas can serve as an indicator for the state of the local water quantity. These areas consist of vegetation growing in proximity to a water source that is therefore greatly affected by changes to that source, such as decreased input due to human alteration or climate change. In the Reese River Valley of Nevada, the driest state in the US, within one generation members of the Shoshone Yomba tribe have reported noticeable changes to the landscape and its water supply. A lack of available data from stream gauges and updated aerial imagery hinders research in the area. In such cases, changes in river characteristics such as the measured areas of riparian coverage, sandbars, and the active water channel can be used as proxies for surface water supply. Increasing total areas of sandbars and decreasing total areas of riparian vegetation and the active water channel over time, can signal changes in the surface water supply in the Valley and may be evident of climate change. In this project, I use Google Earth imagery from 2010, 2013, and 2016 to digitize sandbars, riparian vegetation, and active water channel and ArcGIS Pro to calculate the total areas from each year of the Reese River within the Yomba reservation to assess measurable changes to the landscape. The greatest changes occurred between 2010- 2013, with a decrease in riparian and an increase in sandbar areas, reflecting concerns in a decreased water supply in the valley.

Analysis of pIgR expression in adult zebrafish

BIANCA DE LEON and Valerie Hohman

Most infections begin when pathogens have entered the body through mucous membranes and attack the healthy tissues causing inflammation. Polymeric immunoglobulin receptors or pIgR, are an essential molecule that helps contain the infection by delivering antibodies that target the pathogens and weaken their effects. While pIgR localization has been detected in the gills, intestines and liver of various species of teleost fish, data analyzing cellular expression in these tissues are limited. The purpose of this research is to detect expression of pIgR in adult zebrafish to determine the types of cells producing this molecule. Zebrafish have been used in numerous immunology studies and thus is a good model organism for this project. To accomplish this goal, I am using in-situ hybridization on tissue sections. I expect expression in the epithelial cells of the gills and intestines as previous RT- PCR experiments in the Hohman lab have already identified a putative pIgR in these tissues, and such cells align with predicted pIgR function. My results can provide a better understanding of teleost fish mucosal immunity which could lead to the improvement of fish vaccine strategies.

Ball-Milling to Promote Post-Synthetic Ligand Exchange in UiO-66

JOE AVALOS and Lauren Benz

Metal-Organic Frameworks (MOFs) are highly porous nanoparticles composed of inorganic, secondary building units (SBUs) and organic ligands. MOFs have many applications, including gas capture and storage, water purification, drug delivery, and catalysis. Post-Synthetic Exchange (PSE) is a method of modifying the organic or metal components of MOFs after synthesis by replacing ligands to integrate new functional groups within the molecule, which increase reactivity to a wider array of possible targets. PSE usually occurs in a solution of a related but chemically discrete ligand. PSE time and temperature can be adjusted to achieve the desired degree of incoming ligand incorporation. Ball milling is a mechanochemical approach of inducing chemical reactions and structural changes to molecules, making it an ideal method for achieving PSE without the use of solvents. In these experiments, I utilized ball-milling as a physical means to achieve PSE between UiO-66 and 2-iodoterephthalic acid. I measured bulk levels of ligand using energy-dispersive X-ray spectroscopy (EDX), and measured the rate of surface exchange using X-ray photoelectron spectroscopy (XPS) to determine whether PSE occurred at the surface or throughout the entire molecule. Two sets of samples (Defect-Rich and Defect-Free) were tested to determine whether the initial amount of defects influenced the level of PSE. The data collected shows that PSE was achieved under all conditions, but occurred at a higher rate in the Defect-Free samples. EDX and XPS data suggests that PSE was achieved throughout the entire sample, not just at the surface.

Amino Acid-Derived Polymethacrylamides: A Potential Alternative Treatment of Multi-Drug Resistant Bacteria?

JULIET ANAWALT, ASTRID PRATT and Joan Schellinger

Multidrug resistance (MDR) is a phenomenon in which bacteria develop a resistance to certain antibiotics that have previously been successful in killing or controlling them. MDR has made it difficult to control the spread of disease and prolonged the process of approving antibiotics that function similar to these once-effective therapeutics. Antimicrobial peptides (AMPs) are the common substitute for traditional antibiotics. AMPs provide the advantage of high target selectivity and are less likely to induce MDR in bacteria due to their narrow-spectrum activity. The downside is their high cost of production. Our lab circumvents this economic expense by synthesizing AMP-mimicking polymers. These polymers allow easier manipulation of charge location and side chain identity. Our lab plans to prepare a library of lysine-derived polymers which mimic the cationic and amphiphilic properties of AMPs. The development of our AMP-mimicking polymers will follow three phases: (1) monomer synthesis, (2) polymerization of monomers, and (3) evaluation of polymer antimicrobial activity. We are responsible for the first step. To evaluate the properties of distinct monomer R-groups, our lab will compare the antibacterial activity of lysine monomers with chemically distinct R-groups. We will use this to observe how differences in cation location and hydrophobicity affect polymer antibacterial activity. So far, we have optimized the synthesis of several different monomers in gram scale. Our reactions gave yields of 83.4% (N-Alpha N-Epsilon L-Lysine), 79.7% (N-Epsilon N-Alpa L-Lysine), and 88.4% (N, N'-Di-Cbz-L-Lysine). 1NMR and TLC were used to confirm the identity and purity of the products.

Rapidly Changing Communities in Desert Streams

JANELLE DOI, Rainier Cardin and Kate Boersma

As climate change progresses, the availability of surface water is becoming increasingly variable and unpredictable, especially in arid regions. However, these water sources are crucial habitats for desert organisms. Although aquatic invertebrates spend part or all their life in the water; many adult aquatic invertebrates are able to disperse aerially to find new water sources. However, little is known about how they colonize novel water sources in streams that dry intermittently. To study this, we conducted a field experiment in a seasonally drying stream, San Felipe Creek, in Anza-Borrego Desert State Park (ABDSP), California, to test how aquatic invertebrate diversity changes over time and with distance from a water source. On June 27, 2022, 18 mesocosms (189L tanks) were placed in the dry stream bed of San Felipe Creek, ~500m apart in groups of three at six distances downstream of Sentenac Cienega. Sentenac Cienega is a
desert wetland where San Felipe Creek meets the Sentenac Canyon. Tanks were filled with water open for aerial colonization by invertebrates. All invertebrates were sampled with aquarium nets, preserved in 70% ethanol, and transported to USD for identification. We identified invertebrates in the laboratory using dissection microscopes and compared diversity and species composition among distances from the wetland and weeks of the experiment. We found high abundances of larval midges, mayflies, and mosquitos, suggesting that these rapidly reproducing taxa are among the first pioneer species in new water sources. This is important because these species may form the basis of novel aquatic food webs.

The Effects of a Non-Native Predator Gasterosteus aculeatus williamsoni on the Morphology of Larval Mayflies in San Felipe Creek

TEREN GREY and Kate Boersma

The introduction of fish predators can have both lethal and non-lethal effects on prey. For example, some aquatic invertebrates adapt to fish predation by changing their morphology to make them harder to consume. Despite evidence in damselflies, morphological changes in response to predation remain understudied for most aquatic invertebrate species, including mayflies. Head capsule width is a measurement of developmental stages in invertebrates. Larger head capsules may lead to size advantage when escaping predators, thus we would expect to see larger head capsule width in mayflies when fish predators are present. To test this hypothesis, I am measured the width of the caudal gill, head capsule and body length in mayflies collected before and after the introduction of a novel predatory fish species, the unarmoured threespine stickleback (Gasterosteus aculeatus williamsoni) into San Felipe Creek, San Diego County, CA. Little is known about the non-lethal effects of novel fish predators on their prey. After my research , I found an interaction effect between season and fish introduction on head capsule width. My results will help fisheries managers consider aquatic invertebrates in future conservation strategies.

Interannual Variation of Ichthyofaunal Utilization of a Man-Made Salt Marsh Creek in Mission Bay, California

MARIA ANGST and Drew Tally

Southern California's wetlands are drastically declining due to human activities. Increasingly, marsh restoration and creation are being used to mitigate such losses. This study used minnow traps to resample the ichthyofauna of a created marsh (Crown Point Mitigation Site; CPMS) and an adjacent natural marsh (Kendall Frost) in Mission Bay, California, 26 years following the marsh creation. These data were compared to data collected from 1995-1998, immediately after marsh creation, and data from 2021. Fishes captured included Fundulus parvipinnis, Gillichthys mirabilis, Acanthagobius flavimanus, Ctenogobius sagittula, and Mugil cephalus. Species richness and dominance measures were higher in the natural relative to the created marsh. The size-structure of F. parvipinnis populations in the natural marsh were skewed towards larger sizes relative to those in the created marsh. These size differences were similar to 2021, but were opposite of those noted in the years immediately following marsh creation, suggesting that these represent long-term changes and not inter-annual variability. The changes in size structure appear to arise from differences in creek morphology between the created and natural systems, with the created marsh having become shallower through time. The differences in ichthyofaunal communities between the created and natural systems suggest that marsh and creek geomorphology may be affecting the suitability of habitat for resident fishes, and so should be more carefully considered when designing marsh restoration projects.

Using Mussels as a Bioindicator of Microplastic Pollution in Mission Bay

JULIA HUMPHREY and Steven Searcy

Plastics are increasingly recognized as a major threat to the marine environment with microplastics of special concern. Understanding spatial trends of microplastics is critical as studies have determined negative effects on organisms. This pilot study is the first to use mussels as a bionindicator to examine microplastics in Mission Bay, CA. Specifically, bioindicator effectiveness, spatial trends, and potential negative impacts of microplastics in mussels were assessed. Mussels from four sites around Mission Bay were collected, organic tissues were digested, and contents were filtered to examine ingested microplastics. Mussels were found to be an effective bioindicator of microplastics since microplastics were extracted from their tissues. A general trend of higher microplastics in the back of the bay than the mouth was observed. This trend was likely observed due to the back of the bay having more storm drains, higher freshwater input, and longer flushing intervals which can lead to higher contribution and longer retention of microplastics. Little color variation of microplastics was observed, indicating the microplastics were ubiquitous in the environment. With both these findings, there may be a more significant difference after a rain event that may input microplastics. No mussels with high microplastics reported a high condition, a measure of plumpness. Lower condition could be due to reduced filtering rates, stunted growth, and impaired energy allocation. The wide range of conditions with low microplastics may be due to another parameter, such as heavy metals. These findings exemplify the need for an expansion of biomonitoring efforts.

Plant Species Effects on the Spread of NPV in Agraulis vanillae larvae

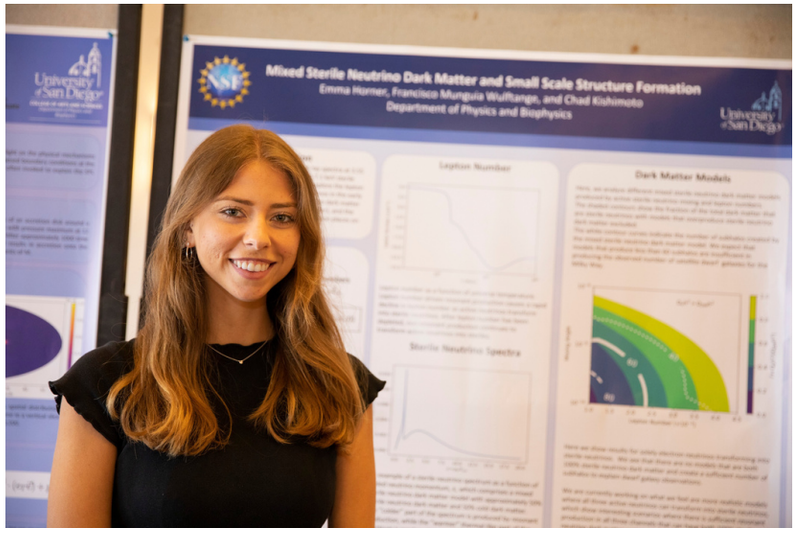
ELIZABETH FLANDERS and Arietta Fleming-Davies

Plants, herbivores, and pathogens have been coexisting on Earth for over 350 million years. Through coevolution, these organisms have evolved strategies to avoid each other's defense systems. Studying the interactions between plants, herbivores, and pathogens will lead to a better understanding of how environmental factors such as food source influences disease spread. In my research, I focused on Agraulis vanillae butterflies and their host Passiflora, specifically looking at how different plant species influence the spread of Nuclear Polyhedrosis Virus (AgvaNPV). To test whether plant species affect rates of virus infection, larvae were raised on different plant species (P. caerulea or P. edulis). Larvae were then infected at the fourth instar with one of four virus doses (0 OBs, 50 OBs, 100 OBs 1,000 OBs) and were monitored until they died from virus or pupated. The preliminary results indicate that larvae raised on P. caerulea are infected at higher rates than larvae raised on P. edulis. Though larvae died at higher rates while consuming P.caerulea, it appears to remain their preferred food source. The preliminary results suggest that larvae raised on P. edulis also emerged at higher rates than larvae raised on P.caerulea. This could be due to the fact that P. edulis contains a higher amount of secondary metabolites than P. caerulea, which are known to be toxic to herbivores.

Nucleopolyhedrosis Effects on Mating Success of Agrualis vanillae

YURIANI PALOMINO and Arietta Fleming-Davies

Host-pathogen interactions are an aspect of ecosystems but the rapid change of the environments has challenged organisms to adapt quickly. In my research, I investigated how nucleopolyhedrovirus (NPV) affects the reproduction of the Gulf Fritillary Butterfly, Agraulis vanillae, on drought-stressed Passiflora caerulea. NPV infects individuals at larval stage, when larvae consume the virus on contaminated P. caerulea leaves. Larvae grew in controlled environments where they were selected at random for a diet of high water or drought-stressed plants. We then infected larvae with one of four virus doses. Pupae were collected and survivors mated within their diet and infection treatment groups after they emerged as butterflies (n= 27 females and n= 17 males). Male and female mating success was determined as a binomial (yes/no) trait, based on whether a mating led to laying of fertile eggs. We found that in the absence of the virus, there was no difference in female mating success between butterflies raised on drought-stressed plants and those raised on high-water plants. However, in the presence of the virus, female butterflies raised on drought-stressed plants had higher mating success (logistic regression, virus by water treatment interaction effect= 19.58, LR= 4.72, p=0.03). This experiment has shown that pathogens and the effects of climate change in the form of drought can influence mating success and oviposition in a butterfly. Thus, the presence of pathogens negatively influences population growth of butterflies through increases in larvae mortality, butterflies that survive exposure see an increase in fitness.



The Effect of Microplastic Concentration on the Properties of Marine Snow

PLUTO WAH and Jennifer Prairie

Plastics have a negative impact on many environments, including the ocean. Microplastics can be consumed by small creatures and enter the food chain. It was previously thought that plastics were only present in ocean surface waters; however, recent studies have revealed that there is a lot of plastic on the ocean floor. Even though plastic is often less dense than seawater, it can be transported to the deep ocean in sinking particles known as marine snow. The purpose of this study is to measure the incorporation of plastic in marine snow as it forms and determine if the quantity of plastic affects the properties of marine snow. We used the diatom species Thalassiosira weissflogii to create marine snow that we formed in three rotating cylindrical tanks: one tank contained only marine snow and the other two had two different concentrations of small plastic beads. After the 3-day period, marine snow aggregates from each tank were measured for size and their sinking rate was recorded with a camera. I will present results from these experiments, showing how the amount of plastic in marine snow may rise as a result of increasing plastic concentrations, and how that changes the size and sinking speed of these particles.

Can Virus be Good for You? The Effects of Diet and Infection on the Weight of Surviving Dione vanillae Butterflies

FELIX TURRUBIARTES and Arietta Fleming-Davies

Pollinator populations are declining globally and drought, caused by climate change, has altered the water available in California, affecting pollinators and crops alike. Within San Diego, the Gulf Fritillary butterfly (Dione vanillae), lays eggs on Passiflora spp. and use the leaves as a food source for larvae. A species-specific nuclearpolyhedrovirus (NPV), lethal at high doses, infects D. vanillae at the larval stage, regulating their populations. I studied the effects of drought and sublethal infection on the Gulf Fritillary butterfly's pupal and adult morphology. Larvae were reared and placed into diet treatments using drought-stressed or daily-watered P. caerulea. They were then given either a water control (0 Occlusion Bodies [OBs]), or one of two different sub-lethal NPV doses: Low dose (50 OBs) or High dose (100 OBs). To measure the effects on Gulf Fritillary morphology, I measured pupal mass and length, as well as butterfly wing length, antennal length, proboscis length, and abdomen length and diameter. Although there was no significant difference in pupal weight among water treatments (ANOVA; Water Treatment Effect: $F=1.39$, $df=2,114$, $p=0.25$), interestingly pupal size increased with virus exposure (ANOVA; Dose Effect: $F=3.78$, $df=2,114$, $p=0.03$). Data on adult morphology are currently being analyzed. Through this research, results will contribute to the gap in literature regarding drought and pollinator-pathogen interactions.

How foraging behavior of Calanus pacificus at a marine snow thin layer is affected by the presence of another species

JAMESON MORRIN and Jennifer Prairie

One of the significant ways in which carbon sequestration occurs is through the sinking of particulate organic carbon from the upper layers of the open ocean to the benthos. Much of this sinking particulate carbon is in the form of marine snow, visible aggregates of phytoplankton, and organic matter, which can form layers at density gradients in the coastal ocean; copepods are one of many organisms which are associated and interact with marine snow. In this study, we conducted experiments to determine how the behavior of the copepod species, Calanus pacificus, changes when interacting with other copepod species in the presence of a marine snow thin layer. Copepods were collected 1-2 weeks before experiments and sorted at a species level. Phytoplankton cultures of Thalassiosira weissflogii were grown and rolled in cylindrical tanks to form marine snow aggregates, which were then added to the experimental tank and allowed to form a layer at a density gradient. Two video cameras were used to record copepod behavior within the tank. We will present results showing how other copepod species affected the swimming properties (including velocity, tortuosity, and jump frequency) and residence time of C. pacificus within the marine snow thin layer. This study will provide insight into how copepods interact with and fragment marine snow, which has implications for carbon cycling in the ocean.

Exploring the Role of the Dimer Interface in Plasmodium falciparum Malate Dehydrogenase: The Impact of Q11I, I15Q, L19N and L22N Mutations on Quaternary Structure and Enzymatic Properties.

DANIEL ARMENDARIZ, Diego Hernandez, Megan Keene, Jessica Bell and Ellis Bell

Many enzymes show behavior suggesting allosteric interactions involving communication between subunits in a quaternary structure. Malate Dehydrogenases from a wide variety of organisms have either a dimer or a tetrameric quaternary structure. Little is known at the molecular level of how the subunits in malate dehydrogenase communicate the presence of a ligand on one subunit to another subunit in the quaternary structure. We hypothesize that the polarity of the local environment of E18, governed by 4 residues Q11, I15, L19, and L22 in Plasmodium falciparum Malate Dehydrogenase modulates the interactions E18 makes across the interface and helps govern ligand-induced subunit interactions necessary for the normal function of the enzyme. To test this hypothesis, we constructed site-directed mutants of each of these four residues Q11I, I15Q, L19N, and L22N. Mutants were sequence confirmed, and the resultant proteins were expressed, purified, and characterized using enzyme kinetics and size exclusion chromatography. All four mutants had significantly lower specific activities than the wildtype enzyme, with Q11I having the highest turnover number of the mutants, approximately 8% of the wildtype. The L19N mutation shifts the equilibrium almost entirely to the monomer with minimal indication of tetramer or dimer forms. Overall, these results support our hypothesis concerning the importance of the polarity around the E18 residue in Plasmodium falciparum MDH, and form the basis for future studies aimed at exploring possible targets on Plasmodium falciparum MDH for potential drug design as well as providing basic information about the mechanisms of subunit interactions in oligomeric proteins.

Spatial and Temporal Distribution of Pacific Bluefin Tuna, Thunnus orientalis, Within the Southern California Bight

PARKER CLAY, Suzanne Walther and Jennifer Prairie

Pacific Bluefin Tuna (Thunnus orientalis) play an important ecological role along the coast of Southern California. However, they are a highly migratory and an environmentally sensitive species subject to the effects of global and regional climate change, including warming sea surface temperatures. Here we investigated the spatial and temporal distribution dynamics of T. orientalis and sea surface temperatures within the Southern California Bight between 1986-2016, using purse seine fishery data obtained from the InterAmerican Tropical Tuna Commission (IATTC) and hydrographic CTD data from California Cooperative Oceanic Fisheries Investigations (CalCOFI). In 1986, T. orientalis were widespread and abundant throughout the entire study area. By 2016, CPUE was reduced by >50%, and tuna were found further south, and closer to shore. 82% of tuna were caught between June and September. Sea surface temperature distribution maps show decadal cooling of the California Current. There was a significant positive correlation ($p=0.0467$, $r=0.258$, $df=58$) between mean zonal sea surface temperature and tuna CPUE. T. orientalis concentrations within the Bight correspond well with temperatures between 18–22°C. Changes to local sea surface temperatures can potentially alter Pacific Bluefin tuna summer migration patterns within the Southern California Bight, driving tuna elsewhere to seek preferred water temperatures. Understanding how Pacific Bluefin respond to changing physical oceanographic parameters is important for the protection and conservation of the species.

Effects of recreational activities on the temporal and spatial patterns of plankton communities in Mission Bay

BRIGHTON HEDGER and Michel Boudrias

Estuaries are vital to coastal communities due to their high productivity and their large diversity of ecosystems. Mission Bay is an estuary and aquatic park located in San Diego, CA. Due to its recreational nature, it experiences high anthropogenic inputs near marinas, and the impacts of this are not well studied. Plankton communities are essential to marine estuarine environments, as well as excellent bioindicators of community ecosystems. Plankton sampling was done at 6 sites in October 2021, March 2022, and July 2022. Contrary to the expected result, the findings did not show an effect of marinas on the abundance, diversity, or species composition of plankton. However, there was one consistent pattern throughout all 3 sampling periods. The site closest to the mouth of the estuary always experienced a much higher phytoplankton abundance than any other site. The plankton abundance and species composition varied from previous studies done on Mission Bay. The abundance in the fall indicates a bloom higher than any previous analyses on Mission Bay found. The spatial diversity of plankton in Mission Bay was also found to be different from any previous analyses. These findings show that Mission Bay estuary needs regular intervals of plankton sampling to assess the changes occurring.

Demonstration of the Intermediate Axis Theorem with Shifting Weights

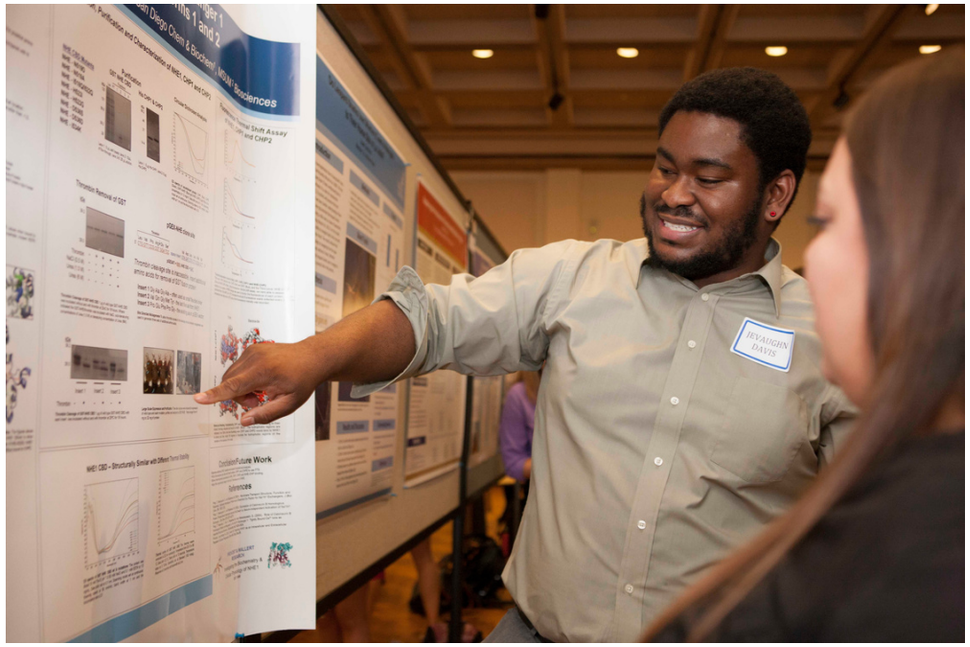
IAN CROZIER and Daniel Sheehan

Almost anything can rotate — from gymnasts to satellites — but not everything can rotate stably. The stability of a rotation depends on its axis and moment of inertia. We are developing an apparatus for a simple demonstration of this concept in 0g. Every object has three principal moments of inertia. The first principal moment, with the greatest inertia, and the third principal moment, with the least inertia, are both considered stable. The second principal moment, however, is not stable, and will undergo chaotic rotations. Attempting to rotate an object around this so-called intermediate axis of rotation can cause the object to tumble chaotically, which for objects like satellites or gymnasts, can be catastrophic. Using this principle, we aimed to design a device that takes advantage of the inertial centrifugal force resulting from the unstable rotations in order to shift weights within the device. As a result, the device's second and third principal moments of inertia switch during the unstable rotation. This experiment is made to the standards of equipment on board the International Space Station (ISS), including concerns over material off-gassing, flammability, and overall size, as we hope to test this experiment on board the ISS.

Minimal phosphorylation sites required for SIKE dimer to monomer transition

DANIELLE R. ETIEL, Michelle Bidwell Astaburuaga, Alyssa Pham, Erika Lopez Pena, Briana Gonzalez-Labastida, Jessica Bell and Ellis Bell

Structure dictates function and protein interactions mediate those functions. In the innate immune response to viral infection, Suppressor of IKK Epsilon (SIKE) is a protein of unknown structure and function, although several distinct protein interactions have been identified. Our long term goal is to understand how and why distinct SIKE interaction networks form and their impact on the innate immune response. We have defined SIKE as a primarily dimeric protein that undergoes a transition to a monomeric state when phosphorylated. We have also shown that SIKE phosphorylation modulates interactions with tubulin (enhances) and actinin (decreases). From our model of the SIKE dimer, five of SIKE's six phosphorylation sites per subunit are located at our predicted dimer interface suggesting that charge-charge repulsion of clustered phosphorylated serines mediates this quaternary state transition. Computational evaluation of these sites impact on dimer stability and their evolutionary conservation suggested that three of the five sites may be sufficient to induce this quaternary state transition. From these preliminary studies, we hypothesize that SIKE holds two distinct quaternary states that are regulated by phosphorylation at serines 187, 190, and 198. We have created a series of site-directed mutations representing individual and all combinations of these three serines mutated to glutamate. All bacterial expression of mutants was comparable to wild type levels. SEC of wild type SIKE shows multiple species, primarily dimer but also tetramer, which was confirmed by separating crosslinked WT-SIKE by SEC and assessing species present in peak fractions by SDS-PAGE followed by silver staining. Individual, double, and triple mutants were assessed in a similar manner. Results show how the introduction of negative charge redistributes the stable quaternary states and promotes the monomeric state.



Microwave-Assisted Reversible Addition-Fragmentation Chain Transfer Polymerization of Monomers for the Development of Antimicrobial Polymers

LOGAN TUCKER and Joan Schellinger

Antibiotic-resistant microorganisms are one of the world's most urgent public health crises with 10 million deaths each year by 2050, as estimated by WHO. Synthetic antimicrobial polymers are an attractive alternative to antibiotics for their enhanced efficacy, reduced toxicity, and low likely-hood for resistance. This report is focused on investigating the use of microwave heating in the reversible addition-fragmentation chain transfer polymerization of functional monomers utilized as antimicrobial agents. We utilized N-(3-aminopropyl) methacrylamide hydrochloride (APMA) and N-[3-(dimethylamino)propyl] methacrylamide (DMAPMA) to optimize the microwave-mediated polymerization conditions. Under comparable polymerization conditions, the microwave-assisted reaction achieves increased rate enhancement over conventional oil-bath mediated reaction. Linear relationship observed between number average molecular weight and monomer conversion for different target degrees of polymerization to give low- to high-molecular weight cationic polymers. This methodology will be used to efficiently polymerize different monomers to allow for systematic structure-activity relationship studies of antimicrobial polymers.

Climatological Factors Affecting Water Discharge Rates in Long Island Sound

CHARLES SCHEUCH and Jennifer Prairie

Long Island sound is a productive protected marine estuary, and is home to a wide variety of terrestrial and marine organisms. Long Island is also a populated coastal urban area which can be affected by climatological change. During periods of heavy rainfall, high water discharge rates can occur which can move pollutants from urban areas into these ecosystems, as well as communities. In this study I analyzed the effects that precipitation has on groundwater discharge rates, which is a major mode of nutrient transport between terrestrial and aquatic ecosystems. I also looked at the relationship precipitation and groundwater discharge has to the North Atlantic Oscillation (NAO). The NAO is a weather phenomena and a primary mode of climate variation in the North Atlantic that is caused by stronger than normal pressure gradients in the subpolar lows and subtropical highs. In this study, I found that central Long Island Sound has a significant positive relationship between precipitation and groundwater discharge, but no relationship was found between NAOI and groundwater discharge.

Social Sciences

Exploring the McGurk Effect using Word Stimuli

ISABELLA RAMIREZ, ALEXANDRA GRIFFIN, SARAH MANN and Laura Getz

Speech perception is an inherently multimodal process, where auditory signals provide concurrent information to visual information from the speaker's mouth movements. The McGurk effect is an illusion often used to study audiovisual speech integration; it is created by presenting incongruent auditory and visual speech cues. In the original study, listening to the spoken syllable /ba/ while watching visual mouth movements for /ga/ resulted in a 'fusion' perception of /da/ in 98% of participants (McGurk & MacDonald, 1976). Following, research on audiovisual integration has largely looked at the effect in isolated syllables. Our goal was to enhance the ecological validity of the McGurk effect by creating word stimuli mimicking everyday conversations (e.g., pairing audio for /beer/ with lip movements for /gear/ to determine listeners' interpretation). In this study, we varied task (forced-choice vs. open-ended) and stimuli (words vs. non-words) between participants. In the word condition, all three stimuli formed words (e.g., beer, deer, gear) whereas in the non-word condition, either the B, D, or G stimuli was a word and the other two were nonwords (e.g., besk, desk, gesk). We found that fusion responses were much lower than in previous studies, potentially due to the use of full words. Importantly, participants also showed the most fusion responses when the D choice was a word with B and G forming non-words. We conclude that the McGurk effect occurs at a decision level rather than a perceptual level because task and stimulus differences influenced McGurk effect likelihood.

Rapid Social Transfer of Pain in Rats

CALI BOUSTANI, JULIA JOHNSON, Erin Foley, Rubye Strickland, Jennifer Wenzel and Monique Smith

Empathy, or the adoption of another's sensory and/or affective state, is a core social ability which is now appreciated as evident in many species, including rodents. Our recent experiments show that 'bystander' mice adopt the sensory and emotional state of a social partner, modeling a key component of empathy. The aim of the current studies was to replicate this paradigm and characterize the social transfer of pain in rats, followed by an investigation of endocannabinoid signaling in the social transfer of pain. Bystander rats socially interacted for one hour with a familiar partner that was experiencing inflammatory pain (due to an hindpaw injection of Complete Freund's Adjuvant; CFA). The bystander rats demonstrated enhanced pain behavior that was similar to the CFA-injected rats. Cannabinoid receptors have been identified as a form of receptor mediated analgesia during inflammatory pain. We conducted another social transfer of pain study following an injection of URB597 into bystanders. URB597 blocks the enzymatic degradation of endocannabinoids, and thus causes an accumulation of anandamide and activation of CB1 receptors. These studies demonstrate that rats display the social transfer of pain similarly to mice, and the potential role of endocannabinoid signaling in the acquisition of socially transferred pain.

Elapsed Time Processing and Spatial Working Memory Deficit in a Rodent Model of Attention Deficit Hyperactivity Disorder

TURLEY DUQUE, JAMES GHALY, MADISON WYATT, ZOE WYNTER, MARIA TAVARES and Jena Hales

The ability to process time and space is essential for organizing and storing events in memory. Our lab previously reported that damage to the hippocampus disrupts elapsed time processing in rats tested on the Time Duration Discrimination (TDD) task. We also found that hippocampal lesions resulted in impaired spatial working memory in the Traveling Salesperson Problem (TSP) task. Interestingly, similar deficits in both working memory and memory for elapsed time have been measured in people with attention deficit hyperactivity disorder (ADHD). Our study compares performance of Spontaneously Hypertensive (SHR) rats, a widely used rodent model of ADHD, with control Wistar Kyoto (WKY) rats on both the TDD and TSP tasks. The TDD task requires rats to navigate a figure-eight-maze. Immediately after entry in the delay box at the end of the central arm, rats experience a 10- or 20-second time delay. Following the delay, the delay box opens and rats are rewarded if they turn left after a 10-second delay or right after a 20-second delay. Preliminary results suggest that SHR rats are impaired in learning the time discrimination, particularly for 20-second delay trials. In the naturalistic TSP task, rats attempt to find an efficient path around fixed locations in an open arena. Preliminary results on this task suggest a spatial working memory deficit, as SHR rats make more revisits to already contacted target locations compared to WKY rats. These results are consistent with impairments seen in humans with ADHD as well as those seen in rats following hippocampus lesions.

Structure May Be More Important Than Autonomy Support for Some Learning Tasks

KOBE HUYNH, Andrea Rodriguez, Bryn O'Gara, Sukhmani Nagra, and Adriana Molitor-Siegl

Recent conceptualizations of parenting distinguish structure and autonomy support as important dimensions for children's competence and achievement because the former provides feedback and guidance while the latter promotes a sense of volition and intrinsic motivation. Investigations of teaching-learning should examine them jointly, as both dimensions influence children's engagement and mastery. However, some studies suggest that the impact of autonomy support and structure may be context-specific. For example, autonomy support may be more useful in frustrating situations, while structure may be more useful in novel situations (Matte-Gagne et al., 2015; Grolnick et al., 2014). The present study investigated whether maternal structure, autonomy support, or a combination of the two predicted toddler performance during two teaching-learning tasks: board lacing and a multi-dimensional shape puzzle. Our sample consisted of 117 30-month-olds and their mothers. Independent coders rated aspects of structure (e.g., clarity of guidance, informative feedback, consistency), autonomy support (e.g., provision of choice, expansion, non-controlling behavior), and child performance (e.g., persistence and accuracy) in 15-second intervals for each 3.5-minute task. Results confirmed both dimensions predicted toddler persistence during lacing; however, maternal structure emerged as the stronger predictor. Moreover, regression analyses confirmed only maternal structure predicted toddler persistence during the puzzle task rather than the lacing task. These findings suggest that maternal structure may be consistently important in predicting child engagement and mastery during learning tasks while the relevance of autonomy support may be more task-specific.

Examining the Role of the Endocannabinoid System in Elapsed Time Memory in Rats

VIVIANA CASTRO, ERIN FOLEY, JOSH SPAULDING, Jennifer Wenzel and Jena Hales

Our sense of time is a fundamental ability we use to judge duration of events, temporally organize our experiences, and decide when to initiate actions. Previous research shows the hippocampus is critical for estimating elapsed time duration. The hippocampus expresses cannabinoid type-1 (CB1) receptors that are activated by endogenous and exogenous cannabinoids which regulate neural signaling. Cannabis acting on CB1 receptors 'speeds up' an organism's internal clock through CB1-dependent mechanisms, meaning that time intervals seem longer than they really are. However, it is unclear whether CB1 signaling within the hippocampus affects elapsed time discrimination. We trained rats on the Time Duration Discrimination (TDD) task where they learned to discriminate two time durations to perform the correct learned response. Once rats learned the task, they underwent surgery and bilateral cannulas were implanted into the CA1 region of the hippocampus. After recovery, rats continued daily testing and, on select days, received intracranial infusions of a CB1/CB2 receptor agonist, a CB1 receptor antagonist/inverse agonist, or a cocktail of GABAA+GABAB receptor agonists. Rats then underwent satiety and LiCl devaluation procedures to test for habitual responding. After testing, rats were perfused and their brains were sectioned. We stained hippocampal tissue with cresyl violet to localize cannula placement in the dorsal hippocampus. Additionally, we performed immunohistochemistry to stain for the immediate early gene, cfos, and used ImageJ to measure and quantify all active cells. Ongoing histological and behavioral analyses will assess the role of the hippocampal endocannabinoid system in elapsed time processing.

Using EEG to Understand the Impacts of Top-Down Processing on Speech Perception

SAM EASON, HELEN SKEELAND, GRACE MASINO and Laura Getz

Cognitive psychologists believe that our brain not only interprets bottom-up information received from sensory input, but prior knowledge can also change what we hear in a top-down manner (Getz & Toscano, 2019). In this study, we were interested in collecting electroencephalography (EEG) data to determine how strongly top-down processing impacts the perception process. Our stimuli consisted of common word pairs (e.g., bunk beds, amusement park) in which target words were manipulated to have varying voice onset times (VOTs). The sounds /b/ and /p/ exist on a VOT continuum, with /b/ having a short VOT (voiced) and /p/ having a longer VOT (voiceless); /d/ and /t/ follow the same pattern. During the experiment, participants determined the starting sound (b, d, p, t) of the second word in each pair. The first word was either an association prime or neutral prime. We began with a behavioral pilot test, investigating how various top-down factors would affect reaction times. We varied the word frequency, neighborhood density, and lexical status of the primes. We found that responses were most impacted by lexical status, meaning participants were more likely to perceive ambiguous targets as words (rather than non-words). For associated primes, responses differed based on expected voicing (an ambiguous VOT between b/p was perceived as /b/ in the context of bunk BEDS, but as /p/ in amusement PARK). We are currently using EEG to track brain voltage fluctuations and are conducting ERP analysis to understand the time course of top-down information's influence on speech processing.

Game Progression in Tennis Grand Slam Tournaments: Parity or disparity?

EMILIA HONEY, GRACE MAREK, Mike Raphaeli and Nadav Goldschmied

Tennis Matches with a win three sets rule were studied. Data were collected from the four Grand Slam international tournaments: Australian Open, Wimbledon, US Open, and Roland Garros, between the years of 2000 and 2022. We found that nearly two-thirds of the games started with a 2-0 score (i.e., one-sided) with only about one-third of the games at a 1-1 score (i.e., split). From there on data revealed that on split starts the player who won the third set, was able to win the game around two-thirds of the time. On the other hand, about 75% of one-sided starts ended in "sweeps" (3-0 final score). In fact, sweeps, which include three sets, are more common than split starts which include merely two sets. Finally, among one-sided starts very few games extend to five sets but among those, we observe a greater likelihood of comebacks such as the player who tied the game is more likely to win the final fifth set. Overall, across all tournaments the number of one-sided games highlights the imbalance between top-level players. Even though these players constitute the 128 best in the world, there still seems to be major differences in their skill level.

Examining the Role of the Endocannabinoid System in Reward and Aversion in Social Contexts

RUBYE STRICKLAND, BAILEY BANCROFT and Jennifer Wenzel

Social interaction is fundamental to survival. Despite this, the neural mechanisms of social behaviors remain unclear. Previous research has used a Pavlovian social distress procedure to examine social behavior in rodents during rewarding and aversive predictive cues and outcomes. In this procedure subjects are presented with cues predicting the delivery of food, foot shock, or nothing to themselves or a cage-mate located on the other side of a divider. This task has been employed in rats to show that the presence of a conspecific decreases cue-induced responding to threat and motivates empathy-related and consolation-like behavior. The purpose of this study was to determine if these behaviors could be recapitulated in a mouse model, and to examine how systemic endocannabinoid agonist and antagonist administration affects reward and aversion in social contexts. To this end mice were trained on this procedure and then they underwent 9 test sessions on which they received various doses of the endocannabinoid antagonist AM251, the agonist JZL187, the agonist URB597, each agonist in conjunction with AM251, or vehicle. Behavior was recorded and scored by blinded observers for each test session. We found that mice exhibited similar behavior as rats, and that endocannabinoid manipulations significantly altered behavioral outcomes.

Effects of Task Language on English and Spanish Bilinguals' Speech Perception

ELLIS NOTEBOOM, GABRIELLA THOMAS, CAMILLE TORRE and Laura Getz

Variability across speakers and across languages makes speech perception a surprisingly complex task, as there are not exact numerical values you can memorize to determine what speech sound someone is intending at any given time without understanding the speaker context. For example, one acoustic cue is voice onset time (VOT), a measure for the length of different stop consonants. In English, voiced stop consonants like /b/ have short VOTs (around 0ms) and voiceless stop consonants like /p/ have longer VOTs (around 40ms). In Spanish, the same sounds are shifted in VOT, such that /b/ is pre-voiced with a VOT around -40ms and /p/ has a VOT around 0ms. Thus an English voiced phoneme and a Spanish voiceless phoneme actually have identical VOTs. This is especially relevant for bilingual speakers, who need to know the rules for phoneme pronunciation in multiple languages. The specific goal of our research project was to investigate how bilingual English-Spanish speakers shift their perceived VOT boundary based on language context. Researcher interacted with participants in either all English or all Spanish, and then participants completed an experiment where they were asked what they heard for a variety of pairs of words/non-words that exist in English and/or Spanish (e.g., basta/pasta where both are words in Spanish but only pasta is a word in English). We hope the results of this project will give us more insight into how bilingual individuals switch between languages and how task-switching affects even their basic perception of sounds.

Exposure to Cannabinoids in Adolescence Alters Cocaine Conditioned Reward and Attenuates Cocaine-Induced Dopamine Release in Adulthood

MARISSA FRANCO and Jen Wenzel

Cannabinoids (CBs) are the most commonly abused illicit drugs among adolescents, and use during this period is associated with the development of cocaine (COC) use disorder. The cause of vulnerability, however, remains unclear. Given the well-documented role of dopamine (DA) in COC conditioned reward and reinforcement along with the ability of CBs to augment DA release, it is possible that CB exposure during this critical window affects DA system maturation resulting in long-term effects on neurobiological and behavioral responses to COC. To examine this, adolescent rats received daily CB administration. In adulthood rats were tested for the development of COC conditioned place preference (CPP) and aversion (CPA). Human and animal studies show that COC administration produces initial reward which then gives way to dysphoria and anxiety. Indeed, rats develop a CPP to the immediate effects of COC and a CPA to the delayed effects of the drug. We found that adolescent, but not adult, CB exposure dose dependently attenuates CPP for COC, and, in fact, adolescent treatment with a moderate CB dose results in CPA in adulthood. It is counterintuitive that adolescent exposure would abolish COC reward, considering the increased incidence of abuse in individuals with CB experience. By shortening the conditioning session (from 5 to 2 min), we revealed that both CB-treated and control rats developed COC CPP, suggesting that CB treatment does not abolish COC reward in adulthood, but hastens the switch from positive to negative experience of the drug.

The role of the dorsal and ventral striatum in avoidance behavior

ELIZA BOCKSCH, SARA PARDO, Emma Navaro, Jenifer Wenzel

Human behavior is driven by positive and negative reinforcement. While the role of the striatum in positive reinforcement is well-documented, relatively few studies have examined the striatum's role in negative reinforcement. In our lab we use an operant shock avoidance procedure to investigate the neurobiological underpinnings of negative reinforcement. Briefly, rats are trained to press a lever to avoid footshock. Previous research shows that inhibition of dopamine signaling in the ventral striatum disrupts avoidance behavior early in learning of this task, however after the task is well-learned this manipulation no longer has any effect on avoidance. This suggests that well-learned avoidance behavior is controlled by brain systems outside the ventral striatum. Well-learned, or habitual, positively-reinforced behaviors come under control of the dorsal, rather than ventral, striatum. In this set of studies we employed DREADD inhibition and intracranial drug administration to examine the role of the ventral striatum, as well as the dorsomedial and dorsolateral striatum in avoidance learning and maintenance of well-learned shock avoidance in rats. We find that these regions differentially regulate learning and control of ongoing behavior.

How COVID-19 concerns have changed over time

GRACE LAKOSE and Jennifer Zwolinski

Several studies have shown that distress levels increased during the COVID-19 pandemic relative to pre-pandemic levels (Aknin et al., 2022; Fruehwirth et al., 2021). The current study examined whether distress was highest in the fall 2020 semester, relative to fall 2021 and fall 2022. Participants included 301 college students who completed online self-report measures from September 2020-December 2022 across three fall semesters. The outcome variables included combined levels of anxiety, depression and stress change from the prior 12 months to the time of the self-report. One way ANOVA showed changes across time for distress with a clear decline in distress in fall 2022. Findings from this study provide insight into the need for increasing attention to mental health and coordination resources especially for college students as well as the need to monitor changing distress levels over time.

Social Media as a Key Player in Collegiate Sport Communication

ASHLEY SUTTON and David Sullivan

Historically, traditional media has been a middle man between sports teams and the public for communicating schedules, statistics, stories, and events. Today, social media provide an opportunity for a more direct communication process between team and fans. This study discussed the evolution of sports communication over historical eras while focusing on the direct communication between team and public in today's world of social media. This case focused on the University of San Diego Athletic Department's social media strategy in order to understand how their social media are developed and used. It compared their practices to other universities, such as those in the West Coast and Big Ten Athletic Conferences. Personal interviews were conducted with the director and assistant of the USD Athletic Department of Communication to gather as much insight as possible from the hands of the social media writers. The officials identified four main audiences they focus on: recruits, parents and family, donors, and media. They measure success primarily through likes, comments, and reposts. A challenge the university faces is being a small private university. However, successful athletic teams provide an opportunity for the school to be recognized on much larger stages which allow for social media to enhance both the experience and fan engagement. Future work should expand to the broader West Coast Conference, other major NCAA conferences, or professional league sports to analyze how to effectively connect with audiences through social media and what this means from a marketing perspective.

The effects of social interaction on cocaine reward and aversion in rats in an oxytocin dependent manner

ERIN FOLEY, Marissa Franco, Cassidy De Anda Gamboa, Vanessa De La Riva, Katarina Matic, and Jen Wenzel

People who use cocaine report that cocaine reward is followed by anxiety and aversion. Thus, both cocaine’s rewarding and aversive properties likely drive motivation to use the drug through positive and negative reinforcement mechanisms. Initial cocaine use is most commonly performed in a social setting, and social interaction is shown to activate similar brain systems as drug administration. Despite this, relatively little is known about how social interaction shapes drug reward and aversion. Previous research is sparse, but shows that adolescent rats exhibit cocaine reward to a lower dose of cocaine when in the presence of a playmate, and adult rats exhibit reduced alcohol-induced aversion when a conspecific is present. The purpose of this pilot study was to examine how the presence of a same-sex cagemate affects cocaine conditioned reward and aversion in adult male and female rats. We used a place conditioning procedure to interrogate conditioned reward for two doses of cocaine (0.25mg/kg or 1.0mg/kg) and conditioned aversion for 1.0mg/kg cocaine. Briefly we found that the presence of a conspecific increased cocaine reward and decreased cocaine aversion in male and female rats.

Humanities

Feminist Art or Just Art?

ADRIANA PAIZ and Peter Mena

The Renaissance occurred around the same time as the first waves of feminism in Europe. Looking back at all the silenced voices of these female artists whose art has been painted as feminist, is it based on what was considered feminist in that time period, or the present one? While looking at the work of Cristina da Pizzano, Isotta Nogarola, and Sofonisba Anguissola, as well as the work of contemporary art scholars, we could compare what we find to a set of characteristics of 'what makes a piece feminist'. The arguments for this paper are based on the work done by the previous mentioned artists and what was said about them during their time. Hopefully, along what art scholars have said about art in general and feminist art, we can find an answer to whether an art piece is considered feminist because of what it is or what it represents. Furthermore, we could compare feminist art back then in the renaissance and contemporary art feminism. For women in the renaissance trying to make a life or rather just getting involved in art was already in itself a form of feminism. This paper's goal is to further examine whether an art piece is feminist because it was done by a woman or because it involves feminist characteristics within the artwork. This paper could argue that the life of a woman and what she decides to do with it in a patriarchal society could be considered in the future as a feminist act, whether or not it was just existing as a female.

The Image of The American Man: Masculinity, Race, and Culture in Sports Media

DAVID AMBAGTSHEER and Bradl ey Mel ekian

The cultural influence of sports is undeniable. Sports are central to the time and resources spent by the American populous. The United States, which some would consider the sports capital of the world, fosters cultural development within and outside of athletic communities through the image of the 'American Man'. This image is reflected and perpetuated within all sports, but especially within America's highest grossing and most watched sport, American football. The American man is loosely defined as 'the conqueror' or as 'the great competitor' who stands before his opponents having dominated, and bested them in competition. This image bears striking resemblance to the hegemonic colonist American Man and the cultural underpinnings that prevail in capitalism. This paper will deconstruct the image of the American Man through feminist theory, critical race theory, and cultural theory as it reflects in sports. The young male as the 'American Man' is portrayed in media, sports literature, movies, and TV shows as a brash, insensitive jock who usually is on the top of the social hierarchy not just in high school, but also at the university and professional levels. This ideal is reinforced as a form of peak masculinity as high school-aged jocks typically receive favorable treatment from faculty and, in many cases, the university setting as well. Though this jock figure is archetypically a handsome, white adolescent, a glaring paradox exists in that young black men make up the majority of competitive sports communities, especially in American football.

Renaissance and Revolution: Legacies of Pan-Arabism in the Egyptian Arab Spring

CLAIRE WAGNER and Ali Gheissari

This project explores the degree that Pan-Arabism influenced in Egypt's Arab Spring and how the Arab Spring represented the unfinished goals of decolonization in Egypt. The evidence suggests that the relationship between Pan-Arabism and the Arab Spring is complex. The promises of decolonization in the mid-twentieth century were economic and political independence with self-rule, explicitly separate from the influence of the colonizing powers, the British and French, Pan-Arabism promised social and political unity based on shared language and ethnicity and included broader goals such as the liberation of Palestine. During the decolonization campaign Gamal Abdel Nasser (1918-1970; PM 1954-56; Pres. 1956-1970) inexorably tied Pan-Arabism to Egyptian Nationalism. Many activists and leaders grew up under the influence of Nasser's ideology and charismatic personality. The failure to deliver on the promises of Nasser's ideology after 1952 resulted in the disenfranchisement of Egyptians and a renewed call for the promises of decolonization; free and fair elections, an end to emergency powers and military rule, decreased unemployment and inflation. The Arab Spring as a series of revolutions in Tunisia, Egypt, Syria, and Yemen represented the continuation of shared identity and Pan-Arab ideas decades after decolonization. It will be argued that even after 2011, questions of justice, leadership, and shared identity remain central to Egypt and beyond. In particular, evaluations of the Arab Spring and the negotiations between feminist organizations, religious organizations, and youth organizations in the development of a post-Arab Spring government are particularly relevant in light of the ongoing protests in Iran.

The Inherent Power of Roman Buildings

AUSTIN MALLIE and Ryan Abrecht

The Inherent Power of Roman Buildings Through History The Roman Empire, one of the most influential states in history encompassed land from the coasts of England to the sandy dunes of Egypt and remained a symbol of power even after its fall. In the first centuries CE, Roman rulers created massive monuments in their capital including the Colosseum, Pantheon and Arch of Constantine. These structures were built with the utmost craftsmanship in accordance with the writings of ancient Roman Engineers such as Vitruvius who wrote the Ten Books of Architecture created for Augustus Caesar who reigned over the Roman empire. Even after 1000 years since the fall of the Roman empire the power the buildings carried into the reign of Pope Pius II when he issued a Papal decree to protect Roman buildings from demolition during the Renaissance era. Centuries later the fascist leader Benito Mussolini tried to recreate an Italian empire, using Roman history and architecture to make his campaigns and regime more popular to the masses. The connection to Rome was a call back to the glory Italian ancestors once had. Both Pope Pius II and Mussolini had started major restoration projects of ancient Roman buildings in the city of Rome and would use them as symbols of their power. Through the use of meticulous construction methods and architectural designs used by the Romans, various leaders throughout history have used these buildings to garner power.

The Emasculation of Glory: Pestilence, Revolution, and Madness in Mary Shelley's The Last Man

OLIVIA SUTTON, Ivan Ortiz and Mary Hotz

In her apocalyptic novel, The Last Man, Mary Shelley creates a world in which Nature seeks to humble, eliminate, and emasculate empire, reducing humanity to a single man, with the use of plague, revolution, and madness. Empire is the accumulation of political systems that are largely male, patriarchal structures. In the novel, disease acts as a metaphor for revolution and femininity which in turn destroys and deconstructs empire and the legacies of mankind. Susan Sontag's Illness as Metaphor and AIDS and Its Metaphors will provide this research with the vocabulary to draw out the metaphor and the connective tissue to relate the topic to such disparate fields and discourses as hysteria, psychoanalysis, orientalism, and political science. In the wake of the COVID-19 pandemic, this research offers a window into these perpetuated binary representations of pandemic as a feminine, emasculating force that continue to limit and inhibit humanity's response to pandemic. This essay is part of a larger project that studies the pattern, found in pandemic literature, of feminine natural forces nullifying man's attempts at empire.

The Peaky Blinders: A Postmodern and Ideological Analysis of Class, Gender, and Nationalism

CHARLOTTE FERGUSON and David Sullivan

This paper focuses on the ideological and postmodern approaches to analyzing the popular television show from the British Broadcasting Corporation, Peaky Blinders. Utilizing a thematic approach for analysis, this paper highlights social class, gender, and nationalism throughout the show that best exemplifies the impact it has on challenging and subverting traditional narratives, as well as reflecting and upholding particular beliefs and values about the world. The analysis of the themes, and intersectionality of the themes, assesses the impact the television show has on audience viewpoints of social constructs, norms, and reality.

Homogeneity and Controlled Deviation. Design Codes as Behavior Codes in California's Golf Communities.

JILLIAN WHITCOMB and Can Bilsel

Located in Southern California's Coachella Valley, this study examines some of the most exclusive golf clubs and their residential desert communities. Particular emphasis in this work is given to the architectural design guidelines of these communities and how they frame the aesthetics of 'landscapes of privilege' while simultaneously delineating the limits of creativity in custom home building. Based on site documentation, architectural analysis, and interviews, this fieldwork documents the ways design regulations dictate how residents must behave according to, buy in, or challenge the notion of homogeneity within the communities. A deep dive into the elite country clubs of the desert and their larger service and support communities brought to surface the cultural ideal of the 'good life' that underpins our society. To be in the top one percent has not proven to be a qualifier for complete creative freedom in design for these communities. This begs the question of why is not all privilege the same when it comes to design? Why do landscapes of privilege both conform with and diverge from the norm? And further, who controls homogeneity and deviation in architecture and landscape design?

The Vanishing Past: Exploring the Rise and Decline of the History Major since 1950

TYLER LENDMAN and Channon Miller

From 1969 to 1985, the History major experienced its most substantial decrease, which followed the surge in college attendance during the 1960s. Today, the major has reached its lowest enrollment levels since that time. The objective of this endeavor is to monitor how higher education has transformed since World War II and the causes that led to the downfall of the History major in the 1980s and presently. To comprehend this drop, one must investigate the reasons behind its rise in popularity during the 1950s and, particularly, the 1960s, with a focus on the Black Campus Movement and the establishment of Ethnic Studies programs that primarily focused on African-American studies. In actuality, this section will support historian Martha Biondi's assertion that the majority of campus protests during that time were not focused on the Vietnam War but instead, the matter of black educational rights. This ultimately led to an increased interest in the History major, with more classes available on African-American history and minority history, in general. The primary aim of this work is to connect the period between 1969-1985 and the current period since the 2008 financial crisis to gain a deeper understanding of the reasons for the History major's significant decline. Furthermore, the principal causes of this decline seem to be the growing awareness of post-college earning potential, negative perceptions of history majors, and a shift towards majors that are perceived to have more practical and direct career paths, such as STEM (science, technology, engineering, and math) fields.

Momentum and Emotion in Narrative: Rhetorical Use of Subliminal Feelings of Progress in Histories

HUGH GLEYSTEEN and Kathryn Statler

I have perpetually been interested in telling a good story, and telling a true story. I believe these concerns are both timely and timeless. I want to explore what goodness and truth are, and negotiate the conflict between the two, when a conflict occurs. I want to explore what good writing is to better understand what is satisfying to myself and others. I want to explore what is truth in writing to understand what is credible to myself and others. Finally, I want to apply my studies as much as possible to history, a discipline which fascinates me and that I feel was a missed calling in college. Writing in historical journals presupposes a conflict between the "dramatic" and the true, in that drama is used to diminish faith in other authors' works. Even in modern historiography, describing the feelings of a historical figure is a taboo: how could an author possibly know that? I want to explore the gendering of histories which have emotional descriptions of their figures or emotional impacts on their audience. I aim to justify which feelings belong in history writing: as they are historical occurrences, they have a place somewhere. Finally, I aim to delineate where in gender discourses emotion became gendered female, and how this gendering works in a post-modern context.

Blood and Iron: Germany's 1916 War Machine

ETHAN FUSSELMAN and Katherine Statler

The First World War saw the German Empire and its far weaker allies pitted against the overwhelming might of the Entente powers and their global empires. This project analyzes how a surrounded and outgunned nation managed to prevent total defeat for four agonizing years. As the German Empire slogged through the battles of 1914 and 1915, the imperial technocrats and aristocratic officer core began to forge an economic and military system necessary for waging total industrial war by 1916. Through a military organization that placed a large emphasis on small unit leadership and tactical flexibility, copious amounts of heavy artillery and new industrial weapons such as flamethrowers, light machine-guns, and phosgene gas, the Germans managed to stave off defeat in 1916 when under threat from a multi-pronged Entente offensive against German defenses.

The Jewish Divergence Regarding Co-Education

BEN HUGGINS and Ryan Abrecht

My thesis examines how did twentieth century American Jewish educational institutes responded to the breach between Orthodox and Conservative Jewish communities regarding the secular coeducational debate. While religious education played an important role in socialization within Jewish communities, diaspora communities in the United States disagree about the amount of secular topics that should be infused into a religious education. Before the 1930s, many American Jewish communities wanted their children to culturally assimilate while retaining their Jewish religious identity. Thus, they advocated for co-education, Jewish Talmudic education that incorporated secular topics into the curriculum. Other diaspora communities in America fought to keep secular topics out of Jewish education to avoid indoctrinating students with dangerous secular teachings such as eugenics, which had led to the Shoah. Jewish educational institutions in the twentieth century gravitated towards the extremes of the co-educational debate; more Orthodox Jewish schools chose to minimize secular topics in their curriculum as a means of preserving their students' Orthodox identities, while Conservative Jewish schools incorporated large amounts of secular education in addition to Talmudic education to help their students more culturally assimilate. I will explain how Jewish persecution during the late 19th and early 20th centuries contributed to the removal of secular topics from Jewish education in Orthodox schools, disclose how fundraising for Conservative schools required them to include more secular options for their students, and demonstrate how Orthodox educational institutions struggled to maintain the enrollment numbers that their Conservative counterparts achieved due to their restrictive religious educational structure.

Flying High: An Analysis of Essentialism and the Cultural Consequences of "Wings" by BTS

MEI FLORY and Koonyong Kim

In 2016, South Korean K-Pop group BTS released their album Wings, which included their hit song "Blood Sweat and Tears." The following year, BTS became the first South Korean artist to win a Billboard Music Award, marking their official entry into the Western music industry. Wings, inspired by Western literature such as Hermann Hesse's Demian and the Greek myth of Icarus, blends cultural references to illustrate BTS' successful crossing of cultural boundaries and the criticisms that come with it. As a K-Pop group and therefore a major component of the Hallyu Wave, BTS' commercial and social success highlights the exportation of South Korean culture, thus demonstrating South Korea's soft power through a transcultural, humanistic lens. The popularity and permanence of BTS' work thus examines the Hallyu Wave influences Western society's perceptions of South Korea and the cultural relationship between these differing societies. "Blood Sweat and Tears" and its temporal placement in BTS' discography also challenges the notion of essentialism within South Korean culture and works to redefine what K-Pop is as a form of media. Through my research, I will be analyzing how BTS' Wings album propelled K-Pop and BTS into Western media and what social and cultural consequences resulted from their music.

Mental Health Stigma: The Vietnamese-American Outlook

KYLA LE and Yi Sun

Notable studies in recent years reveal that 17.3% of Asian-Americans experience psychiatric disease in their lifetime, compared to 46.4% of the general U.S. population. Meanwhile, only 8.6% of Asian-Americans have sought mental health resources, in contrast to 18% of the general U.S. population. The primary explanation for this discrepancy is a lack of utilization of resources due to familial/cultural misunderstanding of what having a mental health disorder entails & the pressures of preserving public appearances. Existing research has focused mainly on general studies concerning Asian-Americans and how they've dealt with mental health problems; however, this neglects the significant particularities unique to the Vietnamese-American community. My SURE project helps to fill a certain void by focusing on the Vietnamese community in San Diego. Data from my interviews helped assess the degree of mental health stigma prevalent in each generational group & account for how strict cultural beliefs and language barriers impede many Vietnamese-Americans' efforts to seek medical help. The findings from these interviews elucidate the links between differing generational mindsets, varying levels of receptiveness to Western medicine, & minimal "culturally responsive modes of mental health care" to the lack of mental health assistance sought by the Vietnamese community.

Reimagining Mexica Identity

ANDREA MACHADO and Michael Gonzalez

Historians have examined the Spanish conquest of the Aztec empire for centuries, yet an adequate interpretation of this major event still remains elusive. This is due to a lack of consensus within the limited amount of historical documents that have survived from the 16th century. However, what several modern histories have in common is that they frame Mexica identity in a derogatory way which responds directly in favor towards the Spanish imaginary of the Mexica. In fact, the Mexica and the Spanish had a lot more in common, despite several differences, than many would imagine. Some of these similarities, such as religion and political practices, were utilized by the Spanish to their advantage against the Mexica to consolidate power. The key to understanding how Mexican identity was reconstructed by the Spanish is by analyzing the context that the Mexica and the Spanish were coming from in pre-Conquest times and linking that to the historical documents which followed the post-Conquest era during the 16th century. This paper will demonstrate how the Mexica have been misrepresented and stripped of their history, which affects the perception of this influential civilization to this day. Furthermore, Mexica voices and those of other Indigenous groups will be emphasized to highlight another version of history which has often been silenced and omitted.

Screaming, Laughing: Finding the Humor in Horror and the Horror in Humor

JACK FINGER and David Sullivan

Comedy and horror are inextricably tied to one another. Both of these mediums ask audiences to lean fully into their most animal emotions. Both demand our reaction, be they screaming laughter or simple screams. However, the extreme difference between the comic and the terrifying is one which can be capitalized on to improve both. By marrying the concepts of fear and joy, both can be elevated. In order to identify exactly how this process occurs, I will investigate classic and modern examples of both comedy and horror in order to identify the similar elements of both and explain how making someone laugh can make then more afraid and how making someone afraid can make them laugh. The very roots of comedy can be spotted in the earliest horror work, and vice versa. It is possible to capitalize on horror by including humor within it as a buffer; a function of "relief" for the audience to prepare them for further mental torment. What's more, comedy can become much funnier when it is unexpected, and the ridiculous nature of the comic within the terrifying can capitalize on this perfectly. In a similar way, horror can root an otherwise funny story in devastating reality, creating an emotional whiplash that can emphasize the darkest elements of comedic stories. In this essay, I will identify the boundary between the two and answer the question of how horror and comedy can drastically improve one another through their intertwined nature.

"Taking a Gamble": Navigating Indigenous Identify, Recognition, and Indian Gaming in Southeastern Connecticut

ROBERT JUSTICE and T.J. Tallie

My senior thesis is an homage to Southeastern Connecticut, where I was born and raised, that analyzes the many intersections (gender, race, and socioeconomics) of the three Native tribes in the region. Indigenous History is one of American history's most understudied and incorrectly portrayed aspects. I hope to call more attention to it through this project by studying the process of Federal Recognition and its effect on the histories of three Southeastern Connecticut tribes. Examining the experiences of the Mohegan, Mashantucket Pequot, and Eastern Pequot tribes in their pursuit of recognition throughout the 20th century reveals enduring Native agency. This is done through cultural, political, and economic issues with Connecticut residents (settlers) and the greater United States and will become evident as reasons for and against recognition in Southeastern Connecticut.

Queer Assumptions in Cinema: An Examination on Media not Getting Things Straight

HAYLEE HANSEN and T.J. Tallie

This research unravels the thread of diversified queer representation and stereotypes in popular culture from the 1950s until the modern day. Homophobic representation throughout history fostered a multitude of inauthentic tropes about the LGBTQ+ community. Oftentimes these tropes create or reinforce the negative ideas about homosexuality during the time period. These stereotypes, such as the depraved homosexual and sissy villain, manifest through various historical events such as the Cold War, the Civil Rights Movement, the AIDS epidemic, and the Modern Internet Era. Hollywood creates the villainous, outlandish, or problematic queer to instill a distaste in heterosexual individuals about homosexuality. As the film industry moves through time it attempts to provide more representation, occasionally appealing to desired audiences, but continually missing the mark.

The American Dream as the BIPOC Nightmare

JENNY HAN and Carlton Floyd

The ethos of the American Dream is considered to be the cause and the foundation of the United States of America. However, many people, especially those who are part of the BIPOC (Black, Indigenous, People of Color) community criticize these notions, arguing that if the dream ever existed at one point in time, it no longer exists. On one hand, America is hailed as being the land of freedom and opportunity for immigrants. But on the other hand, America is also thought of as being the land built on the enslavement and exploitation of especially the BIPOC community. As a result of these criticisms coupled with current events, the complex and contradictory notions of the American Dream is more relevant than ever. This research will first explore how notions of colonialism and capitalism serve as the origins of the American Dream in relation to both conceptions of land and freedom. It will also explore different representations and attitudes that various members across the BIPOC community have of this American Dream through case studies of literature, media, and personally conducted interviews. But ultimately, it aims to shed perspective and light on why the American Dream continues to carry saliency despite its criticisms and the consequences that the BIPOC community would face pursuing it.

A Decaying Discourse: On The Death of The English Major

ASHER GARTON and Lisa Smith

The history of the English major is a remarkable and revolutionary one, marked by significant milestones that have transformed the field of written discourse. In the mid-17th century, when compulsory religious knowledge tests were introduced in universities, English Dissenters were compelled to leave major institutions and seek education elsewhere. This mass scholarly exodus gave birth to English departments that produced some of the greatest minds in the history of literature, including Hugh Blair and George Cambell, per Thomas P Miller. While the origins of English studies were not in direct conflict with the church, they were infused with the spirit of protest, freedom of thought, and the pursuit of the liberal arts. The study of the essay, literary theory and rhetorical analysis became a cornerstone of enlightenment and post-enlightenment thought. These stories of remarkable intellectual achievement stand in stark contrast to the present state of the field. Universities, over time, have increasingly become thoughtless machines of economic advancement, and the value of liberal arts has largely been lost as a result. Through a careful analysis of the historical development of the English major, I will attempt to identify and contextualize the major factors that have contributed to its decline. Although restoring the field to its former glory is nigh impossible, to mitigate such a crisis, one must first understand its underlying causes. By shedding light on these issues, this project will make an important contribution to the ongoing debate about the role of the humanities in contemporary society.

The My Lai Massacre and how it changed American's perception of the war

JOSEPHINE LEWIS and Dr. Abrecht

The My Lai Massacre was a mass murder of Vietnamese civilians by U.S. soldiers on March 16, 1968, during the Vietnam War. A company of American soldiers entered the small village of My Lai 4, located in Quang Ngai Province, and began indiscriminately killing over 500 noncombatant men, women, children, and infants. The massacre, when revealed to the public in November 1969, sparked outrage and condemnation both in Vietnam and internationally. The event had a significant impact on U.S. public opinion regarding the war and is widely considered one of the defining moments of the conflict. In the aftermath of the massacre, several soldiers were court-martialed, but only one received a murder conviction, Lieutenant William F. Calley, though many others were never held accountable. Today, the My Lai Massacre is widely remembered as a dark chapter in American history and is widely studied as a cautionary tale about the dangers and costs of war, and the importance of holding those in power accountable for their actions. My senior thesis project will look specifically at the public's response to the massacre, the chain of command's culpability in the crimes, and how preserving the memory of the event is essential for ensuring that the mistakes of our past are learned from and prevented from plaguing our future.

Decolonizing the Clock: Non-Western Time-Narratives in Central American Art and Literature

EDEN VAN SAUN and Julia Medina

Given how entrenched Western systems of time have become in our quotidian lives, it has become increasingly important to broaden our perspective of what time is and can be. This year-long project will explore the intersection of time -- from both a textual and a technical perspective -- in Central American literature and art, focusing specifically on non-Western ontological perspectives and Indigenous and Black voices. My project will demonstrate how Central American voices have worked to question and decolonize the dominant Western narrative of time, and -- by bridging forms of often competing epistemes -- my project would consider these perspectives from outside of the once mutually exclusive categories of the humanities and the sciences. Central America itself is also my primary focus because it, too, is an othered voice within Latin America. In this sense, much of this work takes place within 'the liminal of the liminal', a space-time that deserves amplification. I hope that my work will show others how to better learn from the past and from the future, but most importantly, from non-Western voices. By questioning the linear conception of time we often think of as absolute, my project has the overall goal of decolonizing and decentralizing a Western single story.

Moral Obligation in Dress: The Creative Self and Second-hand Shopping

ROSE BAILEY and Marilynn Johnson

Discourse in philosophy on fashion is relatively thin, this, in alignment with the typical disdain for clothing and dress from this field of study. However, there is some research that measures clothing brand addiction, attachment, digital culture, self-concept, and fashion communication. I aim to add to this research, particularly to the critique of fast fashion, to inform further philosophical conversations on the practice of dress, and not only argue that self-expression and sustainability can be best realized through second-hand shopping but that consumers have a moral obligation to do so, given the surplus material supply in existence. I will continue literature reviews of journal articles by philosophers, sociologists, and psychologists, and will also apply for funding to attend the American Society for Aesthetics conference where I will attend presentations on aesthetics, ethics, artistic, social, and environmental value, as well as conduct interviews with members who attend. I will also conduct interviews with various professors and students at USD on their dress and values. My findings will be mixed testimonies including claims of dressing for functionality, self-expression, and varying ideas of the value to dressing sustainably. With this data, I argue that clothing is intimately linked to personal identity, so dressing the body involves action and deliberation; I argue that this deliberation must attend to moral considerations. These include, how necessary one "needs" a new garment(s), who made the particular piece(s), what is the motivation for buying, and the likelihood of finding this piece(s) at a second-hand store.

The Reel Facts of War: The Ways the Japanese Public Remembers WWII in media and its Consequences on East Asia

EDUARDO FLORES and Yi Sun

This thesis investigates the various ways that the Japanese public remembers WWII and the individuals behind them. There are many different interprepations of the war, from those who fully own up to the war crimes commited by the Imperial Japanese Army to those who hold the belief there was no Rape of Nanking whatsoever. I will examine Japanese film and media about the war to place them in the school of thought they most subscribe to. Film allows for the widepsread dissemination of historical knowledge to the public and allows insight into which school of thought is the most prominent and which stances a filmmaker might have. The public memory of WWII is of great importance to East Asia as Japan continues to downplay and deny the warcrimes it committed. This fuels the tension present in the region today between China, North and South Korea, and Japan. For the scars of war to fully heal in East Asia, Japan must reconcile with its past so that it can finally look towards the future.

Motherhood in Gothic Literature: Toni Morrison’s Use of Gothic Mother Tropes in Beloved (1987) and the Rights of Women

MIRIAM CASTANON and Ivan Ortiz

This project examines the significance behind Toni Morrison's adoption of the absent mother-trope in her book Beloved and its implications on female rights. This trope is foundational to British Gothic fiction from the 19th century and was commonly used to have mother figures in stories be dead or missing from the family and leaving children behind. It is this absence left by the mother that often creates the perfect conditions for Gothic novel protagonists to have their encounters with monsters and the supernatural. Being well versed in the genre, Morrison not only brings this tradition into a new century but reivents it by placing the horror in the mother's presence rather than her absence. By making this transfer, Morrison calls on the effects of slavery in the United States on the sense of identity of black people and on motherhood as a source of horror as well. In this way, she extends criticism of the patriarchy present in early British Gothic fiction and brings it into a new context where one of the main struggles is ownership. Through Sethe's story ownership of the self, over one's own history, and over children gets explored. Using critical reading theory and psychoanalytic criticism, I look at Morrison's text in the context of history and the Gothic literature tradition to extrapolate the importance of this choice. This inquiry will delve into the female identity as it intersects with motherhood, race, and sexuality in Morrison?s characters.

Realm of Masculinity: Encoding Manhood in the Rap Music Genre

JESSICA MILLS and David Sullivan

In today's technological culture, songs and their accompanying music videos are accessible through online websites, streaming platforms, social media outlets and network channels. Their lyrical messages have become a constant presence in everyday life. Texts revealed that music videos create a guideline of how to acceptably act as men and women in today's culture. Among the most popular music genres is rap, which widely features misogynistic content. Rap artists' lyrics and videos feature women who are regularly diminished to sexually promiscuous objects, lacking any individual thoughts and/or feelings. The speed and regularity in which consumers can now access this content desensitizes listeners to sexual harassment, exploitation and violence towards women. Many "old school" rappers such as Dr. Dre, Ice Cube and Tupac set a standard for utilizing misogyny in musical projects which has paved the path for current artists, such as Future. With over 45 million monthly listeners on Spotify, Future is ranked among the platform's top 50 artists. Although his songs and albums vary in terms of featured artists, topics and cover art, his degradation of women is constant. As one of the leading artists in this popular genre with a primarily male audience, a semiotic analysis of Future's music revealed that his construction of violent acts and phrases towards and against women encodes dominance and violence against women as a normal facet to manhood.

Haitian Migrants Housing Solutions and Stability in San Diego

JEAN JEREMIE and Juliana Maxim

This research examines the housing solutions developed by Haitian migrants living in San Diego. San Diego has seen a spike in the number of asylum seekers since the Biden administration recently let migrants into the country after the controversial "Remain in Mexico" 2019 policy. The region has become a stopping point and major port of entry for those wishing to enter the United States of America. After a long journey, a long waiting period in Mexico, and at times imprisonment, Haitians often encounter harsh living conditions upon entering the U.S. A central challenge for Haitian families arriving in San Diego is finding housing. Without documentation, they are unable to legally rent an apartment or find work. This research explores how and where Haitian immigrants find shelter, housing, food, papers, and other essential living needs. Several Haitian migrants were interviewed to hear their firsthand experiences of their journey to the United States and their ability to survive in the country as they await their immigration hearing. We found that there are few organizations helping migrants in San Diego, that their services aren't abundant and often come with a time limit. Many Haitians often feel neglected and forgotten. Ultimately they hope to have documents to reach equal opportunities in the U.S.

Czech it Out: Collaboration and Resistance in Communist Czechoslovakia

HALEY SZCZECH and Clara Oberle

Between the Prague Spring of 1968 and the Velvet Revolution of 1989, citizens of Czechoslovakia were faced with the issue to either support or oppose the communist regime, but often did not fall explicitly within one category. This project explores the coexistence of opposing affiliations within society and seemingly conflicting actions of the individual during the Communist Regime. It reads these in the context of the normalization period. A dominant narrative regarding state-citizen relations in a communist regime emphasizes the force of the totalitarian regime and describes a powerless, submissive population. This project highlights the agency of the citizens of communist Czechoslovakia, embracing a history of everyday life approach to show that a variety of factors and experiences affected their responses towards the government. Normalization in Czechoslovakia created an environment that allowed compliance and dissent to flourish and even coexist.

The Death of Art: How Will It Be Reborn?

SEAN BUTLER and Peter Mena

The reach and impact of technology has been continuously expanding for the past several decades. In recent years the developments in artificial intelligence have reached the art world and have complicated our perceptions of the very nature of art. This research intends to answer the question: to what extent does generative art. More specifically, A.I. generative art, enhance or diminish artistic autonomy and free will? I grapple with this question through the research of various scholars and artists that play a role in the generative art movement. The guiding definitions of art and artistic autonomy utilized in this research will be derived from the work of art historians. Furthermore, the concept of artistic autonomy will be expanded through an exploration of free will as developed by the works of philosophers and theologians. By laying the groundwork for these key ideas, the artwork of Refik Anadol and other prominent artists in the generative art movement will serve as case studies to analyze the question. In doing so, I find that although generative AI art may disrupt the relationship between the artist and the end result of their artwork, this new way to "paint" actually has the potential to enhance artistic autonomy and the role that free will plays in art. By automating the computer to create, the artist is left with creating in a very human way, essentially doing what the computer can't. In this sense, generative AI art actually isolates the human component of artistry. Though it might be in an unconventional way, it nevertheless provides a unique vessel for originality which has the potential to drastically transform and invent a new way in which art is approached and engaged with.

Breakdown the Beat: Hip Hop and its Role in Domestic Affairs

LUCIA BROTHERTON and Ryan Abrecht

Hip hop is often associated with negative connotations: drugs, sex, "potty mouth garbage". For this reason, hip-hop is generally not considered a serious or realistic vehicle to empower and educate the youth, let alone serve as an agent for positive change. This thesis draws the connection between beats and positive action. Analyzing the four main tenets of graffiti, breakin', MCs, and DJs, I identify their significance and how hip-hop connects groups that once had tense relations or none at all. Hip hop was born in the 1970s, evolving out of older forms of performance and improvisation such as elements of jazz. In the fifty years between its birth and the present day, it has evolved both as a musical genre and as a cultural force intimately tied to the urban communities in which it originally took root. Tracing the evolution of hip hop, I argue that hip hop has built communities and developed mutual respect and understanding that transcends gender, race, class, and political barriers. Rappers channel their experiences battling racism, economic disparity, and violence into artistic exchange. In cities like Atlanta, hip hop has pulled communities out of the "trenches", empowered the youth, and inspired citizens to get more involved in local politics, education, and initiatives to better their futures. The connections built through hip hop/rap have strengthened U.S. communities and added tremendous value to our culture as a whole.

Cromwell and English Intervention in the Baltic Sea (1640-1670)

RYAN TATE and Thomas Barton

For 17th-century England, the Baltic Sea was a critical trade route far surpassing the burgeoning Atlantic or Indian Ocean trade. While small quantities of luxury goods came to England across the Atlantic and Indian Oceans, the Baltic Sea trade provided enormous amounts of timber, potash, tar, grain, and other critical goods necessary for the English economy and navy. England's traditional approach to this trade tended to be noninterventionist and laissez-faire. However, this position change dramatically in the mid-17th century when the English Civil War and the replacement of the monarchy with the Commonwealth of Oliver Cromwell in 1649 heralded a major paradigm shift faced with regime change at home and a rising Swedish Empire abroad. England undertook an approach in the Baltic Sea that challenged the status quo that had been previously aggressively maintained by Dutch and Danish merchants. Signing political and economic deals with nations in the Baltic Sea and undertaking military actions to safeguard its interests, England began to adopt the traditional foreign policy approaches of the continental powers - especially the Dutch. Even with the fall of the Cromwellian regime in England, the legacy of intervention in the Baltic Sea persisted.

How to Successfully Fail at Nation-Building

JEFFREY ATTERBURY and Kathryn Statler

Since the late 1940s, the United States (U.S.) has made several attempts at nation-building, defined as U.S. political, economic, and military intervention into a foreign country with the intent of establishing a pro-U.S. government or democracy. Many Americans associate nation-building with catastrophic failure, largely due to Vietnam in 1975 and Afghanistan in 2021. The primary reason for the U.S.' failure to nation-build was the lack of political and public support, both from the populations of the U.S. at home, and the native Vietnamese / Afghani populations. Growing resentment, or lack of interest in the war effort destroyed American morale, creating a desire to quickly end the conflict. When combined with disorganized military and political objectives, as well as a lack of cultural understanding of Vietnam / Afghanistan on the part of the Americans, it becomes clear why both these efforts ended in catastrophe, and the desperate evacuation of civilians from the U.S. embassy in Saigon in 1975, or Kabul in 2021.

Community Resilience Yes, Junkyard No!

ASHLEY VALENTIN GONZALEZ and Alberto López Pulido

Analytical studies on environmental racism have focused on the interconnections between policymakers and environmental hazards in low-income communities to determine the degree of racial inequality. Yet, the majority of these studies ignore the arrival and permanence of toxic spaces such as junkyards and polluting industries impacting poor bayfront neighborhoods such as Logan Heights. We purport to examine this topic on two fronts. First, I plan to investigate the historical connection between the battle over greenspace between the Chicano Park takeover and the junkyard. Junkyards in Barrio Logan play a crucial role in how environmental racism came to be in this community. My second goal is to demonstrate how the resilience and need of a community through political mobilization willresult in re-building the neighborhoods that were destroyed and disregarded by policymakers. We will adopt a Participatory Action Research approach (PAR), in order to discover how and why issues of environmental justice have been at the center of community mobilization in Logan Heights for over 50 years.

Hippies and #Vanlife: A Postcolonial Critique of American Counterculture

MADISON AMARAL and T.J. Tallie

In the past five years the #vanlife has been increasingly all over social media. Young people are leaving their homes behind to go into nature, living in renovated vans that often have everything from a kitchen to a bed. Many people who adopt this lifestyle see themselves as participating in a counterculture movement; they are leaving the nine to five workday behind to explore nature and work an online job with flexible hours. This lifestyle is linked to a hippie aesthetic. From homemade vegan meals and minimalism, to yoga and nature, one can see the influence of the 1960's counterculture hippie movement on the #vanlife phenomenon. Both movements consist of mainly middle to upper class white people trying to reconnect with nature and disconnect from society. History reveals that these counterculture movements are not as revolutionary as they may seem; they claim to offer an escape from society, yet reproduce the same colonial hierarchies that construct and confine the society they want to escape. This is revealed in the implicit beliefs of the 1960s hippie movement and #vanlife. Both hippies and van lifers view nature and wilderness as a space open for them to claim. This is rooted in colonial land views and erases the continued experiences and resistance of Native People. Both appropriate Indigenous culture in an attempt to root themselves to the past and rebel against society. In addition, both movements often ignore their place in the greater hierarchy, thinking they are inclusive while ignoring the experiences of marginalized identities, especially people of color.

'Submerged Perspectives': Central American Ecocritical Literature Across Time

EDEN VAN SAUN and Julia Medina

In her anthology Poéticas de la destrucción / Poéticas de la preservación, Gisella Heffes defines the term 'ecocriticism' as "a land centered practice from which literary and cultural studies can be researched, analyzed, and explored," specifically through environmental and critical lenses. Using her three subsequent classifications as a launching point, my research was organized into six distinct categories: colonialism, extractivism, the Panama Canal, deforestation, conservation, and post-apocalypse and analyzed how humans, but more specifically, foreign polities, have impacted the Central American landscape. In this interdisciplinary exploration -- consisting of comparative explorations of written texts, visual arts, film, and other media -- I have explored alternatives to Western and colonial views of the environment. These alternatives typically come in the form of what Gómes-Barris calls 'submerged perspectives': ways of viewing that challenge coloniality and offer a new way of approaching environmental concerns. I have thus focused on how Indigenous and other underrepresented groups have been able to resist ecological destruction through these submerged perspectives; these and other decolonial epistemes that function outside of the colonial framework ultimately have the potential to shift Western hegemony over the natural world.

Branded Jersey Patches in the MLB: Impacts to the Fan Experience

KAYLEY NORMAN and David Sullivan

The following research investigates some possible effects of the Major League Baseball Association's decision to introduce branded patches to players' on-field jerseys. Drawing from communication and marketing research theories such as Arthur Raney's behavioral and social motivations for mediated sports consumption and Daniel Wann's psychological causes of team identification, this work aims to predict how the introduction of jersey patches might affect the baseball fan's experience. Some relevant historical examples utilized in this analysis include, the merchandising of the 1984 Los Angeles Olympics, a history of branded jerseys in European football clubs, and comparative jersey patches in the National Basketball Association. The central research question posed considers how this rule will affect the fans' experience watching baseball, and more importantly, how the increased integration of brands into the game will affect the sport as a whole. As a baseball fan and a student of marketing and communications, this is a topic of controversy I've found interesting to center my research on, and I'm curious if this type of branding brings fans together, or if it takes away from the integrity of the sport.

Encoding the Oppositional Stance in Candyman (2021): an Ideological Analysis

MIA DELMONICO and David Sullivan

The scholarly analysis focuses on the representation of the oppositional stance in the 2021 Candyman film. The research indicates that there is a lack of representation from the minority view point in the horror genre but newer movies such as the 2021 Candyman are paving the way for change. The filmmakers encode this underrepresented viewpoint in a way that serves to empower minorities in the film, especially African Americans. The encoding of minorities in major roles, the victimization of mainly privileged white people as Candyman's targets, the flipping of preconceived societal norms, and the framing of the monster all work to bring light to low income, black communities' real life struggles while empowering them through these methods and embracing an opposition ideology throughout the film. Using ideological analysis, the scholarly analysis illustrates the encoding of this viewpoint by the filmmakers as compared to the decoding done by the audience, using online reviews as a reflection of audience and critic perceptions. Comments and reviews have shown that many audience members and critics alike are struggling to adjust to this oppositional stance encompassing direct references to social issues and sometimes even more representation of minority groups in major roles, while maintaining a sufficient level of scariness for it to still be considered a horror film. Others have resonated with the film's encoded perspective and may even feel empowered as a result.

The Last Resort: The Causes of America's War for Independence

ALEXANDER BUSHHORN and Kathryn Statler

The American Revolution lies at the heart of American identity because it established the United States as an independent nation and solidified its core values of life, liberty, and the pursuit of happiness. Therefore, the best way to understand the United States and its culture is to understand the American Revolution and why the former British colonies sought independence in 1776. There was not one action or person which drove the colonies towards resistance, but a combination of factors, some more significant than others. This research project argues that the American colonies declared independence from Great Britain because, since 1764, the English Parliament had continually levied unjust legislative acts, such as the Stamp Act of 1765 and the Townshend Acts of 1767, which slowly convinced a majority of colonials that the only way to escape them was to form their own country. Great Britain attempted to increase political and economic control over the colonies because it acquired a massive debt from fighting in the Seven Years War, 1756-1763, and believed taxing the colonies was the best way to generate revenue. Significant colonial resistance to Great Britain only began once the taxation laws passed, and the resistance evolved from boycotting to riots to outright war. My paper will contribute to the literature surrounding the causes of the American Revolution by emphasizing how Great Britain's attempts to control the colonies impacted the lives of every colonial, such as landowners, Native Americans, slaves, and women, rather than just the Founding Fathers.

Analyzing the Outcome of the Mexican-American War

LOUISE GARRETT and Michael Gonzalez

The 19th century in America was a period of Westward Expansion. The driving force behind this expansion was the idea of Manifest Destiny, or a God-ordained mission to spread across North America. This was the basis of James K. Polk's platform when he ran for president of the United States in 1844. The annexation of Texas in 1845 was a direct result of Polk's presidential victory and provided the United States with an opportunity to expand. However, it also resulted in conflict between the United States and Mexico, as Mexico still considered Texas to be their territory. The subsequent Mexican-American War (1846-1848) ended in a decisive American victory and the loss of even more Mexican land to the US as a result of the Treaty of Guadalupe Hidalgo. But if it was the United States' Manifest Destiny to control North America, then why did the US only take Mexico's Northwestern territory instead of all of Mexico's land? The answer, I have discovered, is America's unwillingness to engage in societal integration with Mexico due to the ramifications it would have had on issues such as slavery and citizenship, just to name a few. In my senior research project, I explore how cultural, political, and religious factors contributed to the outcome of the Treaty of Guadalupe Hidalgo and helped shape America and Mexico as well as modern US-Mexico relations. This is an important topic because the Mexican-American War set the tone for modern U.S.-Mexico relations.

An Exploration of the Norms and Values of the Lowrider Community in San Diego

AMAYA ARDILLA and Meghan Donnelly

Since its beginnings in the 1950s, lowriding has been an important part of the Mexican-American community in Southern California. People outside the community, and even some Mexican-Americans themselves, often associate lowriding with gangs, violence, and delinquency. However, are these accurate depictions of the lowrider community in San Diego today? What kinds of values and norms do members of the community uphold? In order to answer these questions, I conducted 10 in-depth interviews with members of the lowrider community and engaged in participant observation at lowrider events. Preliminary analysis indicates that lowriding values revolve around family, self-image, community aid, and the cars themselves. Members of lowrider car clubs actively work to present themselves as orderly, neat, and respectful individuals, thus showing the public that they are not gang members or criminals. Further, working on lowrider cars actually provides young people with a way to stay out of trouble and not get involved in gangs. These findings not only provide a more nuanced perspective about a group that has long been stigmatized; they also contribute to pressing public debates about the unfair treatment of people in the lowriding community.

“The Hot Sad Girl Reading List”: Patriarchal Feminine Sadness at the Intersection of Internet and Literature

AVERY BARRETT and Tim McCarty

The “Hot Sad Girl” is a new image for the 21st-century woman which prevails in online spaces. While feminine sadness is not a new narrative––a trope often seen in literature––it has transcended the literary world into social media as an online microtrend or internet aesthetic. Those who follow the microtrend are meant to read books that have been identified as the “Hot Sad Girl Reading List” (including Sally Rooney’s Normal People (2018) and Ottessa Moshfeigh’s My Year of Rest and Relaxation (2018)) and act similarly to these literary characters who are both beautiful and sad. This project will examine how the internet and literature work together to create a fictional, manufactured social type that does not exist beyond the screen or page. Additionally, I will investigate why this microtrend is alluring for women. By analyzing literature in the “Hot Sad Girl Reading List,” a clear narrative of feminine sadness forms as one which calls for a man to save women from their own feelings. The narrative of feminine sadness continues cycles of patriarchy and heteronormativity, keeping women sad and desiring a man. This project will not only reveal greater information about the intersection of literature and internet culture in identity formation but also how these two forces can work together to create potentially dangerous, patriarchal, and limiting narratives.

Made in China: Analyzing the Cultural Consequences of Transnational Adoption

MEI FLORY and Atreyee Pukan

This project will outline the context under which transnational adoption becomes necessary and how this international process affects bicultural individuals. I will be focusing specifically on the One Child Policy of China and its psychological and sociopolitical effects on Chinese American adoptees, who are often girls. Transnationally adopted Chinese Americans are inherently bicultural due to the difference between their nationality and ethnicity; thus, I will be examining how transnationally (native country differs from adoptive country) adopted individuals interpret their place in between both cultures and how this affects their psychological well-being, with attention to COVID-19 and the overturning of Roe v. Wade. The context and consequences through which I analyze the parameters that determine whether an individual belongs to a ‘culture’ will be organized through a literary framework of Postcolonialism.

Migración Mixteca: De Oaxaca a San Diego, CA

ANALLELI VILLEGAS BARRERA, Thomas Ehrlich Reifer and Alberto López Pulido

This ethnographic and archival research aims to understand how the Mixtec (Ñuu Savi) community of San Diego has continued to exist as a transnational community in San Diego through their engagement in particular socio-cultural practices. I will start off by creating historical and statistical context for which the Mixtec community of San Jorge Nuchita, Oaxaca left the homeland during the late 1980s and throughout the 1990s, what could be considered, the first wave of migration of this pueblo. I will continue with setting the scene for the first destination of this community, being the cities of Carlsbad and Encinitas. In doing so I aim to understand the politics, and culture that existed in these cities, upon the arrival of the Ñuu Savi community in the late 80's and throughout the 90's, taking mainly into account the contestation Mixtec experienced from both white supremacist of Northern San Diego County and those involved in the expansion of commercial San Diego. This research will also look at socio-cultural practices during the early wave of migration that allowed for the continuous existence of Ñuu Savis in the cities of San Diego County today. With the use of oral histories, archives, and auto ethnography, I aim to unearth and bring to light this relatively unknown part of San Diego history, and highlight the brilliancy of the Mixtec community, specifically those from San Jorge Nuchita that have maintained their identity as Indigenous people in the face of pressure to assimilate into American culture and the visibly present Latinx community of San Diego.

The Creative Exchange and Cross-Cultural Friendship of Carlos Chávez and Aaron Copland in the 1940s

YAHAIRA RODRIGUEZ and Charissa Noble

An influential composer, conductor, and musician, Carlos Chavez (1899-1978) worked closely with the Mexican government as an emissary of Mexican culture, and played a crucial role in the reconstruction of Mexican identity after the Revolution. His unique compositional style synthesized Mexican folk traditions with modernist aesthetics and spanned many musical genres, such as wind ensembles, symphonies, and choral works. In addition to his work as a composer, Chavez rose to international prominence, garnering numerous accolades, awards, and positions. On a trip to New York City in the 1920’s, Chavez met Aaron Copland, an American composer who also drew from his nation’s folk music and kept a close relationship with him over the years. Whereas many historical scholars have studied the friendship and mutual admiration between the composers, few have discussed the possibility of a specific musical exchange. In this project, I examine the possibility of musical exchange between Chavez and Copland during the 1940s, a time characterized by numerous collaborative projects and concerts between the two. In addition, I consult both the published correspondence and musical scores between Chavez and Copland to gain a more complex understanding of the musical and political relationships between them. Through a survey of the available published literature, I contextualize the meeting between these composers within the prominent artistic, political, and socio-economic ideas of their shared historical period. I hope to shed light on the importance of music as a prosocial activity with the ability to foster cross-cultural understanding and friendship through creative formulations of national identity.

A Paradoxical Threat to Democracy

NICK SEGOVIA and Mark Woods

“A Paradoxical Threat to Democracy” examines in-depth the two major threats U.S. democracy faces—climate change and autocracy—and how the mitigation of these threats is paradoxical. The first paradox relates to how United States Department of Defense lists climate change as a national security threat, therefore making the Department responsible for its mitigation. However, this presentation sheds light on the Department of Defense’s role as a critical contributor to this threat by being the largest institutional consumer of fossil fuels in the world. How can the military fight climate change by being one of the highest consumers of fossil fuels in the world? A second paradox exists in that some scholars argue that democratic governments will not be enough to solve climate change. Specifically, in a democracy, individuals have the right to choose their own leaders and dissent to the state, both of which can deter the progress of climate policy. On the other hand, a well-intentioned ‘environmental authoritarianism’ would allow a government to smoothly implement environmental policy without interruption from individual dissent. The result would be a quick and effective response to climate change, abandoning individual liberty in favor of protecting the planet. Environmental authoritarianism would shake the foundation of the democratic world order held dear by the United States and NATO, which begs the question: how can the United States defend itself from the threats of climate change and autocracy, when autocracy is seen as one of the few solutions to combat climate change on an institutional level?

History and Fiction Writing

RAYMOND GRITTON and Ryan Abrecht

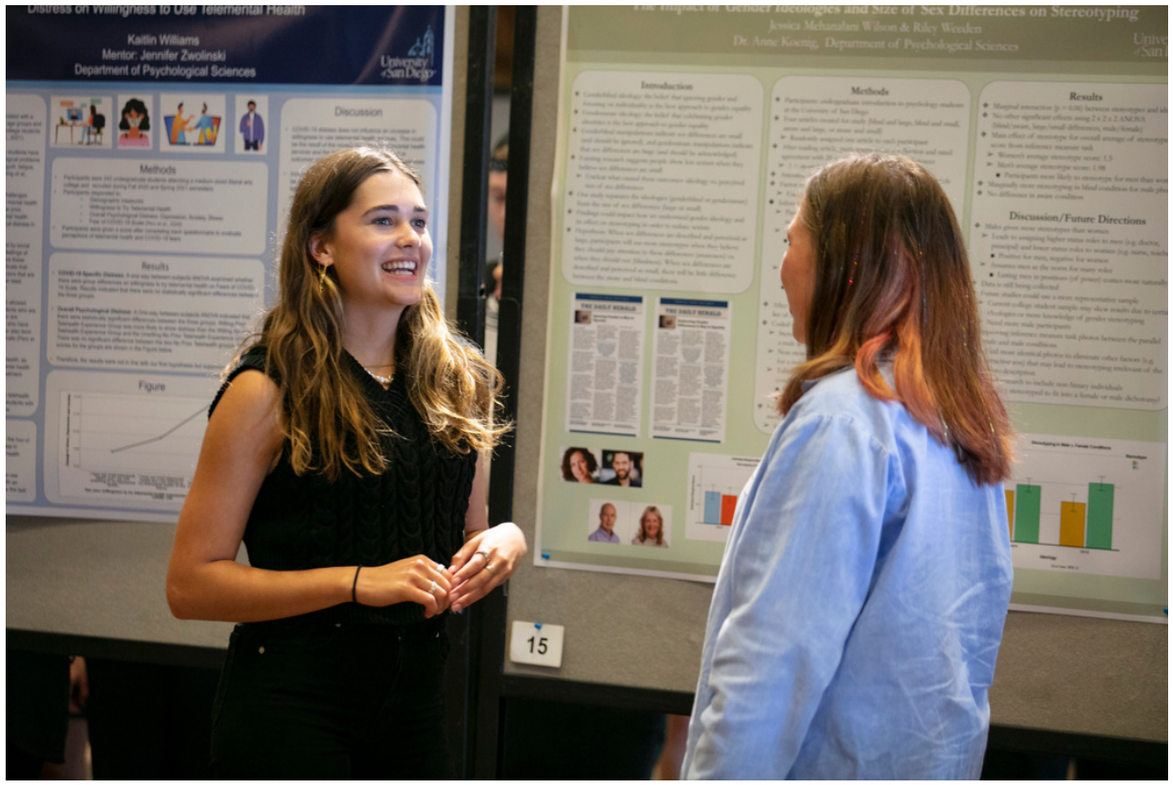
Throughout the past one hundred years, there has been a growing change in the ecological movement. This project will examine how changing historical conditions and ecological ideas shaped three influential works of fantasy and science fiction literature: J. R. R. Tolkien’s Lord of the Rings, Frank Herbert’s Dune, and Rick Riordan’s Percy Jackson and the Lightning Thief. Tolkien’s books make a strong argument against industrialization and its crimes against nature, Mordor an example of industrial devastation in peruit of power. Tolkien spent some time in WWI and shows hatred to the destruction it caused, not only in other places, but in his own home country as well. Herbert’s book looks into resource scarcity, and will be comparing the drug “spice” from the book with oil in real life. Before Herbert wrote his book, he studied the environment and even wrote an article about the Dunes of Florence, Orgeron that became the inspiration for his own book. Riordan's books have to do a lot with water and the pollution of that water, the pollution of the world in general. During this paper, I will also be looking into the lives of these authors and gaining the understanding behind this concern for nature. And Riordan had wanted to include the influence Ancient Greek had with nature that would still be very relevant today.

Math and Computer Science

PytheyBuddy COMP110 Chatbot

DIANNE CATAPANG, MELISSA VARGAS and Saturnino Garcia

Many Computer Science majors have had prior experience with coding before coming to USD. This gave many of them an advantage when taking the Computer Science introductory course. However, this caused a wide gap between the students who already had experience in coding, compared to those who were exposed to it for the first time. Learning how to code is like learning a new language, where there are rules within every word we type, also known as a coding language's syntax. It takes many hours of patience and dedication to perfect a language's syntax, which may not come as easy to a college student. A lack of constant assistance may discourage someone learning more about Computer Science or majoring in the field. Albeit the internet may have some solutions, it is not solely designed to help students with their labs and Problem-Solving Assignments. Technology and Internet applications have continuously improved students' education since the early 21st century. One of these types of applications is a chatbot, which is a program that assists and communicates with users in a question and answer format. Within our research, we developed a chatbot prototype for the sole purpose of being a resource to COMP 110 students. The findings of our research reflect if Artificial Intelligence may be a viable resource to students who are pursuing coding, and the different ways this may be implemented.



Engineering

Art Car Electric Vehicle Platform

DAKOTA GATES, OLIVIA WAGNER, CAMERON DENNINGTON, NICOLE ORTIZ, CRISTIANO MEDRANO and Gordon Hoople

The goal of this project is to design and create a prototype for an electric vehicle platform that can be used as the base of an art car for the Burning Man event. In accordance with the environmental principles of Burning Man and our sponsor organizations, we will pursue sustainability in design and construction of this platform. This platform will serve as a way for event participants to interact with art and function as a way to transport people. As an additional bonus, this platform will set the standard for sustainability for the future of art cars. During this past semester, we conducted thorough research into the feasibility of electric vehicle platforms and explored many possible options. We concluded that the most realistic way to achieve this electric vehicle platform was to build the system entirely from scratch. After this decision, we examined various subsystems necessary for the functionality of the vehicle. At the conclusion of this semester, we were able to test and create a critical function prototype of the steering system. During the next semester, we hope to test and build more prototype subsystems of the drivetrain, the frame, and power storage. By the end of the semester, we hope to deliver a fully-functional model of the art car platform. After completion of these goals, the designs and model will be saved so the project can be expanded upon by another party, most likely ArtBuilds or another senior capstone engineering team.

PTSD Detection Device

JASON YAGER, GRACE SCHMIDT, JONATHAN MONTGOMERY, TANNER VAN NEWKIRK, DANIEL TORNSEY and Ming Huang

This project focuses on improving the well being and independence of veterans struggling with Post Traumatic Stress Disorder (PTSD). Service dogs are vital for a veteran in daily routines and for emotional support. They are trained to prevent their veteran from experiencing a PTSD episode, but the service dog could be preoccupied with another task or in an environment that makes it difficult for them to read their veteran. To fix this issue, we have developed a device for the veteran and a device for the service dog. The veteran's device is wearable and will be able to track important biometric information to detect if a PTSD episode will occur. The device will factor things like a sudden increase in heart rate and if certain markers are met that hints towards a PTSD episode, the device will then send a signal to the device on the service dog. The device on the dog will read that signal and start vibration motors in the dog's vest to alert it. It is essential that nobody in the surrounding area knows that the device is functioning to respect the veteran's privacy and self confidence. It is also very important to enable a bluetooth connection between the two devices to prevent any accessibility issues. The main goal for this project is to develop a working prototype that does not restrict the veteran or service dog in any way.

Listening Overhead, Calculating Adaptive Tracking by Exploitation of Signals

RAFID ALI, ASHLEY BERARD, PRIYA DOANE, ERIC KLUESSENDORF, BRANDON NGUYEN, and Christopher Smith

When thinking about geolocation, the first thing that comes to one's mind is GPS, or the Global Positioning System, which is a system of MEO (Medium Earth Orbit) satellites that help one determine their location on the globe (among other things like timing). To do this, GPS uses atomic clocks and timing signals, so if one knows when a signal leaves the satellite and the precise time the signal arrives at a receiver, then the distance between the satellite and the receiver can be determined. When used in conjunction with at least three GPS satellites, one can triangulate their position and therefore geolocate. But what if one does not have GPS? This is what the L.O.C.A.T.E.S. team aims to solve - finding a way to geo locate without GPS. There are many ways that the problem could potentially be solved (known emitters like radio towers, IMU's or Inertial Measurement Units/dead reckoning, etc.), but the way the team aims to do so is to exploit the signals sent from other satellites. LEO (Low Earth Orbit) satellite constellations such as STARLINK for instance, provide many opportunities for signal exploitation since there are over 3,000 satellites within this constellation. Our team aims to develop a solution whereby we can detect the satellite signals convert to I/Q data, process the data in an algorithm, and then calculate a position (coordinates and altitude) of a receiver on the globe.

Solarflux PV Power System Capstone Team 2023

CAROLINE HOLM, GABRIEL GOINS, DILLON MULDOON, RYAN NETT, FARES ALKHALIDI and Gordon Hoople

Solarflux is a technological company developing solar concentrators to provide clean thermal energy. The issue that Solarflux is facing is the high installation cost of trenching in order to connect their concentrator to the grid for power. Therefore, Solarflux is looking into design alternatives to provide off-grid power to their product. Our capstone team is collaborating with Solarflux to help address this issue by designing a system to provide their solar concentrators with off-grid power. The goal of our final design is to provide Solarflux with 115 VAC of renewable, off-grid power via a photovoltaic (PV) solar powered system that will be attached to their flagship product. Our system will be powering the concentrator's motor for sun tracking, and control system for operations. This means that we must be able to have enough solar power during the day to operate the system at peak power, as well as enough stored power to maintain system operations during the night, as well as any minimal sunlight event. The scope of our project is to design a solar powered system able to operate at a peak power of 200W, to supply enough battery storage for 2 to 3 days worth of stored power while maintaining healthy battery life, to develop a means of attaching our system onto the existing concentrator's design, and to provide our client with electrical schematics and wind loading analysis to demonstrate the practicality of our design. Our proposed solar powered system consists of 10 solar panels collecting our DC power, a charge controller to regulate the voltages being outputted from the panels, 4 batteries to provide 14.4 kWh of storage, an inverter that will convert our power to 115 VAC to feed into the concentrator, and fuses where necessary to avoid dangers of electrical overload. This system has a minimum 10 year life expectancy with light maintenance required, and easy manufacturability as one cohesive product for our client.

Groundwater Quality and Availability in California and Israel

ZHICHEN LIU, JACOB RUANO, OZ SHAHAR, Yaal Lester and Frank Jacobitz

Groundwater mostly originates from the infiltration of precipitation into the ground. The water travels through pores in rocks and porous soil and is stored in groundwater aquifers, where it can be pumped for beneficial use. Roughly 20% of the world population relies on groundwater as a source of freshwater. The biggest problem with groundwater is that the consumption of groundwater is unsustainable. Groundwater has a net recharge rate of how much water it can replenish, which has many factors involved beyond human control. Groundwater is often used at a faster rate than it is able to replenish in high-populated regions, as is the case with most aquifers. Another big problem is the risk of contamination with groundwater (in this case, specifically with aquifers), especially ones underneath urban or industrial areas. One specific example of a groundwater source in California is the one located in the Central Valley. The usage of groundwater is controlled by local agencies, but not everyone in California has access to a groundwater source; this limits the accessibility of water and strains these local aquifers as reliable water sources. Israel also faces a similar situation with their groundwater sources today. The risk of contamination is considerably grave, since Israel's crop irrigation uses 40% of fresh groundwater sources (the other 60% are irrigated with reclaimed water). Therefore the goal of this project is to identify topics of concern for groundwater quality and availability in both California and Israel, and propose suitable solutions for its management and distribution.

Improving Sanitation and Temperature Accuracies of Leishmaniasis IR Wand

LEO ALBALAWI, MUNEERAH ALTERKAIT, SAM GRIFFIN, ZACHARIAH HAGAN, GABE PENCE and Subramanian Shastri

The mission our capstone project pursues is to optimize Thermosurgeries' Thermomed. Thermomed is a radio-frequency emitting device that is used to treat topical skin diseases, particularly Leishmaniasis. It accomplished this end goal by exciting the afflicted cells through RF frequencies, which in turn heat the cells to 50 degrees celsius and cause the abnormal cell to burst and die. To optimize further success of this device we were tasked with two primary goals– to improve the sanitation of the device and the accuracy of the temperature reading. To improve the sanitation of the device we are designing a disposable sheath made of RF transparent thermoplastic for the prongs that emit the RF and make contact with the patient. These disposable covers will be interchanged between each patient's use to minimize cross-contamination. We also aim to integrate a method of mechanics that makes each disposable applicator unable to be used more than once, ensuring proper use. To increase the accuracy of the device's temperature reading, we are integrating an IR sensor. The current model utilizes thermocouples to read temperature at the targeted site; however, accuracies vary due to human error as thermocouples require sufficient and proper contact with the desired area. An IR sensor with a non-permanent mount would enable us to integrate with the current thermomed design without significant obstacles; however, our team must get the signals from the IR sensor to read as if they were from a thermocouple due to the device's original design.

Glaukos

RENE BORTONI, CARLOS HERNANDEZ, MARIUS HUHNKE, ANDRES PEREZ, MELISSA SHORT and Gordon Hoople

Glaukos is a medical device company which manufactures devices for glaucoma treatments and operations. Glaukos cleans the hypodermic tubes used in operations when received by the manufacturer. The process of cleaning the tubes is time and labor intensive. The goal was to save time and labor costs associated with tube cleaning. The team set out to develop a device that would automatically wash the tube inner diameter ranging in size from 21-32 gauge. After going through the engineering design process, we identified several designs which could work. The identified design will encompass four subsystems from the point of loading the tubes into a loading tray, movement through a robotic arm, washing through the Tuohy borst hydraulic flushing block (Tbhfb), and draining into a lobed funnel system. The washing subsystem is what we call a Tuohy borst hydraulic flushing block (Tbhfb). The Tbhfb uses compression with an ACME power screw within a stepper motor on a consumable Tuohy borst gasket to create a seal around the hypodermic tube. Upon sealing the tube, the Tbhfb will use peristaltic or diaphragm pumps to transport fluid from a reservoir to the Tbhfb which will have a 30cc void. Once the individual fluids are delivered to the block, air pressure will force the fluid out of the tube after every fluid effectively washing and rinsing the tube. The key performance metrics are time of washing one tube and ensuring cleanliness. The time to wash one tube plus handling time is estimated to be 49 seconds, ensuring cleanliness will be determined by organic compound testing of known clean water output.

Autonomous Categorization of Bacteria Based on Motility

KYLEE SCHIRMER, OWEN HESS, JACOB BORELLO, REESE ADAMS, JOSEPH NELSON, Subramanian Shastri and Kent Wallace

For remote missions with limited communications, it is necessary to autonomously classify a rich mixture of many bacterial species present in samples of aqueous solutions. There is currently not an effective way to autonomously characterize bacteria based on motility. We will use the instrumentation that has been developed the previous 3 years, and focus our attention on autonomous characterization and classification of the microbes measured in the field based on their motility. We will be optimizing a system for the benchtop holographic microscope designed by former students working with JPL. Using a digital holographic microscope (DHM), we will get a series of videos of bacteria which will then be processed through pre existing software called HELM. It will be used to extract the values for the x,y, and t coordinates of the bacteria in space and mugshots out of the videos taken by the DHM. The DHM will be used in conjunction with data which JPL has already taken and labeled to optimize time use and produce higher accuracy results. We will work with software used by previous similar JPL projects, HELM, to track motile particles and differentiate life-like organisms from insensate particles. To visually confirm the data is being processed correctly, a previously built system in MATLAB was optimized to display the data taken by HELM. We will use MATLAB to crop and perform a fourier transform to the images taken by the microscope to get the height of a cell in a mugshot, the z-coordinate. After optimizing the matlab program, we will create csv dataset files that represent bacteria in terms of x, y, z, and t coordinates before updating the neural network classifier to support four features. Testing will be conducted to determine if the classifier that worked in three dimensions is still superior. Once we reach a satisfactory classification threshold of 82%, we will include more bacteria species in the dataset to train the neural network.

Lion Tracking Collars

EMMA FLOISAND, LIZZIE BANKER, MONIQUE NANG, REGHAN PETTIT, ALI ALOJAIRI and Keith McDonald

For our Capstone project, our team is tasked with engineering a tracking collar for the use of wildlife tracking in Uganda. The collar will go to the Uganda Carnivore Program, which is headed by Dr. Ludwig Siefert. Our contact at the University of San Diego is Keith Macdonald, who is the building manager of the Shiley Center for Science and Technology. Our job as engineering students is to deliver a product to Keith and the Uganda team that has the capabilities of tracking lions and leopards within Queen Elizabeth National Park. Two of these collars have been brought to USD to be evaluated so a new design for tracking can be created and implemented. The collar must be very durable and have a longer battery life than before, which will add to the overall goal to tranquilize the lions as little as possible. Tracking of the big cats within the park helps to ensure their health and safety, as well as location pinpointing for safari purposes.

Kapawi Ecolodge Electric Motor Boat Design

DAVID BARGER, JUAN CEDILLO, BRIANA REYNOSO, AMANDA TULOLO, YSABEL YU and Odesma Dalrymple

The aim of this project is to establish a boat design that incorporates the use of an electric engine for use on the Amazon River by the Kapawi Ecolodge. The Kapawi Ecolodge is an ecolodge in Ecuador that offers travel down the river to experience the beautiful rainforest setting. The ecolodge currently uses a boat with insufficient seating, stability, and gas powered propulsion. They requested for us to create a boat that is stable with seating and does not obscure the views of the surroundings while using an electric engine as a means of propulsion. The added benefit of a new, electric powered boat is that we can assist the Kapawi Ecolodge in attaining a sustainable means of operation that reduces river contamination and noise pollution. Through our research and testing during this last semester, we concluded that a boat consisting of a flat hull shape, bench seating, and outboard motor configuration would satisfy the user's needs the most. Using these boat characteristics, we promote the most amount of stability, comfort, and sustainability. Following further tests and research, we have ultimately decided that our boat building capacity was not large enough to provide the Kapawi Ecolodge with a useful end product by the end of the semester or year. During the last weeks of our semester, we have decided to take a new direction to work on the implementation of their motor and boat needs into their current boats. We decided to specifically focus on finding a way to fit their current electric motor to their current boats. Our specific goals for the rest of the year are to design and prototype a motor mount and to experiment with implementation alternatives. Upon completion of these goals, the Kapawi Ecolodge will be able to continue their ecotourism practices while traveling in a more sustainable manner to their fullest potential.

Water Filtration Through Plant Xylem

CHRISTOPHER ANGELO, JESSICA BOYER, JACK COMFORT, MORGAN HOFFMAN, SAVANNA WALTER and Frank Jacobitz

Many countries around the world, particularly those with developing economies, suffer heavily from the lack of safe drinking water. As a consequence of the lack of safe drinking water, many communities are put at risk of chemical and bacterial contamination. Uganda in particular is one of the countries that is severely affected by this deprivation. In this project, we have designed a biofilter prototype that alleviates this issue through the use of plant xylem as part of our development. Furthermore, we strived to do so in a manner that is sustainable, accessible, and culturally sensitive to people experiencing water scarcity. Regionally, the continent of Africa is experiencing harsh consequences of climate change and population growth, thus straining the local, state, and regional economic systems. There are many existing household appliances that achieve this but are not accessible to many communities due to a multitude of local, national, and global influences.

BAE Voice Controlled Bike Shifter

HENRY WILSON, HAMPTON ADAMS, JOHN ROUPHAEL, Shaw Clements and Gordon Hoople

Our project is building a prototype voice controlled handcycle gear shifter to improve the experience for cyclers with limited hand control or finger dexterity. The end users are mostly military veterans who have suffered trauma in their hands, arms, and legs. Adaptive Adventures works closely with our end user. Our proposed solution is one that has a microphone connected to the handcycle and communicates to the shifter using ANT +. We will have a display and a mount that connects to the front of the cycle and communicates with the ANT+ system. We are aiming for the product to perform its function. Using three different top level subsystems: casing, CPU, and shifter/ derailleur, we were able to detail our exact functions. ANT+ and the voice recognition module exist within the CPU subsystem. The functions of the overall system include allowing users to shift gear with their voice, indicate the current gear to the user, resist weather effects, be power cycled, indicate battery Life, support microphone component, interface with derailleur, communicate with different components, and interpret voice commands. The target user will be one with little to no hand function, so it will be extremely necessary that the shifter works with no hand movement by the end user. The user also uses the handcycle in inclement weather conditions, so it must be able to withstand rain and bumpy road conditions. We are hoping to hit an IP66 weather rating, and we will utilize ANT+ to connect the systems together.

Back to Reality: How Re:Emergence Was Built for Burning Man

YSABEL YU, Navin Rai, VALENTINA VARGAS, Chris Schafer, BRIANA REYNOSO, Tony Abelson and Gordon Hoople

The world experienced a shared detachment from reality due to the COVID-19 pandemic. Last year's research team prototyped Emergence, a structure that represents both the awkward shrinking of our worlds and our later awakening from the dream state of the pandemic. The goal of our summer research project was to take last year's prototype to adapt it to a bigger scale structure, called Re:Emergence, with a sturdier and more professional fit and finish. Re:Emergence is a 20 by 60 foot, parabolic shaped tunnel composed of 17 vertical, hexagonal gates. As our goal was to expand the design, we utilized Solidworks to make drawings of 6 additional gates. Construction then consisted of wood and metal fabrication, using mechanical engineering and machining skills. We overcame challenges resulting from multiple people working together with varying inputs. As a result, our original plan and drawings could no longer be followed. Following the completion of the structure, we took the opportunity to reflect on ways to improve this in the future. Our research allowed us to gain experience with the process of turning a design to a physical model, specifically with improvisational techniques for dealing with unexpected challenges.

Surface Water Source’s Quality and Quantity Affected by Community Proximity and Perspective

JULIANA GRIGG, KATE JORDAN, DIANA MONTOYA-HERRERA, ISKA COHEN, RONI BABADZHANOV, Yaal Lester and Frank Jacobitz

Extensive population growth and urbanization is affecting surface water quality and infrastructure across the globe. Urbanization was boosted by the advancements of infrastructure for water, which allows treatment and transport of water through large distances from their original surface water sources such as lakes, rivers, and streams. A major concern of the rapid changes experienced by urban areas is the ecological impacts on surface water due to associated anthropogenic processes. Activities such as the overconsumption and extraction of surface water have negatively affected the quality and quantity of those sources. In addition, discharge of treated wastewater may impact the quality of the water source. Prevention of overexploitation and contamination of surface water resources is typically related to community culture and available technologies. Examples of this can include community appreciation of water resources and efforts to limit water usage in households and industries, by implementing new water technologies. This project looks into the effect of knowledge and technology on the quality of surface water sources and the use of those resources. This information is used to devise a comprehensive analysis of water conservation efforts on the quality and quantity of surface waters in Southern California and Israel. The project will involve research by the University of San Diego and Azrieli College of Engineering in Jerusalem.

Simulation of the Interaction of a Laminar Boundary Layer with a Roughness Element

JACOB RYAN, Dylan Poole, Jack Comfort and Frank Jacobitz

The interaction of a laminar Blasius boundary layer developing on a flat surface with a cylindrical roughness element of small aspect ratio and a height smaller than the local boundary layer thickness is studied using the Ansys Fluent computational fluid dynamics software. This flow geometry represents roughness on the surfaces of planes or automobiles due to manufacturing limitations or dirt speckles. The simulations are compared with experiments performed in a laminar water channel by means of temperature-sensitive paint (TSP) (see J. Lemarechal et al., 2018). Two different simulations are analyzed. At first, the development of a boundary layer developing over a heated flat plate is studied without a roughness element. In this case, the simulation results for the downstream development of the surface temperature agree with those obtained from the experiments and the heat flow entering the boundary layer can be estimated. Then, the interaction of the boundary layer with a roughness element is considered. In this more complex flow, a horseshoe-shaped vortical structure develops around the roughness element. This flow structure observed in the simulation agrees qualitatively and quantitatively with the thermal footprint of the flow structure determined experimentally using TSP.

Brake Brick

PAYTON HENRY, EIMA KOZAKAI, TYSON ARAMAKI, DAVID ROCKY HIDALGO, TROY ROTTLER, Tom Lupfer and Subramanian Shastri

Over the past 10 years, the U.S. Department of Transportation has reported a 12% increase in injuries and fatalities due to a car crash, of which 8% occur via rear-end collisions. The safety of drivers and passengers in cars has long been a concern, and many companies have designed safety products, from manufacturers to after-market products. However, many of these products are designed to assist once a crash occurs, such as better air bags or automatic emergency response assistance. The 'Brake Brick' will be a stand-alone brake light system that is an additional indication that will show the degree of a car's deceleration. This system will have an LED display that corresponds to said deceleration. The LED light system will give fellow drivers optical feedback, allowing them to respond properly to the braking of the car with the brick attached. Altogether, we hope this will help to reduce the number of rear-end collisions and promote safe, aware driving.

Plant Xylem Water Filter Prototype Testing

JACK COMFORT, MORGAN HOFFMAN, SARAH HAYOUNE, Yaal Lester and Frank Jacobitz

Many countries around the world, particularly those with developing economies, suffer heavily from the lack of safe drinking water. As a consequence, many communities are put at risk of chemical and bacterial contamination. Water-borne pathogens are responsible for an estimated 485,000 deaths each year worldwide (WHO 2022). Uganda, in particular, is one of the countries that is severely affected by the lack of safe drinking water. Currently, Sub-Saharan Africa lacks the infrastructure necessary to deliver potable water to its people. One of the options to overcome the lack of central water infrastructure is the development of small household treatment devices. These devices use local material and inexpensive technologies to locally purify water. The goal of our project is to test a biofilter prototype that uses plant xylem as the primary mode of filtration. We will measure water quality metrics such as turbidity, heavy metal concentrations, the presence of waterborne bacteria, and chemical contaminants, such as arsenic and fluoride. This testing will verify the effectiveness of plant xylem as a water filter and will be completed in conjunction with students at the University of San Diego and the Azrieli College of Engineering.

Scripted Control Systems for Quantum Technologies at USD

BLAKE LINDEMEYER, ANDREW JOCKELLE, RACHELLE CHILDERS, CHRISTIAN PICOS, JOAQUIN DE CABANYES GALINDO, MATHEW GLORIANI, Venkat Shastri and Maren Mossman

The purpose of this project is to develop a scripted control system for applications in quantum technology within the Quantum Hydrodynamics Lab at University of San Diego. We are working on this project to build hardware for DAC and TTL control, develop a software interface for autonomous hardware-timed control, develop an understanding of bit management and manipulation, and implement and test the integrated control system in an R&D setting. Our objectives for this project are to propose a hardware solution for a pseudo-clock and COTS Digital Input/Output (D I/O) boards to be used in the system, build hardware and develop hardware-control software interface for the system, integrate control system into the lab environment, and to test DAC set points, ramp functions, and TTL control using existing experimental setups including feedback loops and high-inductive coils. This project allows us to develop a familiarity with automation programming and time-dependent control systems for quantum technologies, to learn how to build and develop time-keeping electronics for D I/O control, to further develop circuit design and development skills, and to gain experience working in an R&D setting. We present results based upon the above mixture of overarching systems and subsystems to support the QHL lab.

The E-Human Powered Vehicle

NATHANIEL TINH, Jason Reyna, Walker Newton, Dylan Poole, Tommy Burns, Basel Ali, Talal Abdul, Basel Alkandari and Daniel Codd

The Human Powered Vehicle Competition is an engineering event where teams build a race vehicle to compete in an endurance contest. In the years past that USD has furnished a team, the vehicles have been designed to minimize weight and focusing on rider comfort in order to improve average speed across the span of the 2.5 hour race. This has been accomplished with lighter materials and novel designs. Further improvements to achieve a higher average speed is necessary for a superior race result and to develop the school program. The goal of our research is to target several aspects of human powered vehicle design to improve average speeds obtainable via human with electrical assistance. Addressing the efficiency of the vehicle was the main focus by considering the center of gravity, aerodynamic drag, and frame geometry with regard to rider position. By analyzing previous vehicles we were able to determine a practical approach to our design - consisting of a novel cable pre-tensioned, fully faired, tadpole frame design with a direct drive internal hub motor with regenerative braking for electrical assistance. We expect our design to excel in the course environment.

Wastewater Treatment and Reuse in California and Israel

AYELET HASHAHAR KATZ, CARLOS HERNANDEZ, MATAN MAYER, TRACY JOHNSTON, DANNY ROSALES, Frank Jacobitz and Yaal Lester

Wastewater is composed of liquid and solid waste discharged from residential homes, commercial, industrial and agricultural sources. Potential problems of wastewater are typically associated with their high concentrations of organics, salts, toxic chemicals and pathogenic microorganisms. The typical wastewater treatment process is a multi-step process and is riddled with challenges such as: removing solids, biological treatment, outdated infrastructure and the inefficiency of removing recalcitrant contaminants such as pharmaceuticals, as well as pesticides, herbicides, insecticides and other chemicals of emerging concern. Israel has made many advancements in wastewater treatments and reuse that can be applied for solving many of the issues that California is presently facing. This project will focus on addressing the current issues with the California wastewater process through the lens of the water technology and experience that Israel has had with its own wastewater. Efforts will be made from both the students at the University of San Diego and the Azrieli College of Engineering in order to see this project come to fruition.

USD Torero Racing, Society of Automotive Engineers Baja Collegiate Competition

TRACY JOHNSTON, NOAH SASSMAN, AUSTIN ADZIMA, DAVID COLUMBUS, NICHOLAS REYNOLDS, SEBASTIAN PAREDES, NICHOLAS CLASSEN, ALEC HAYDEN, JASPER CADDELL, DOMENIC HULL, MATHIAS LANE, KATHERINE LONG, JON MENARD, YOUSIF ISMAEEL, THOMAS WATSON, KEITH HARRIS, NATHAN S and Daniel Codd

The Society of Automotive Engineers (SAE) Baja collegiate design series allows engineering students to design, build, and test a single-seat, four-wheel drive vehicle in multiple competitions with other universities from around the world. The students must function as a team to build an all-terrain sporting vehicle that is to be a prototype for a reliable, maintainable, ergonomic, and economic production vehicle intended for sale to the nonprofessional weekend enthusiast. This must all be completed within the SAE rule book to ensure driver safety and eliminate an unfair advantage in racing. As in real work situations, these future engineers must work together as a team to discover and resolve technical challenges during the design and manufacturing process while also addressing any business issues along the way. The 2022-2023 USD Torero Racing Baja team put an emphasis on reducing the overall weight of the vehicle to improve performance while maintaining reliability to survive the severe punishment of rough terrain presented during the competitions. This was accomplished by reducing the frame size, having a smaller set of wheels and tires, and a redesigned transmission system. There are two main scoring sections during the competition consisting of static and dynamic events, worth 320 and 680 points respectively, for a total of 1000 points total possible. The Torero team intends to compete in two competitions this year located in Wisconsin and Oregon with a goal of placing in the top 10 out of 100 colleges in both.

Business

Factors Contributing to Rising Housing Prices in Cities across the United Kingdom

SARAH HAETZEL and Alyson Ma

This paper investigates factors that contribute to median house prices in cities in the United Kingdom from year to year. Using a panel dataset, this study conducts a fixed-effects regression model to determine the impact of macroeconomic factors and housing market conditions on median house prices. The macroeconomic conditions include employment rates, interest rates, inflation, and credit availability. Housing supply will be proxied by housebuilding rate and land prices. This paper expands upon the existing literature by accounting for both household characteristics and macroeconomic conditions to highlight the importance of the both micro- and macroeconomic factors on the state of the housing market. The results will provide policy guidance on consumer expenditure and the economy.

Energy Burden as an Indicator for the Rate of Owner-occupied Housing

JACKSON LINSCOMB and Alyson Ma

This paper examines the factors that are associated with owner-occupied housing rates in Southern California cities during 2021. The data is from the United States Census Bureau and the United States Department of Energy. In addition to factors included in previous studies, such as demographic and characteristics about the real estate market as well as the local economy, this study examines the burden of energy costs on owner-occupied housing rates. It is expected that the relationship between energy burden (percent of income spent on energy costs) and the owner-occupied housing rate is negative. The model will factor in demographic, real estate market, general well-being, and economic variables to best explain the variance among entities.

Factors Affecting Urban Average Incomes

CHERYL PHAM and Alyson Ma

This paper seeks to investigate the impact of education, age, race, and gender on the incomes of urban areas. This paper employs the use of cross sectional data. It is expected that areas with a greater proportion of racial minorities are more likely to have lower average incomes.

The Impact of the Unemployment Rate on the Crime Rates for Violent and Non-violent Crimes at the State Level

CIARAN MCCORMICK and Alyson Ma

This paper investigates the effect of the unemployment rate on the crime rates of violent and non-violent crimes at the state level. Previous studies suggest a positive correlation between unemployment and crime rates using time series data from the U.S. Census at the national level. The suggested reasoning is that criminals are risk-loving and have a preference for leisure. This analysis uses cross-sectional data for the year 2019 while controlling for additional factors that may impact crime rates, such as educational attainment, average per capita disposable income, and the racial and ethnic background of the population. This model predicts that the unemployment rate has a positive relationship with the state crime rates for both violent and non-violent crimes.

Competition and its Impact on MLB Organizational Revenues

JACK LAURITANO and Alyson Ma

This paper focuses on factors that impact MLB organizational revenues. Previous studies indicate that the two major factors are team performance and market size. In addition, teams with 'star' players attract fans due to the superstar phenomenon. Thus it is expected that teams with more 'star' players will likely have higher revenues. Also, competition for viewership within an organization's city will likely decrease revenues. This competition includes other major sports teams playing in the same location, or in other entertainment options, such as outdoor activities. The results highlight directions for MLB organizations to consider to increase revenue.

Putting a Price On Nature

CAITLIN BURNS and Alyson Ma

The philosophy and logistics behind “putting a price on nature” has become an important debate as our global environment undergoes rapid deterioration. With an increased emphasis on natural capital protection, countries question how this will affect their national economy. This paper will examine whether an increased protection of natural capital will positively influence GDP; the study analyzes national GDP in relation to the natural capital protection policies in each country. The wealth and demographics of the country will also be considered, as well as personal consumption, business investments, government spending, and net exporting.

Characteristics of Accounting Fraud: Study of Audit Quality

QUINCY HAMMER and Alyson Ma

Accounting fraud is a malpractice used to alter financial statement data or account balances. The inaccuracies caused by fraud, when caught, can be detrimental to the company, hurt the reputations of accounting firms, and cause investors to lose faith in the market. External auditors are independent of the company and work to give reasonable assurance that the financial statements are free of errors. Within accounting research, the quality of an audit is often quantified by how many errors will be found within the statements after an opinion is offered. Once errors are found, the company must file a restatement in order to maintain an unqualified audit opinion, which is an auditor's judgment that the financials adhere to GAAP and are fairly presented. This study examines the relationship between audit quality and a set of independent factors, including the size of the external accounting firm, earnings before interest and tax, meeting analyst expectations, and internal control levels. We use financial restatement as a proxy for audit quality, which is measured as the number of restatements a company has made in the past year. Our sample consists of public companies in the United States that had financial restatements in 2017-2019. Financial statement fraud is not usually found by the auditor, it is turned in by an insider or whistleblower. Using this data, the SEC, AICPA, and PCAOB can create more relevant guidelines for auditors in order to catch fraud better.

The Impact of Economic Recessions on Hospital Revenue

OLIVIA CRISTANTE and Allyson Ma

This paper examines changes in total revenue of US hospitals due to major economic shocks, particularly the Great Recession and the Covid-19 Pandemic. The results shed light on the impact of a crisis on the healthcare sector. The data is from the American Hospital Association 2005-2020 Annual Survey as well as the Federal Reserve 2005-2020 Quarterly Hospital Revenue Reports. The regression model includes hospital operational variables and binary variables that indicate a recession to measure the differences in total revenue based on whether a recession occurs in each year. The 2020 Covid-19 Pandemic is expected to have a larger negative impact on total revenue than the Great Recession.

The Effects of Political Instability and Trade Policies on GDP

MATTHEW GEARY and Alyson Ma

Many countries limit or restrict trade with partners due to their political or ideological justifications. A recent example is the U.S. ban on Russian oil due to its war with Ukraine. The decision to implement politically-motivated trade restrictions varies across countries and over time. The paper examines the effects of political instability, corrupt governments, and other trade policies on their overall growth in GDP. Building on existing studies, this paper adds to the current literature by focusing on policy and corruption as factors determining trade patterns. The data includes over 150 countries ranging from 1990-2021. The expected results will show a negative correlation between political instability and closed-trade policies, and growth of GDP. The results will highlight policies that impact international trade.

Can Education Help Fight Organized Crime and Reduce Violence in Mexico?

CARLA CANALES and Alyson Ma

Mexico has been dealing with drug related violence for years, which has taken thousands of lives each year and prevented economic growth. There is existing evidence that shows that higher education levels are associated with lower crime rates, yet there are not many studies on education in developing countries known for organized crime. This paper examines a regression analysis using panel data from all 32 Mexican states across the years of 2010 to 2020 to determine the relationship between crime and education. Additional factors that impact crime will include gross state product, unemployment, tourism, median income, and state demographic characteristics. Previous studies suggest the impact of schooling varies depending on the types of criminal activities. It is expected that as education increases, there will be a reduction in crime due to an improvement in employment opportunities from the increase in human capital, which in turn increases social welfare and promotes social values that discourage criminal activities. The results provide insights for policies in education as a crime prevention strategy in Mexico.

Tourism Revenue Variability

FERNANDA NAME and Alyson Ma

This paper examines the variation of tourism revenue across countries. The main focus is to explore price changes. Additional factors considered are the number of historical landmarks, exchange rates, GDP per capita, crime rates, and whether or not a country is landlocked. The number of historical landmarks is a proxy for the history and culture of a country, which may serve as an attraction for tourists. This paper will also be exploring whether or not Influencer Marketing actually has an effect on tourism revenue. Influencer marketing is growing more and more, therefore I want to explore if influencers actually have the power of affecting the economy. Knowing what factors affect tourism revenue will help countries grow their economy by focusing on the factors that the country has to offer and what specific policies they could implement in order to increase their revenue.

Happiness and Renewable Energy

CHRISTINA SOMANOTHAM and Alyson Ma

Increasing occurrences of natural disasters, biological threats, and depletion of natural resources raises concerns about the living condition of future generations. This issue is shared across ecosystems, cultures, and economic development as communities question how these changes will impact their ability to thrive and sustain their lifestyles. This study analyzes the impact of renewable energies on a country's well-being using a happiness indicator across 150 countries. Additional factors examined include access to healthcare, GDP per capita, availability of renewables, and measures of risk.

Consumer Tendencies relating to Sustainability in the Fast Fashion Industry

DANIELA ANTON and Alyson Ma

This paper examines companies' ratings related to sustainability, particularly for fast fashion brands. The low costs of fast fashion have become an attractive purchase option for consumers, however, in more recent years, social, environmental, and economic concerns have placed sustainability at the center of research studies. It is expected that fast fashion products will continue to influence consumers to purchase from brands that are less sustainable than other brands that may incur higher prices. Factors taken into consideration include three different Fashion Transparency Indexes, Good on You rating, the Company’s yearly sales, and the age of the company. The results will shed light on whether consumers are conscious of, and take into consideration, the ethical, social, economic, or environmental issues when purchasing clothing.

Investigating the Main Factors Shaping Crime Rate in Mexico

ANDREW LANDIN and Alyson Ma

Mexico has been fighting with a violent reality for many decades. As an emerging economy, Mexico has been growing over the past decades, despite the violence and corruption prevailing in the country. Additionally, Mexico has also been struggling to reduce poverty while experiencing a shrinking middle class. As poverty increases, committing a crime for financial compensation becomes more attractive due to the reduced access to well-paying jobs. This paper focuses on the effects of economic factors that impact crime rates. These factors include average wage, unemployment rate, poverty, attitudes towards police enforcement, and state level GDP. As wage increases, the opportunity cost of committing a crime rises. Similarly, the relationship between education and crime is expected to be negative due to the increase in human capital from schooling. The results suggest policies to reduce the crime rate in Mexican states.

Central Bank Rate vs Unemployment Rate

ETHAN WU and Alyson Ma

Unemployment rate is a part of having an economy that is unavoidable, no matter what country you live in, but what makes the unemployment rate different across countries' This paper examines the relationship between the interest rate determined by the central bank and the unemployment rates in Europe, Japan, and the United States for the time period 2015-2022. We hypothesize that GDP, Federal Funds Rate, and population have a significant effect on unemployment. The results will indicate that the Federal Funds rate will have a positive relationship with unemployment. This means that we can use the federal funds rate in order to lower or raise the unemployment rate.

Differences in Death Tolls from Natural Disasters

GRAHAM WARD and Alyson Ma

As we continue to evolve and interact with our natural world, climate change is expected to intensify, changing the frequency and intensity of natural disasters. It is necessary to examine the factors that contribute to the death toll that a country experiences from a natural disaster. Determining death tolls from natural disasters consists of factors such as geography, population, socioeconomics, government, healthcare, investment, level of poverty and many more. Data is obtained from the Centre for Research on the Epidemiology of Natural Disaster's (CRED) Emergency Events Database (EM-DAT) which tracks the occurrence and death tolls from natural disasters across the world. Additional data from the World Risk Index (WRI) measures the risk of natural disasters. The focus is the relationship between death tolls and socio economic factors that impact a country's death toll due to natural disasters.

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In keeping with USD's commitment to sustainability, the 2023 Creative Collaborations abstract book will be available on the MySDMobile app and on the Office of Undergraduate Research web page.

With Gratitude

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